

HP A5159B PCI Dual Port FWD SCSI Host Bus Adapter

Service and User Guide

Edition 1



Manufacturing Part Number : A5159-96003

E0103

U.S.A.

© Copyright 2003, Hewlett-Packard Company.

Legal Notices

The information in this document is subject to change without notice.

Hewlett-Packard makes no warranty of any kind with regard to this manual, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Hewlett-Packard shall not be held liable for errors contained herein or direct, indirect, special, incidental or consequential damages in connection with the furnishing, performance, or use of this material.

Warranty. A copy of the specific warranty terms applicable to your Hewlett-Packard product and replacement parts can be obtained from your local Sales and Service Office.

Restricted Rights Legend. Use, duplication or disclosure by the U.S. Government is subject to restrictions as set forth in subparagraph (c) (1) (ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.227-7013 for DOD agencies, and subparagraphs (c) (1) and (c) (2) of the Commercial Computer Software Restricted Rights clause at FAR 52.227-19 for other agencies.

HEWLETT-PACKARD COMPANY
3000 Hanover Street
Palo Alto, California 94304
U.S.A.

Use of this manual and flexible disk(s) or tape cartridge(s) supplied for this pack is restricted to this product only. Additional copies of the programs may be made for security and back-up purposes only. Resale of the programs in their present form or with alterations, is expressly prohibited.

Copyright Notices. ©copyright 1983-2003 Hewlett-Packard Company, all rights reserved.

Reproduction, adaptation, or translation of this document without prior written permission is prohibited, except as allowed under the copyright laws.

©copyright 1979, 1980, 1983, 1985-93 Regents of the University of California

This software is based in part on the Fourth Berkeley Software Distribution under license from the Regents of the University of California.

©copyright 1980, 1984, 1986 Novell, Inc.

©copyright 1986-1992 Sun Microsystems, Inc.

©copyright 1985-86, 1988 Massachusetts Institute of Technology.

©copyright 1989-93 The Open Software Foundation, Inc.

©copyright 1986 Digital Equipment Corporation.

©copyright 1990 Motorola, Inc.

©copyright 1990, 1991, 1992 Cornell University

©copyright 1989-1991 The University of Maryland

©copyright 1988 Carnegie Mellon University

Trademark Notices UNIX is a registered trademark of The Open Group.

X Window System is a trademark of the Massachusetts Institute of Technology.

MS-DOS and Microsoft are U.S. registered trademarks of Microsoft Corporation.

OSF/Motif is a trademark of the Open Software Foundation, Inc. in the U.S. and other countries.

1. HP A5159B Adapter Overview

About the A5159B Adapter	13
Parts	14
Features	15
System Requirements	16
Supported HP Servers and Workstations.....	17

2. Installing the A5159B Adapter

Preparing for Installation	21
Handling the A5159B Adapter	22
Looking at Adapter Installation	23
Install Using OLAR (HP-UX 11i).....	23
Install/Replace with System Powered Down.....	27
Connecting SCSI Peripheral Devices	29
Terminating the A5159B Adapter.....	32
Setting SCSI IDs	35
Verifying Installation.....	38
Using the EFI Flash Utility	40
Features.....	40
Description	40
Preparation	40
Menu Driven Mode	41

3. Troubleshooting

General Procedure	47
Checking SCSI Bus Compatibility	48
Checking SCSI Bus Compatibility for HP A5159B Host Bus Adapters Installed In PA-RISC Based Systems	49
The SCSI Command	50
Checking SCSI Bus Compatibility for HP A5159B Host Bus Adapters Installed In Itanium, Based Systems	54
Using Support Tools Manager (STM)	58
Contacting Your Hewlett-Packard Representative	59

A. SCSI Sense Codes

Interpreting the SCSI Sense Codes	62
---	----

B. Regulatory Information

Contents

Regulatory Statements	78
FCC Statement (For U.S.A. Only)	78
IEC Statement (Worldwide)	78
DOC Statement (Canada)	78
Spécification ATI Classe A (France	79
VCCI Statement (Japan)	79
Declaration of Conformity	80

Tables

Table 1-1. A5159B Supported Servers and Workstations	17
Table 2-1. Important Terms	24
Table 2-2. A5159-60101- Default Attribute Values	27
Table 2-3. SCSI Bus Widths and Speeds.	29
Table 2-4. Maximum SCSI Bus Lengths.	30
Table 2-5. Record of SCSI IDs	37
Table A-1. SCSI Status Codes	63
Table A-2. SCSI Sense Keys	64
Table A-3. SCSI Additional Sense Code/Qualifier Code Pairs.	65

Tables

Figures

Figure 1-1. The A5159B PCI Ultra HVD SCSI Host Bus Adapter 13
Figure 2-1. Termination Jumpers 33
Figure B-1. Declaration of Conformity 80

Figures

1 HP A5159B Adapter Overview

This chapter contains the following sections that describe the HP A5159B PCI Dual Port FWD SCSI host bus adapter (HBA):

- “About the A5159B Adapter” on page 13.

- “Parts” on page 14.
- “Features” on page 15.
- “System Requirements” on page 16.
- “Supported HP Servers and Workstations” on page 17

About the A5159B Adapter

The A5159B PCI Dual Port Fast/Wide/Differential (FWD) SCSI host bus adapter is a PCI (peripheral component interconnect) controller card that provides an interface between HP servers or workstations and SCSI storage devices. The adapter supports bootable devices and can be used with disk drives, tape drives, and other SCSI devices.

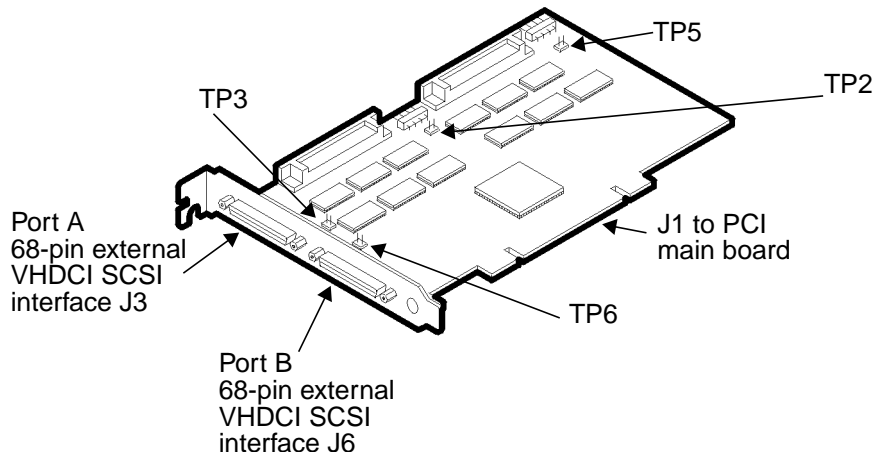
NOTE

The A5159B adapter is a High Voltage Differential (HVD) type and cannot support single-ended (SE) mechanisms.

This guide is for qualified personnel who maintain or service HP servers or workstations. Installing the adapter requires proficiency in both hardware configuration and software administration.

Figure 1-1 below is a drawing of the A5159B adapter.

Figure 1-1 The A5159B PCI Ultra HVD SCSI Host Bus Adapter



Parts

The A5159B package contains the following items:

- A5159B PCI to Ultra SCSI host bus adapter (HP part number A5159-60101).
- ESD kit (HP part number A3024-80004).
- *A5159B PCI Dual Port FWD SCSI Host Bus Adapter Service and User Guide* (HP part number A5159-96003).

Features

The A5159B adapter has the following features:

- Installs into one standard PCI slot.
- Includes two identical SCSI ports.
- Includes two 68-pin, very high density cable interconnect (VHDCI) SCSI connectors.
- Supports boot on all supported HP servers and workstations, see Table 1-1 on page 17.
- Can be connected to an external storage device.
- Provides automatic termination and term power.
- Self-resetting, current-limiting device.
- Supports asynchronous and synchronous transfer modes.
- Supports synchronous SCSI data transfer rates:
 - Wide and Ultra SCSI (40 Mbytes/sec).
 - Ultra SCSI (20 Mbytes/sec).
 - Wide and Fast SCSI (20 Mbytes/sec).
 - Fast SCSI (10 Mbytes/sec).
 - Narrow (5 Mbytes/sec).
- Supports differential mode only.
- Supports up to 30 SCSI devices (two SCSI IDs reserved for controller).
- Supports logical unit numbers (LUNs) 0-7.
- Supports bus master DMA.

System Requirements

The system must have an available PCI slot and a supported operating system. For Itanium® based systems, the appropriate EFI system firmware version must be installed. For more information about supported systems and operating systems, see Table 1-1 on page 17.

NOTE

Before installation and use of the A5159B card, the appropriate EFI system firmware version for rx56xx and rx2600 servers, as well as zx2000 and zx 6000 workstations, is required.

For HP rx2600, zx2000 or zx6000 systems, the system firmware revision must be 1.80 or greater to support EFI on the A5159B SCSI host bus adapter. Earlier system firmware releases do not contain a patch which is necessary for EFI to function properly.

For HP rx56XX systems, the system firmware revision must be 2.11 or greater to support EFI on the A5159B SCSI host bus adapter. Earlier system firmware releases do not contain a patch which is necessary for EFI to function properly.

Supported HP Servers and Workstations

Table 1-1 below shows the HP servers and workstations the A5159B adapter is supported on.

Table 1-1 **A5159B Supported Servers and Workstations**

HP Servers and Workstations	HP-UX Operating System	OLAR Support
rp24xx (A400/A500)	11.0 & 11i v1	No
rp54xx (L-Class)	11.0 & 11i v1	Yes
rp7400 (N-Class)	11.0 & 11i v1	Yes
rp7410	11i v1	Yes
rp8400	11i v1	Yes
Superdome	11i v1	Yes
rx2600	11i v1.6	No
rx5670	11i v1.6	No
zx2000	11i v1.6	No
zx6000	11i v1.6	No

Note that the maximum number of SCSI HBAs you can install in any HP server or workstation is equal to the maximum number of corresponding card slots. For example, if you are installing SCSI PCI HBAs and the server has four PCI card slots, you can install four SCSI PCI HBAs in that server.

2

Installing the A5159B Adapter

This chapter contains the following sections that describe how to install the A5159B adapter:

- “Preparing for Installation” on page 21.

- “Handling the A5159B Adapter” on page 22.
- “Looking at Adapter Installation” on page 23.
- “Connecting SCSI Peripheral Devices” on page 29.
- “Terminating the A5159B Adapter” on page 32.
- “Setting SCSI IDs” on page 35.
- “Verifying Installation” on page 38.

Preparing for Installation

Installing the host bus adapter requires disassembly of some server or workstation components. Before beginning installation, see the HP system user manual for detailed instructions on how to install host bus adapters in the PCI slots.

You will need the following things:

- ✓ One HP A5159B SCSI adapter.
- ✓ One grounding (ESD) wrist strap.
- ✓ Any other tools needed for installing components in an HP system (for example, screwdrivers); see the system's documentation.

Handling the A5159B Adapter

The host bus adapter is packaged with an ESD kit, which contains materials to prevent damage from static electricity during installation.

CAUTION

The adapter is highly susceptible to damage by electrostatic discharge during installation and routine maintenance procedures. Do not handle circuit boards without wearing a wrist strap fastened to a good earth ground or to the system chassis.

While you are installing the A5159B adapter, please follow these precautions:

- ✓ Keep the adapter in its shielded antistatic bag until you are ready to install it.
- ✓ Use a wrist strap or other ESD protection. Wrap the strap around your wrist and attach the copper end to a metal portion of the computer frame.
- ✓ Avoid working in carpeted areas.
- ✓ Gently place the adapter, printed circuit board (PCB) side down, on an antistatic work surface pad.
- ✓ Hold the adapter only by its sides or cover plate. Do not touch any components on the printed circuit board assembly (PCBA).
- ✓ Do not use any test equipment to check the components on the PCB.
- ✓ Do not bump, jar, or drop the adapter. Do not place other objects on top of the adapter.
- ✓ Transport the adapter in its shielded bag in an appropriate shipping container. Do not put other materials in the bag with the adapter.

Looking at Adapter Installation

Installation can be performed in two ways:

- Power down the system and then add or replace the SCSI HBA. Check the hardware manual for the system you are installing the SCSI HBA in for details on adding or replacing PCI I/O cards.
- Use the OLAR (On Line Add/Replace) capability (HP-UX 11i)

The method you choose will depend on your situation and requirements.

Install Using OLAR (HP-UX 11i)

The letters O, L, A and R stand for On Line Addition [and] Replacement. This refers to the ability of a PCI I/O card to be installed (replaced or added) in an HP-UX computer system designed to support this feature without the need for completely shutting down, then re-booting the system or adversely affecting other system components. The system hardware uses the per-slot power control combined with operating system support in HP-UX 11i to enable this feature.

IMPORTANT

Certain “Classes” of hardware are not intended for access by users. At this time this includes V-Class and Superdome systems. HP recommends that these systems only be opened by a qualified HP Engineer. Failure to observe this requirement can invalidate any support agreement or warranty to which the owner might otherwise be entitled.

Important Terms and Concepts

The addition or replacement of an OLAR-compatible card may be done in either one of two ways:

1. Using the SAM utility.
2. Issuing command-line commands using `rad`.

For detailed information about the use of either of these two procedures, please refer to the following document:

Configuring HP-UX For Peripherals, HP Part Number B2355-90698

This document can be ordered from HP, or you can view, download and print it from the following web site: www.docs.hp.com

Table 2-1 **Important Terms**

Term	Meaning
OLAR	All aspects of the OLAR feature including On-line Addition (OLA) and On-line Replacement (OLR).
Power Domain	A grouping of 1 or more interface card slots that can be powered on or off as a unit. (NOTE: Multi-slot power domains are not currently supported)
target card / target card slot	The interface card which will be added or replaced using OLAR, and the card slot in which it resides.
affected card / affected card slot	Interface cards and the card slots in which they reside, and which are in the same power domain as the target slot.

IMPORTANT

In many cases, other interface cards and slots within the system are dependent upon the target card. For example:

If the target card is a multiple-port card, suspending or deleting drivers for the target card slot also suspends individual drivers for the multiple hardware paths on that card).

During a card replacement operation, SAM performs a *Critical Resource Analysis*, which checks all ports on the target card for critical resources that would be temporarily unavailable while the card is shut down.

Planning and Preparation

SAM will, generally, prevent you from performing OLAR procedures that would adversely affect other areas of the server. Refer to *Configuring HP-UX For Peripherals*, HP Part Number B2355-90698 for detailed information.

Critical Resources Because power to the slot must be off when the old card is removed and the new card is inserted, the effects of shutting down the card's functions must be carefully considered.

This is particularly important if there is no on-line failover or backup card to pick up those functions. For example:

- Which mass storage devices will be temporarily disconnected when the card is shut down?
- Will a critical networking connection be lost?

A critical resource is one that would cause a system crash or prevent the operation from successfully completing if the resource were temporarily suspended or disconnected. For example, if the SCSI adapter to be replaced connects to the unmirrored root disk or swap space, the system will crash when the card is shut down.

During an OLAR procedure, it is essential to check the targeted card for critical resources, as well as the effects of existing disk mirrors and other situations where a card's functions can be taken over by another card that will not be affected.

Fortunately SAM performs a thorough critical resource analysis automatically, and presents options to you based on its findings. If you determine that critical resources *will* be affected by the procedure, you should replace the card when the server is off-line.

If you must take action immediately, you can use `rad` to attempt an on-line addition of a backup card and deletion of the target card.

Card Compatibility

On-Line Addition (OLA). When on-line adding an interface card, the first issue that must be resolved is whether the new card is compatible with the system. Each PCI slot provides a set amount of power. The replacement card cannot require more power than is available.

The card must also operate at the slot's bus frequency. A PCI card must run at any frequency lower than its maximum capability; however, a card that operated at a maximum of 33 MHz would not work on a bus running at 66 MHz. `rad` provides information about the bus frequency and power available at a slot, as well as other slot-related data.

On-Line Replacement (OLR) When on-line replacing an interface card, the replacement card must be identical to the card being replaced or at least be able to operate using the same driver as the replaced card. This is referred to as *like-for-like* replacement and should be adhered to because using a similar but not identical card may cause unpredictable results. For example, a newer version of the target card which is identical in terms of hardware may contain an updated firmware version that could potentially conflict with the current driver.

The PCI specification allows a single physical card to contain more than one port. A single-port SCSI bus adapter can not be replaced by a dual-port adapter, even if the additional port(s) on the card are identical to the original SCSI bus adapter.

When the replacement card is added to the system, the appropriate driver for that card must be configured in the kernel before beginning the operation. SAM ensures the correct driver is present. (In most cases, the replacement card will be the same type as a card already in the system, and this requirement will be automatically met.) If you have any question about the driver's presence, or if you are not certain that the replacement card is identical to the existing card, you can use `ioscan` together with `rad` to investigate.

- If the necessary driver is not present and the driver is a dynamically loadable kernel module (DLKM), you can load it manually. Refer to the section "Dynamically Loadable Kernel Modules" in Chapter 2 of the document: *Configuring HP-UX For Peripherals*, HP Part Number B2355-90698 for more information.
- If the driver is static and not configured in the kernel, then the card cannot be On-line Added. The card could be physically inserted on-line, but no driver would claim it.

OLA/R Restrictions for the A5159B

The HBA has some restrictions in the OLA/R procedure. These restrictions are explained below.

The restrictions are necessary because the SCSI attributes of initiator ID and speed cannot be changed online for this HBA. They can be changed only in the **Processor Dependent Code (PDC)** at the **Boot Console Handler (BCH)** prompt; this means rebooting the system if it is not already at the BCH prompt.

OLA of A5159-60101 The HBA can be online added *only* if the attribute values of initiator ID and speed are usable in your SCSI configuration. These values will be set to the current PDC values (if any) or be defaulted to the new HBA's values (see Table 2-2).

Table 2-2 **A5159-60101- Default Attribute Values**

Attribute	Default Value
Initiator ID	7
Speed	Ultra2
Auto Termination	Controlled by jumper settings

If these attributes are not acceptable, you must reboot the system to access the BCH prompt and then change the values in the PDC.

OLR of A5159-60101 The A5159-60101 can be Online Replaced without special considerations. See the *Configuring HP-UX Peripherals* manual for the steps that are necessary to OLR this HBA.

Install/Replace with System Powered Down

Check the manual supplied with the server to perform the following installation:

- Step 1.** Shut down the operating system.
- Step 2.** Power off the system and disconnect the power cord and cables.
- Step 3.** Access the back of the server cabinet following the instructions in the server documentation. Refer to the server documentation for instructions on disassembling the server and installing host bus adapters.

- Step 4.** Locate the card separator/extractor slot where you intend to install the adapter.
- Step 5.** Remove the blank panel aligned with the PCI slot you intend to use. If the blank panel has a bracket screw, save it for reuse during the installation.
- Step 6.** Remove the adapter from the package and verify that it is not damaged.
- Step 7.** Following the instructions in the server manual, insert the adapter into an available PCI slot.

The adapter is keyed to be inserted in only one way. The components on the adapter may face the opposite way from other boards in the system.

- Step 8.** Verify that the connectors on the adapter and the bus converter are aligned properly and firmly seated. The card's bracket should fit where the blank panel was removed. Secure the bracket with the bracket screw from the blank panel, if there is one. Note that, for N-Class systems, a screw is *not* used to secure the card.
- Step 9.** Connect peripheral devices and terminate the SCSI bus.
- Step 10.** Set the SCSI ID, if needed.

The default SCSI ID is 7. To change this to a different address for High Availability (HA) applications, you must use the Boot Console Handler. There are no SCSI address switches or jumpers. You must invoke the appropriate commands in the SCSI section of the BCH and change the address electronically to whatever is required for the HA configuration being used.

- Step 11.** Reassemble the server.
- Step 12.** Restart the system.

Connecting SCSI Peripheral Devices

Connect multiple SCSI devices by chaining them together with shielded 68-pin VHDCI to 68-pin HD cables. The connectors on these cables are keyed to ensure proper pin-1 to pin-1 registration. Refer to the peripheral manual for instructions on attaching SCSI cables. Peripheral storage devices are normally shipped with the required SCSI cables.

Table 2-3 below shows the SCSI bus widths and speeds as that have been established by the SCSI Trade Association (STA).

Table 2-3 **SCSI Bus Widths and Speeds**

Type ^a	SCSI Bus Width (in Bits)	SCSI Bus Speed Maximum Data Rate (in Mbytes/Second)
SCSI-1	8	5
Fast SCSI	8	10
Fast Wide SCSI	16	20
Ultra SCSI	8	20
Wide Ultra SCSI	16	40
Ultra2 SCSI	8	40
Wide Ultra2 SCSI	16	80

- a. Absence of the word “Wide” means an 8-bit bus width. Using the term “Narrow” is also acceptable to avoid ambiguity.

You can connect up to eight SCSI, Fast SCSI, and Ultra SCSI devices on a single-ended Ultra SCSI bus if they are evenly spaced on a 1.5 m Ultra 2 SCSI cable (0.19 m between devices).

You can connect up to four devices if they are evenly spaced on a 3 m Ultra SCSI cable (0.75 m between devices). The single-ended SCSI bus must not exceed 3 m (total internal and external cable lengths) even with fewer than four devices.

For Low Voltage Differential (LVD) applications, you can connect up to 16 devices if they are evenly spaced on an Ultra SCSI cable (0.19 m minimum between devices).

Table 2-4 below shows the maximum bus length for each of the SCSI types.

Table 2-4 Maximum SCSI Bus Lengths

Type	Maximum Bus Length (in Meters) ⁽¹⁾			Maximum Devices
	Single-ended (SE)	Low Voltage Differential (LVD)	High Voltage Differential (HVD)	
SCSI-1	6	12.5	25	8
Fast SCSI	3	12.5	25	8
Fast Wide SCSI	3	12.5	25	16
Ultra SCSI	1.5	12.5	25	8
Ultra SCSI	3	-	-	4
Wide Ultra SCSI	-	12.5	25	16
Wide Ultra SCSI	1.5	-	-	8
Wide Ultra SCSI	3	-	-	4
Ultra2 SCSI	(2)	12.5	(2)	8
Wide Ultra2 SCSI	(2)	12.5	(2)	16

Table 2-4 Maximum SCSI Bus Lengths (Continued) (Continued)

Type	Maximum Bus Length (in Meters) ⁽¹⁾			Maximum Devices
	Single-ended (SE)	Low Voltage Differential (LVD)	High Voltage Differential (HVD)	
<p>⁽¹⁾This parameter can be exceeded in point-to-point and engineered applications.</p> <p>⁽²⁾Single-ended and High Voltage Differential are not defined at Ultra2 speeds.</p>				

Terminating the A5159B Adapter

The A5159B adapter has four sets of termination pins, labeled TP2, TP3, TP5, and TP6; they are normally open. TP3 and TP6 are near the bulkhead connectors for Channel A and Channel B, respectively. TP2 and TP5 are along the top edge of the adapter, near the internal connectors. The labels for TP2 and TP5 can be hard to see, because they might be obscured underneath the shorting jumpers. TP2 is in the center of the adapter, next to markings that say, “J4” and “Channel A.” TP5 is near the edge of the adapter opposite the bulkhead, next to markings that say, “J7” and “Channel B.”

The pin sets are associated with the channels as follows:

- Channel A: TP2 and TP3
- Channel B: TP5 and TP6

TIP

The connectors labeled J4 and J7 are not used.

There is a pin set labeled TP1 on the bottom edge of the adapter, near the PCI connector. This pin set is not used. Leave the jumper for this pin set in the factory default setting (open), where the pins are *not* shorted together.

When the pin sets are in the open state, the A5159B adapter provides *automatic termination when a SCSI cable is connected to the connector*.

When you use the A5159B adapter in High-Availability (HA) applications (such as MC/ServiceGuard) *and* it must be in the middle of the bus, you must disable the adapter’s termination.

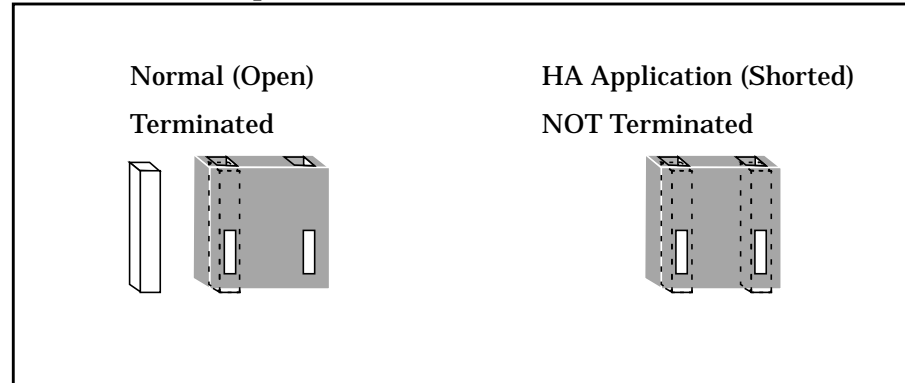
NOTE

When you use the adapter in HA applications that use two SCSI HBAs (such as MC/ServiceGuard) and it must be in the middle of the bus, you will need to change the adapter’s SCSI ID (for example, from 7 to 6). Each device on the bus must have a unique ID. See “Setting SCSI IDs” on page 35.

To disable the adapter's termination, move the jumper from its normal position (on only one of the pins in the pair) to its shorted position (jumping both pins in the pair). See Figure 2-1 below.

Figure 2-1

Termination Jumpers



Shorting these pins together causes automatic termination to be defeated. Some other SCSI device (for example, a disk, disk array, or other HBA, as required) must now provide the termination for the bus.

IMPORTANT

You cannot set the auto termination feature independently for the internal and external *connectors*. However, you can set the auto termination state of each *channel* independently of the other channel. If you want to change the state of the auto termination feature, then *you must change the jumpers on both sets of pins at the same time*.

NOTE

V-Class systems use a pass-through termination cable and will, therefore, have the shunts/jumpers in the disabled position from the factory for any of the adapters they might use (currently, the A5159B only).

If you need an additional terminator for connecting directly to the A5159B HBA, the appropriate terminator is HP part number 5021-1120 (VHDCI HVD terminator). If you need an additional terminator for

connecting to a peripheral on the end of the SCSI bus, order the appropriate terminator needed for attaching to the peripheral (see the peripheral's documentation for more information).

Setting SCSI IDs

You must assign the SCSI host bus adapter and each SCSI device a separate SCSI ID (0 through 15 for a 16-bit SCSI bus). The device's priority on the SCSI bus is determined by the device's SCSI ID. The order of SCSI ID priorities (from highest to lowest) is 7, 6, 5, 4, 3, 2, 1, 0, 15, 14, 13, 12, 11, 10, 9, and 8. A device with SCSI ID 7 has the highest priority, and one with SCSI ID 8 has the lowest.

When you are assigning SCSI IDs, we recommend you give the SCSI host bus adapter higher priority than the other SCSI devices on the bus. SCSI ID 7 is the preset SCSI ID for the A5159B SCSI host bus adapter (giving it the highest priority on the SCSI bus). Set each of the other SCSI devices on the bus to one of the remaining SCSI ID's.

For a multi-initiator (High Availability [HA]) configuration—where multiple SCSI host bus adapters are connected to the same SCSI bus—the SCSI host bus adapter that carries the most traffic should be assigned a SCSI ID of 7 (giving it the highest priority), then you *must* change the SCSI ID of each of the remaining SCSI host bus adapter's on the bus from the preset setting (7), to the next highest priority remaining SCSI IDs (e.g. 6, 5, 4... and so on).

If you plan to boot your system from a hard disk drive on the SCSI bus, you should assign that drive the next highest priority unassigned SCSI ID. If there is only one SCSI host bus adapter (SCSI ID = 7), the hard disk drive would be assigned a SCSI ID of 6. If there are multiple SCSI host bus adapters, the hard disk drive would be assigned the next highest priority SCSI ID available after all of the SCSI host bus adapters have been assigned higher priority SCSI IDs.

To change the A5159B host bus adapter's SCSI ID, refer to “Checking SCSI Bus Compatibility” on page 48.

The peripheral device SCSI IDs are usually set with jumpers or a switch on the peripheral. Refer to the peripheral manufacturer's instructions to determine the ID of each device and how to change it.

IMPORTANT

You *must* have *no* duplication of SCSI IDs on a SCSI bus—the system will hang or crash if duplicate SCSI IDs are on the bus.

Setting SCSI IDs

Make any necessary changes to the SCSI IDs and record the IDs for future reference. You can use Table 2-5 below to keep a record of the IDs

Table 2-5 **Record of SCSI IDs**

SCSI ID	SCSI Device
15	
14	
13	
12	
11	
10	
9	
8	
7	
6	
5	
4	
3	
2	
1	
0	

Verifying Installation

After installing the adapter and attaching peripheral devices, verify that all components are working. Refer to your system documentation for information on verifying operation.

HP 9000

- Step 1.** To verify that the adapter is correctly installed, execute the following command:

```
ioscan -f
```

The `ioscan` output could look like this:

```
ext_bus 0 0/0/0 c720 CLAIMED INTERFACE Ultra wide SCSI
```

The third column represents the hardware path of the slot the adapter is installed in. For information about the `ioscan` command, refer to your operating system reference manual or the `ioscan` man page.

- Step 2.** Verify that the adapter and driver display.
- Step 3.** Verify that the devices you attached to the adapter display.

HP e3000 Assume an rp7400 (N-Class) system with an I/O card being added to slot #12, we will expect paths 1/0/0/0 and 1/0/0/1 to be returned for our card.

Step 1. From BCH menus:

```

-----
-Command          Description
-----
ALL              Display all system information
...
IO            Display I/O interface information
...
-----
Information Menu: Enter command > io

I/O MODULE INFORMATION

          Path  Slot
          (dec) Number  HVERSION  SVERSION  Vers
-----
System bus adapter  0
Local bus adapter  0/0  Built_In  0x7820    0xa00    0x0
Local bus adapter
...
Local bus adapter  1/0  12      0x7820    0xa00    0x0
...
PCI DEVICE INFORMATION

          Path          Vendor  Device  Bus  Slot
          (dec)         Id      Id      #    #
          -----
Ethernet cntlr  0/0/0/0  0x1011  0x19    0    Built_In
SCSI bus cntlr  0/0/1/0  0x1000  0xc     0    Built_In
SCSI bus cntlr  0/0/2/0  0x1000  0xf     0    Built_In
SCSI bus cntlr  0/0/2/1  0x1000  0xf     0    Built_In
Comp. ser cntlr 0/0/4/0  0x103c  0x1048  0    Built_In
Comp. ser cntlr 0/0/5/0  0x103c  0x1048  0    Built_In
SCSI bus cntlr  1/0/0/0  0x1000  0xf     128  12
SCSI bus cntlr  1/0/0/1  0x1000  0xf     128  12
Information Menu: Enter command >main
Main Menu: Enter command or menu > sea 1/0/0/0
Searching for potential boot device(s) - on Path 1/0/0/0

This may take several minutes.
To discontinue search, press any key (termination may not be immediate).
  Path#  Device Path (dec)  Device Path (mnem)  Device Type
  -----
  P0     1/0/0/0.6          intscsia.6          Random access media
Main Menu: Enter command or menu >

```

Using the EFI Flash Utility

If you are installing the A5159B SCSI host bus adapter in an Itanium® based system, there is an Extended Firmware Interface (EFI) flash utility that can be used to verify the firmware version, or to flash and save firmware images onto the A5159B host bus adapter. This EFI flash utility, as described below, is supported on HP A5159B SCSI host bus adapters that are based on the **53C876E** LSI Logic SCSI chip.

Features

- Supports host bus adapter (HBA) selection for updating
- Displays the firmware version on an HBA or in a firmware image file
- Supports a menu driven mode

Description

This utility allows the user to update the HBA flash memory with the LSI Logic EFI driver. New versions of these images are released periodically. Your HBA must have a flash memory to use this utility. **WARNING:** Do not attempt to use this utility to flash any binaries other than the EFI option ROM images.

The EFI utility's executable file name is `EFI8XXFL.EFI`. This file, and any firmware image files you need, should be stored on a diskette or CD-ROM. These files should not be stored on a hard disk (If the flash fails, there is no way to recover and the hard disk may not be accessible).

The EFI utility should be executed from a diskette or CD-ROM. For EFI based systems without a floppy diskette drive, burning the EFI utility and other firmware images onto a CD-ROM will allow proper execution, but with reduced functionality. In this situation, the user will not be able to save an image of the flash memory to the CD-ROM.

Preparation

At power up of EFI enabled systems, the diskette or CD-ROM containing the EFI utility needs to be in the drive during boot to allow for device mapping. The EFI utility and firmware image files will be

located in the root directory, or in a subdirectory, on the diskette or CD-ROM.

Boot the system to the EFI shell prompt. The floppy diskette drive or CD-ROM drive should appear in the list of mapped devices as: fs0

In systems with a floppy drive, change to this device by typing: fs0:

Menu Driven Mode

If the EFI utility and firmware image files are located in the root directory, enter the efi8xxfl command at the prompt as illustrated below. Otherwise, cd to the directory these files are located in and continue.

```
fs0:\> efi8xxfl
```

The following main window screen appears:

Choice	Vendor ID	Device ID	Bus	Device	Func	Flash Part
1	0x1000	0x000F	0x09	0x02	0x00	Am29F010
	LSI Logic, Inc. 53C875/53C876 Ultra-Wide SCSI					
2	0x1000	0x000F	0x09	0x02	0x01	Am29F010
	LSI Logic, Inc. 53C875/53C876 Ultra-Wide SCSI					
3	0x1000	0x0021	0xC0	0x01	0x00	AT29C010
	LSI Logic, Inc. SYMC1010 Ultra160 66Mhz SCSI					
4	- Refresh					

Which chip/adapter (0 to quit)?

The main window allows the user to choose which SCSI chip the path to the flash memory will pass through to perform the selected tasks. Dual channel cards will have two entries displayed on this screen, one for each SCSI chip.

In the example above, the system has two SCSI HBAs, one on bus 0x09, the other on bus 0xC0.

The HBA on bus 0xC0 is a single channel HBA with flash memory part number AT29C010.

The HBA on bus 0x09 is a dual-channel HBA (func 0x00 and func 0x01) with flash memory part number Am29F010.

Since both channels of a dual channel board share the same flash memory, only one of the paths needs to be chosen. No harm will be done if separate updates are done through both paths, but be aware that each update overwrites the existing contents of the flash memory.

The "53C875 / 53C876" and "SYMC1010" designations in the lines that begin "LSI Logic, Inc.", indicate that those devices use the 53C876E and 53C1010 LSI SCSI chips respectively. If a device did not contain an LSI Logic SCSI chip that is supported by this EFI utility, the lines listing the chip numbers would not appear in the display. The HP A5159B SCSI HBA is based on the LSI Logic 53C876E SCSI chip. The other HBA in the example is an HP A6828A single channel ultra 160 SCSI HBA, which is based on the LSI Logic 53C1010 SCSI chip.

At the "Which chip/adaptor (0 to quit)?" prompt, enter the "Choice" number that corresponds to the SCSI chip associated with the flash memory you want to update, as illustrated in the following example where chip 1 is selected:

```
Which chip/adaptor (0 to quit)? 1
```

The following menu will be displayed:

```
LSI Logic Corporation EFI53C8xx/53C1010FLASHUtility.  
EFI8XXFL-1.01.10 (10.16.2002)  
Copyright (c) 2002 LSI Logic Corporation. All rights reserved.  
*****  
  
FLASH  
a - Identify Flash Image  
b - Download New Flash Image  
c - Upload Current Flash Image to a File  
d - Erase Entire Flash Part  
  
MISC  
z - Change Current PCI chip/adaptor  
q - Quit
```

Selection:

The banner at the top of the option menu displays the version of the EFI update utility (1.01.10 in this example) and the release date (10.16.2002 in this example).

The details on each of the menu choices are as follows:

a **Identify Flash Image** Shows the version number of the image in the flash memory associated with the currently selected chip or the image contained in the firmware image file.

b **Download New Flash Image** Overwrites the flash memory associated with the currently selected chip with a new firmware image file. The user will be queried for a file name.

Note: The EFI utility will not flash an image that exceeds the capacity of the flash memory on the selected HBA. Instead a warning message will be displayed.

c **Upload Current Flash Image to a File** Saves the image from the flash memory associated with the currently selected chip to a file. The user will be queried for a file name.

d **Erase Entire Flash Part** Erases the entire flash memory associated with the currently selected chip. Once the flash memory has been erased, option b (above) must be executed before the HBA will be able to function in the boot sequence.

Installing the A5159B Adapter
Using the EFI Flash Utility

3 Troubleshooting

The A5159B adapter is a single field-replaceable unit (FRU) and does not contain any field-serviceable parts. Troubleshooting procedures described in this chapter are limited to verifying that the adapter is operational and that a valid connection is established.

This chapter contains the following sections that describe how to troubleshoot the A5159B adapter:

- “General Procedure” on page 47.
- “Checking SCSI Bus Compatibility” on page 48.
- “Using Support Tools Manager (STM)” on page 58.
- “Contacting Your Hewlett-Packard Representative” on page 59.

General Procedure

The A5159B adapter is a single field-replaceable unit (FRU) and does not contain any field-serviceable parts. Troubleshooting procedures described in this section are limited to verifying that the adapter is operational and a valid connection is established.

In general, follow these steps to troubleshoot the A5159B adapter:

Step 1. Check the connection.

Make sure that the correct cable is used, connected, and operating properly and that there are no bent pins in any of the connectors.

Step 2. Check SCSI bus compatibility.

Ensure transfer rate compatibility with the attached devices using the SCSI boot menu command.

Step 3. Check the adapter.

Inspect the adapter to make sure it is seated properly in the PCI bus slot. If necessary, power down the system, reseal the adapter, and restart the system.

Step 4. Run diagnostics.

If a visual inspection of the adapter and cable does not reveal any problems, or if an action taken as a result of the inspection does not produce a working adapter, you may want to run diagnostics to determine whether the adapter can communicate and respond to PCI bus instructions. Diagnostics are described in the next section.

If diagnostics determine that the adapter is defective, you must replace it. Contact your local Hewlett-Packard customer representative or call the HP Response Center.

Checking SCSI Bus Compatibility

To ensure compatibility between the SCSI controller and SCSI devices, commands have been provided to display and select appropriate SCSI bus parameters including SCSI ID's.

The procedure varies depending on which system the HP A5159B host bus adapter is installed in.

For HP A5159B host bus adapters installed in PA-RISC based systems see "Checking SCSI Bus Compatibility for HP A5159B Host Bus Adapters Installed In PA-RISC Based Systems" on page 49.

For HP A5159B host bus adapters installed in Itanium® based systems see "Checking SCSI Bus Compatibility for HP A5159B Host Bus Adapters Installed In Itanium, Based Systems" on page 54.

Checking SCSI Bus Compatibility for HP A5159B Host Bus Adapters Installed In PA-RISC Based Systems

If the HP A5159B SCSI host bus adapter is installed in a supported PA-RISC based system, use the `SCSI` command to display and select SCSI parameters.

The `SCSI` command is available from the boot menu displayed after the test station has booted (if autoboot is disabled). In the following illustration of the boot menu display, the `SCSI` command is emphasized with bold type:

Command	Description
-----	-----
AUTO [BOOT SEARCH ON OFF]	Display or set the specified flag
BOOT [PRI ALT <path> <args>]	Boot from a specified path
BootTimer [time]	Display or set boot delay time
CLEARPIM	Clear PIM storage
CPUconfig [<proc>] [ON OFF]	Configure/Deconfigure Processor
Default	Set the system to defined values
Display	Display this menu
ForthMode	Switch to the Forth OBP interface
IO	List the I/O devices in the system
LS [<path> flash]	List the boot or flash volume
OS [hpux sppux]	Display/Select Operating System
PASSword	Set the Forth password
Path [PRI ALT CON] [<path>]	Display or modify a path
PDT [CLEAR DEBUG]	Display/clear Non-Volatile PDT state
PIM_info [cpu#] [HPMC TOC LPMC]	Display PIM of current or any CPU
RESET [hard debug]	Force a reset of the system
RESTRICT [ON OFF]	Display/Select restricted access to Forth
SCSI [INIT RATE] [bus slot val]	List/Set SCSI controller parms
SEARCH [<path>]	Search for boot devices
SECure [ON OFF]	Display or set secure boot mode
TIme [cn:yr:mo:dy:hr:mn[:ss]]	Display or set the real-time clock
VERsion	Display the firmware versions

The SCSI Command

The `SCSI` command can be used to display and set SCSI bus parameters to make certain the SCSI adapter is compatible with the SCSI devices.

Displaying Transfer Rates

To use the `SCSI` command to display the SCSI transfer rate for an adapter, follow this syntax:

```
SCSI rate bus_number slot_number
```

where

bus_number Specifies the number of the bus the adapter is installed on.

slot_number Specifies the number of the slot the adapter is in.

For example:

- To display the SCSI transfer rate for the adapter installed on bus 5 slot 2, issue this command:

```
SCSI rate 5 2
```

The output could look something like this:

```
PCI device /5.2 = no limit
```

- To list transfer rates for all bus and slot numbers, issue this command:

```
SCSI rate
```

Setting Transfer Rates

To use the SCSI command to set the SCSI transfer rate for an adapter, follow this syntax:

```
SCSI rate bus_number slot_number rate
```

where

bus_number Specifies the number of the bus the adapter is installed on.

slot_number Specifies the number of the slot the adapter is in.

rate Specifies the adapter's transfer rate:

- 0 (no limit)
- 10 (Fast SCSI)
- 20 (Ultra SCSI)

For example, to set the SCSI transfer rate for the adapter installed on bus 5 slot 2 to Fast SCSI and then display the results, issue these commands:

```
SCSI rate 5 2 10
```

```
SCSI rate 5 2
```

The output (of the second command) could look something like this:

```
PCI device /5.2 = fast SCSI
```

Displaying SCSI IDs

To use the SCSI command to display the initiator (SCSI) IDs for an adapter, follow this syntax:

```
SCSI init bus_number slot_number
```

where

bus_number Specifies the number of the bus the adapter is installed on.

slot_number Specifies the number of the slot the adapter is in.

For example:

- To display the SCSI ID for the adapter on bus 5 slot 2, issue this command:

```
SCSI init 5 2
```

The output could look something like this:

```
PCI device /5.2 = 7
```

- To list the SCSI IDs for all bus and slot numbers, issue this command:

```
SCSI init
```

Setting SCSI IDs

To use the SCSI command to set the initiator (SCSI) ID for an adapter, follow this syntax:

```
SCSI init bus_number slot_number ID_number
```

where

bus_number Specifies the number of the bus the adapter is installed on.

slot_number Specifies the number of the slot the adapter is in.

ID_num Specifies the adapter's SCSI ID number.

For example, to set the SCSI ID for the adapter installed on bus 5 slot 2 to 6 and then display the results, issue these commands:

```
SCSI init 5 2 6
```

```
SCSI init 5 2
```

The output (of the second command) could look something like this:

```
PCI device /5.2 = 6
```

Checking SCSI Bus Compatibility for HP A5159B Host Bus Adapters Installed In Itanium® Based Systems

If the HP A5159B SCSI host bus adapter is installed in a supported Itanium® based system, use the following procedure to display and select SCSI parameters:

Step 1. At the EFI Shell prompt issue the `drivers` command as illustrated in the following screen display example:

```
Shell> drivers
          T   D
D         Y C I
R         P F A
V  VERSION  E G G #D #C DRIVER NAME                               IMAGE NAME
== ===== = = = == == =====
14 00000010 B - - 8 18 PCI Bus Driver                               PciBus
20 01010201 D X X 5 - LSI Logic Ultra160 SCSI Driver              PciRomSeg=00000000
21 01010201 D X X 1 - LSI Logic Ultra160 SCSI Driver              PciRomSeg=00000000
24 00000200 D X X 3 - LSI Logic Ultra SCSI Driver                  PciRomSeg=00000000
25 00000200 D X X 1 - LSI Logic Ultra SCSI Driver                  PciRomSeg=00000000
28 01010201 D X X 1 - LSI Logic Ultra160 SCSI Driver              PciRomSeg=00000000
2D 00000105 D X X 1 - HP Tachyon XL2 Fibre Channel Mass S        PciRomSeg=00000000
2E 00000105 D X X 2 - HP Tachyon XL2 Fibre Channel Mass S        PciRomSeg=00000000
31 00000020 ? - - - - USB Keyboard Driver                            UsbKeyBoard
32 00000010 ? - - - - UGA Console Driver                                GraphicsConsole
33 00000000 ? - - - - PCI VGA Mini Port Driver                    PciVgaMiniPort
34 00000010 ? - - - - VGA Class Driver                              VgaClassDriver
35 00000010 B - - 1 1 Serial 16550 UART Driver                    Serial16550
36 00000010 B - - 1 1 Serial Terminal Driver                      Terminal
37 00000010 D - - 1 - Platform Console Management Driver          ConPlatform
38 00000010 D - - 1 - Platform Console Management Driver          ConPlatform
39 00000010 B - - 1 1 Console Splitter Driver                    ConSplitter
```

Step 2. Find the driver handle designation `<drv_handle>`.

For the A5159B host bus adapter, the `<drv_handle>` designation will be in the “DRV” column that corresponds to the “LSI Logic Ultra SCSI Driver” listing in the “DRIVER NAME” column. In the preceding sample

Checking SCSI Bus Compatibility for HP A5159B Host Bus Adapters Installed In Itanium, Based Systems

screen display, there are two versions of the LSI Logic Ultra SCSI Driver. The <driver_handle> designations that correspond to the two “LSI Logic Ultra SCSI Drivers” are 24 and 25.

Step 3. Find the controller handle designation, <cntrl_handle>.

At the EFI Shell prompt, issue the `drvcfg` command as illustrated in the following screen display:

```
Shell> drvcfg
Configurable Components
  Drv[20]  Ctrl [1A] Lang [eng]
  Drv[20]  Ctrl [1B] Lang [eng]
  Drv[20]  Ctrl [1D] Lang [eng]
  Drv[20]  Ctrl [1E] Lang [eng]
  Drv[20]  Ctrl [23] Lang [eng]
  Drv[21]  Ctrl [22] Lang [eng]
  Drv[24]  Ctrl [27] Lang [eng]
  Drv[24]  Ctrl [2B] Lang [eng]
  Drv[24]  Ctrl [2C] Lang [eng]
  Drv[25]  Ctrl [26] Lang [eng]
  Drv[28]  Ctrl [29] Lang [eng]
  Drv[2D]  Ctrl [30] Lang [eng]
  Drv[2E]  Ctrl [2A] Lang [eng]
  Drv[2E]  Ctrl [2F] Lang [eng]
  Drv[48]  Ctrl [1F] Lang [eng]
```

From the output of `drvcfg` command, look for the line(s) where the `NN` in `Drv[NN]` is same as the <drv_handle> for the driver(s) you are using. The 2nd column, `Ctrl [NN]`, contains the corresponding <cntrl_handle>, where `NN` is the controller handle. For example, controller handle 27, 2B and 2C correspond to driver handle 24 and controller handle 26 corresponds to driver handle 25.

Step 4. Once the driver handle and the controller handle are known, the SCSI parameters can be displayed and set for any driver and corresponding controller (host bus adapter) on the SCSI bus.

Enter the `drvcfg -s <drv_handle> <cntrl_handle>` command at EFI shell prompt. A GUI screen will be displayed listing the controller (host bus adapter) that the controller handle corresponds to as illustrated in the following example (this is the 1st level screen):

```

LSI Logic Host Bus Adapters
Adapter      PCI  PCI   PCI          IRQ  NVM  LSI Logic
              Bus Device Function
<53C875      60  01   01>         0   Yes  Enabled
    
```

Press the [Enter] key. This will bring up the 2nd level screen containing the controller (host bus adapter) settings, as illustrated in the following example:

Adapter Properties

```

Adapter      PCI  PCI   PCI
              Bus Device Function
53C875       60  01   01
    
```

<Device Properties>

```

Boot Support           [Enabled]
SCSI Parity            [Yes]
Host SCSI ID           [ 5]
SCSI Bus Scan Order    [Low to High (0..Max)]
Spinup Delay (Secs)    [ 2]
Secondary Cluster Server [Yes]
Termination Control     [Auto]
<Restore Defaults>
    
```

Use the arrow keys to highlight the different SCSI parameters

Use the - and + keys to change the highlighted SCSI parameter.

NOTE

Only the “Host SCSI ID” and the “Secondary Cluster Server” parameters should be changed, if necessary.

The “Secondary Cluster Server” should be set to “Yes” if more than one initiator is connected to the SCSI bus.

The other SCSI parameters listed on the GUI are set at default values that should not be changed.

- Step 5.** Press the [ESC] key to exit the 2nd level screen. Another GUI screen will appear with the following statements:

```
Adapter and/or device property changes have been made.  
<Cancel Exit>  
<Save changes then exit this menu>  
<Discard changes then exit this menu>  
Exit the Configuration Utility
```

Use the arrow keys to highlight your selection from the listed choices, then press the [ENTER] key to return to the 1st level GUI screen.

- Step 6.** Press the [ESC] key at the 1st level GUI screen. Another GUI screen will appear with the following statements:

```
Are you sure you want to exit?  
<Cancel Exit>  
Save changes then exit this menu  
Discard changes then exit this menu  
<Exit the Configuration Utility>
```

Use the arrow keys to highlight your selection from the listed choices, then press the [ENTER] key to return to the EFI shell prompt.

Using Support Tools Manager (STM)

STM is a software application that can be run from the console to obtain status and descriptive information about the A5159B adapter, diagnose problems, and update firmware. See the *Support Tools Manager User's Guide* for more details about STM.

Contacting Your Hewlett-Packard Representative

If the equipment is covered by an HP service contract, document the problem as a service request and forward it to your HP representative. Include the following information where applicable:

- Describe the problem, including the events and symptoms leading up to the problem. Attempt to describe the source of the problem.

Include commands, communication subsystem commands, functionality of user programs, result codes and messages, and data that can reproduce the problem.

- Obtain the version, update, and fix information for all software.

1. To check the version of the kernel, enter this command:

```
uname -r
```

To check patches, enter:

```
what /stand/vmunix | grep scsi
```

2. To check the version of MPE/iX enter: SHOWME

To check patches, enter: PRINT HPSWINFO.PUB.SYS

This allows HP to determine if the problem is already known and the correct software is installed at your site.

- Illustrate as clearly as possible the context of any messages. Record all error messages and numbers that appear at the user terminal and the system console.
- Prepare the formatted output and a copy of the log file for the HP representative to analyze.
- Prepare a listing of the HP-UX or MPE/iX I/O configuration being used for the HP representative to analyze.
- Try to determine the general area within the software where the problem may exist. Refer to the appropriate reference manual and follow the guidelines on gathering information for that product.

- Document your interim (workaround) solution. The cause of the problem can sometimes be found by comparing the circumstances in which the problem occurs with the circumstances in which the problem does not occur.
- In the event of a system failure, obtain a full memory dump.
- For HP-UX: If the directory `/var/adm/crash` exists, the HP-UX utility `/sbin/savecore` automatically executes during reboot to save the memory dump. HP recommends that you create the `/tmp/syscore` directory after successfully installing this product. Send the output of the system failure memory dump to the HP representative.
- For MPE/iX: If you use AUTORESTART and DUMPTODISK products follow your normal system recovery steps. Otherwise take a memory dump and save the resulting tape. Contact HP Support for analysis of your failure.

If the equipment is not covered by an HP service contract, there may be a charge for time and materials.

A **SCSI Sense Codes**

This appendix shows the codes that appear in SCSI error messages.

Interpreting the SCSI Sense Codes

The following example shows a typical SCSI error message:

```
[+6708 72410001 002a9858 0:7] scsi disk: CHECK CONDITION on disk 0:6:5:0
Read of logical block 509856, count 128
disk sd45a, block 254920, 65536 bytes
Valid = 1, Error code = 0x70
Segment number = 0x00, Filemark = 0, EOM = 0, ILI = 0
Sense key = 0x1, "RECOVERED ERROR"
Information = 0x00 0x07 0xc7 0xe4
[+6709 72410001 002a9a10 0:7] scsi disk:      Additional sense length = 0x0a
Command-specific information = 0x00 0x00 0x00 0x00
Additional sense = 0x18, Qualifier = 0x01
Field replaceable unit code = 0xea
SKSV = 1, C/D = 0, BPV = 0, Bit pointer = 0
Field pointer = 0x0003
```

The status, **CHECK CONDITION** and the sense key, **RECOVERED ERROR**—shown in bold in the example above—are interpreted for you in the error message text that follows them.

Each **Additional sense** code and its corresponding **Qualifier** code—shown in bold in the example above—require interpretation on your part. Use the two codes together to determine the meaning.

In the example above, the **Additional sense** (0x18) and **Qualifier** (0x01) codes together mean “recovered data with error correction and retries applied.” You can look up the various codes and keys in the tables on the following pages.

Table A-1 below lists all possible SCSI status codes and their meanings.

Table A-1 **SCSI Status Codes**

SCSI Status Code	Meaning
0x00	Good
0x02	Check condition
0x04	Condition met
0x08	Busy
0x10	Intermediate
0x14	Intermediate—condition met
0x18	Reservation conflict
0x22	Command terminated
0x28	Queue full

Table A-2 below lists all possible SCSI sense keys and their meanings.

Table A-2 **SCSI Sense Keys**

SCSI Sense Key	Meaning
0	No sense
0x1	Recovered error
0x2	Not ready
0x3	Medium error
0x4	Hardware error
0x5	Illegal request
0x6	Unit attention
0x7	Data protect
0x8	Blank check
0x9	Vendor-specific
0xa	Copy aborted
0xb	Aborted command
0xc	Equal
0xd	Volume overflow
0xe	Miscompare
0xf	Reserved

Table A-3 below lists the Additional sense codes and Qualifier codes and their meanings. Remember that you must use the combined codes—an Additional sense code/Qualifier code pair—to find the correct meaning.

Table A-3 SCSI Additional Sense Code/Qualifier Code Pairs

SCSI Additional Sense Code	SCSI Qualifier Code	Meaning
0x00	0x00	No additional sense information
	0x01	Filemark detected
	0x02	End-of-partitions/medium detected
	0x03	Setmark detected
	0x04	Beginning of partition/medium detected
	0x05	End-of-data detected
	0x06	I/O process terminated
	0x11	Audio play operation in progress
	0x12	Audio play operation paused
	0x13	Audio play operation successfully completed
	0x14	Audio play operation stopped due to error
	0x15	No current audio status to return
0x01	0x00	No index/sector signal
0x02	0x00	No seek complete
0x03	0x00	Peripheral device write fault
	0x01	No write current
	0x02	Excessive write errors

Table A-3 SCSI Additional Sense Code/Qualifier Code Pairs (Continued)

SCSI Additional Sense Code	SCSI Qualifier Code	Meaning
0x04	0x00	Logical unit not ready, cause not reportable
	0x01	Logical unit in process of becoming ready
	0x02	Logical unit not ready, initializing command required
	0x03	Logical unit not ready, manual intervention required
	0x04	Logical unit not ready, format in progress
0x05	0x00	Logical unit does not respond to selection
0x06	0x00	Reference position found
0x07	0x00	Multiple peripheral devices selected
0x08	0x00	Logical unit communication failure
	0x01	Logical unit communication time-out
	0x02	Logical unit communication parity error
0x09	0x00	Track following error
	0x01	Tracking servo failure
	0x02	Focus servo failure
	0x03	Spindle servo failure
0x0a	0x00	Error log overflow
0x0c	0x00	Write error
	0x01	Write error recovered with auto reallocation
	0x02	Write error—auto reallocation failed

Table A-3 SCSI Additional Sense Code/Qualifier Code Pairs (Continued)

SCSI Additional Sense Code	SCSI Qualifier Code	Meaning
0x10	0x00	ID crc or ecc error
0x11	0x00	Unrecovered read error
	0x01	Read retries exhausted
	0x02	Error too long to correct
	0x03	Multiple read errors
	0x04	Unrecovered read error—auto reallocate failed
	0x05	l-ec uncorrectable error
	0x06	circ unrecovered error
	0x07	Data resynchronization error
	0x08	Incomplete block read
	0x09	No gap found
	0x0a	Miscorrected error
	0x0b	Unrecovered read error—recommend reassignment
	0x0c	Unrecovered read error—recommend rewrite the data
0x12	0x00	Address mark not found for ID field
0x13	0x00	Address mark not found for data field

Table A-3 SCSI Additional Sense Code/Qualifier Code Pairs (Continued)

SCSI Additional Sense Code	SCSI Qualifier Code	Meaning
0x14	0x00	Recorded entity not found
	0x01	Record not found
	0x02	Filemark or setmark not found
	0x03	End-of-data not found
	0x04	Block sequence error
0x15	0x00	Random positioning error
	0x01	Mechanical positioning error
	0x02	Positioning error detected by read of medium
0x16	0x00	Data synchronization mark error
0x17	0x00	Recovered data with no error correction applied
	0x01	Recovered data with retries
	0x02	Recovered data with positive head offset
	0x03	Recovered data with negative head offset
	0x04	Recovered data with retries and/or circ applied
	0x05	Recovered data using previous sector ID
	0x06	Recovered data without ecc—data auto-reallocated
	0x07	Recovered data without ecc—recommend reassignment
	0x08	Recovered data without ecc—recommend rewrite

Table A-3 SCSI Additional Sense Code/Qualifier Code Pairs (Continued)

SCSI Additional Sense Code	SCSI Qualifier Code	Meaning
0x18	0x00	Recovered data with error correction applied
	0x01	Recovered data with error correction and retries applied
	0x02	Recovered data—data auto-reallocated
	0x03	Recovered data with circ
	0x04	Recovered data with lec
	0x05	Recovered data—recommend reassignment
	0x06	Recovered data—recommend rewrite
0x19	0x00	Defect list error
	0x01	Defect list not available
	0x02	Defect list error in primary list
	0x03	Defect list error in grown list
0x1a	0x00	Parameter list length error
0x1b	0x00	Synchronous data transfer error
0x1c	0x00	Defect list not found
	0x01	Primary defect list not found
	0x02	Grown defect list not found
0x1d	0x00	Miscompare during verify operation
0x1e	0x00	Recovered ID with ecc
0x20	0x00	Invalid command operation code

Table A-3 SCSI Additional Sense Code/Qualifier Code Pairs (Continued)

SCSI Additional Sense Code	SCSI Qualifier Code	Meaning
0x21	0x00	Logical block address out of range
	0x01	Invalid element address
0x22	0x00	Illegal function
0x24	0x00	Invalid field in cdb
0x25	0x00	Logical unit not supported
0x26	0x00	Invalid field in parameter list
	0x01	Parameter not supported
	0x02	Parameter value invalid
	0x03	Threshold parameters not supported
0x27	0x00	Write protected
0x28	0x00	Not ready to ready transition (medium may have changed)
	0x01	Import or export element assessed
0x29	0x00	Power on, reset, or bus device reset occurred
0x2a	0x00	Parameters changed
	0x01	Mode parameters changed
	0x02	Log parameters changed
0x2b	0x00	Copy cannot execute since host cannot disconnect
0x2c	0x00	Command sequence error
	0x01	Too many windows specified
0x2f	0x00	Commands cleared by another initiator

Table A-3 SCSI Additional Sense Code/Qualifier Code Pairs (Continued)

SCSI Additional Sense Code	SCSI Qualifier Code	Meaning
0x30	0x00	Incompatible medium installed
	0x01	Cannot read medium—unknown format
	0x02	Cannot read medium—incompatible format
	0x03	Cleaning cartridge installed
0x31	0x00	Medium format corrupted
0x32	0x00	No defect spare location available
	0x01	Defect list update failure
0x33	0x00	Tape length error
0x36	0x00	Ribbon, ink, or tower failure
0x37	0x00	Rounded parameter
0x39	0x00	Saving parameters not supported
0x3a	0x00	Medium not present

Table A-3 SCSI Additional Sense Code/Qualifier Code Pairs (Continued)

SCSI Additional Sense Code	SCSI Qualifier Code	Meaning
0x3b	0x00	Sequential positioning error
	0x01	Tape position error at beginning-of-medium
	0x02	Tape position error at end-of-medium
	0x03	Tape or electronic vertical forms unit not ready
	0x04	Slew failure
	0x05	Paper jam
	0x06	Failed to sense top-of-form
	0x07	Failed to sense bottom-of-form
	0x08	Reposition error
	0x09	Read past end of medium
	0x0a	Read past beginning of medium
	0x0b	Position past end of medium
	0x0c	Position past beginning of medium
	0x0d	Medium destination element full
	0x0e	Medium source element empty
0x3d	0x00	Invalid bits in identify message
0x3e	0x00	Logical unit has not self-configured yet

Table A-3 SCSI Additional Sense Code/Qualifier Code Pairs (Continued)

SCSI Additional Sense Code	SCSI Qualifier Code	Meaning
0x3f	0x00	Target operation conditions have changed
	0x01	Microcode has been changed
	0x02	Changed operating definition
	0x03	Inquiry data has changed
0x40	0x00	RAM failure
	<i>nn</i>	Diagnostic failure on component <i>nn</i>
0x41	0x00	Data path failure
0x42	0x00	Power-on or self-test failure
0x43	0x00	Message error
0x44	0x00	Internal target failure
0x45	0x00	Select or reselect failure
0x46	0x00	Unsuccessful soft reset
0x47	0x00	SCSI parity error
0x48	0x00	Initiator detected error message received
0x49	0x00	Invalid message error
0x4a	0x00	Command phase error
0x4b	0x00	Data phase error
0x4c	0x00	Logical unit failed self-configuration
0x4e	0x00	Overlapped commands attempted

Table A-3 SCSI Additional Sense Code/Qualifier Code Pairs (Continued)

SCSI Additional Sense Code	SCSI Qualifier Code	Meaning
0x50	0x00	Write append error
	0x01	Write append position error
	0x02	Position error related to timing
0x51	0x00	Erase failure
0x52	0x00	Cartridge fault
0x53	0x00	Media load or eject failed
	0x01	Unload tape failure
	0x02	Medium removal prevented
0x54	0x00	SCSI to host system interface failure
0x55	0x00	System resource failure
0x56	0x00	Reserved
0x57	0x00	Unable to recover table of contents
0x58	0x00	Generation does not exist
0x59	0x00	Updated block read
0x5A	0x00	Operator request or state change input (unspecified)
	0x01	Operator medium removal request
	0x02	Operator selected write protect
	0x02	Operator selected write permit

Table A-3 SCSI Additional Sense Code/Qualifier Code Pairs (Continued)

SCSI Additional Sense Code	SCSI Qualifier Code	Meaning
0x5B	0x00	Log exception
	0x01	Threshold condition met
	0x02	Log counter at maximum
	0x03	Log list codes exhausted
0x5C	0x00	RPL status change
	0x01	Spindles synchronized
	0x02	Spindles not synchronized
0x5D	0x00	Reserved
0x5E	0x00	Reserved
0x5F	0x00	Reserved
0x60	0x00	Lamp failure
0x61	0x00	Video acquisition error
	0x01	Unable to acquire video
	0x02	Out of focus
0x62	0x00	Scan head positioning error
0x63	0x00	End of user area encountered on this track
0x64	0x00	Illegal mode for this track
0x65	0x00	Reserved
0x66	0x00	Reserved
0x67	0x00	Reserved
0x68	0x00	Reserved

Table A-3 SCSI Additional Sense Code/Qualifier Code Pairs (Continued)

SCSI Additional Sense Code	SCSI Qualifier Code	Meaning
0x69	0x00	Reserved
0x6A	0x00	Reserved
0x6B	0x00	Reserved
0x6C	0x00	Reserved
0x6D	0x00	Reserved
0x6E	0x00	Reserved
0x6F	0x00	Reserved

B **Regulatory Information**

This appendix contains all of the regulatory-related information for the A5159B adapter.

Regulatory Statements

This section contains all of the regulatory statements for the A5159B adapter.

FCC Statement (For U.S.A. Only)

The Federal Communications Commission (in 47 CFR 15.105) has specified that the following notice be brought to the attention of the users of this product.

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 instruction manual, 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 his own expense. The end user of this product should be aware that any changes or modifications made to this equipment without the approval of Hewlett-Packard could result in the product not meeting the Class A limits, in which case the FCC could void the user's authority to operate the equipment.

IEC Statement (Worldwide)

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

DOC Statement (Canada)

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.

Spécification ATI Classe A (France)

DECLARATION D'INSTALLATION ET DE MISE EN EXPLOITATION d'un matériel de traitement de l'information (ATI), classé A en fonction des niveaux de perturbations radioélectriques émis, définis dans la norme européenne EN 55022 concernant la Compatibilité Electromagnétique.

Cher Client,

Conformément à la Réglementation Française en vigueur l'installation ou le transfert d'installation, et l'exploitation de cet appareil de classe A, doivent faire l'objet d'une déclaration (en deux exemplaires) simultanément auprès des services suivants:

- Comité de Coordination des Télécommunications 20, avenue de Ségur - 75700 PARIS
- Préfecture du département du lieu d'exploitation

Le formulaire à utiliser est disponible auprès des préfetures.

La déclaration doit être faite dans les 30 jours suivant la mise en exploitation.

Le non respect de cette obligation peut être sanctionné par les peines prévues au code des Postes et Télécommunications et celles indiquées dans la loi du 31 mai 1993 susvisée.

Arrêté du 27 Mars 1993, publié au J.O. du 28 Mars - ATI

VCCI Statement (Japan)

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。

Declaration of Conformity

Figure B-1 Declaration of Conformity

DECLARATION OF CONFORMITY According to ISO/IEC Guide 22 and EN 45014	
Manufacturer's Name:	Hewlett-Packard Company Systems Interconnect Solutions Lab
Manufacturer's Address:	8000 Foothills Blvd. Roseville, CA 95747 USA
declares, that the product	
Product Name:	Dual Port FWD PCI SCSI Adapter
Model Number(s):	A5159-60001, A5159-60101
Product Options:	All
conforms to the following Product Specifications:	
Safety:	IEC 950:1991 + A1, A2, A3, A4 / EN 60950:1992 + A1, A2, A3, A4, A11 GB 4943-1995.
EMC:	CISPR 22:1997 / EN 55022:1998 - Class A CNS 13438, GB 9254-1988, CFR47, Part 15 Class A CISPR 24:1997 / EN 55024:1998 IEC 61000-4-2 IEC 61000-4-3 / ENV 50204 IEC 61000-4-4 IEC 61000-4-6
Supplementary Information:	
The product herewith complies with the requirements of the EMC Directive 89/336/EEC and carries the CE marking accordingly.	
1) The Product was tested in a typical configuration with Hewlett-Packard information technology equipment.	
 _____ Tom Le, Hardware Engineer	
Cupertino, CA, December 9, 2002	
European Contact: Your local Hewlett-Packard Sales and Service Office or Hewlett-Packard GmbH, Department HQ-TRE, Herrenberger Straße 130, D-71034 Böblingen (FAX: + 49-7031-14-3143)	