

HP 9000

**HP A2969A/A3644A HP-HSC Fast/Wide  
Differential SCSI Adapters  
Installation and Service**

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**Print History**

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**Safety Considerations**

The product and related documentation must be reviewed for familiarization with safety markings and instructions before installation and operation.

**Safety Symbols**



**WARNING**

**Instruction manual symbol.** If the product is marked with this symbol, refer to the product manuals to protect the product against damage.

A **WARNING** denotes a hazard that can cause personal injury.

**CAUTION**

A **CAUTION** denotes a hazard that can damage equipment. Do not proceed beyond a **WARNING** or **CAUTION** notice until you have understood the hazardous conditions and have taken appropriate steps.

**Grounding**

The computer in which this product is installed is a safety class I product and has a protective earthing terminal. There must be an uninterruptible safety earth ground from the main power source to the product's input wiring terminals, power cord, or supplied power cord set. Whenever it is likely that the protection has been impaired, disconnect the power cord until the ground has been restored.

**Servicing**

Any servicing, adjustment, maintenance, or repair must be performed only by authorized service-trained personnel.

**Warranty**

If you have any questions about the warranty for your product, contact your dealer or your local Hewlett-Packard sales representative.

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## Regulatory Statements

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

Federal Communications Commission Radio Frequency Interference Statement

**Warning:** This equipment generates, uses, and can radiate radio frequency energy. If it is not installed and used in accordance with the instruction manual, it may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Part 15 of FCC Rules, which are designed to provide reasonable protection against interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

If this equipment causes interference to radio reception (which can be determined by turning the equipment off and on) try these measures: Re-orient the receiving antenna. Relocate the computer with respect to the receiver. Move the equipment away from the receiver. Plug the computer and receiver into different branch circuits. Consult your dealer or an experienced technician for additional suggestions.

VCCI Class 1 (For Japan Only)

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## **About This Book**

This book is the installation and service manual for the HP A2969A/HP A3644A HP-HSC (High-Speed System Connect) Fast/Wide Differential SCSI Adapters. The HP A2969A adapter connects an HP 9000 Series Kxxx computer (using the HP-UX operating system release 10.0 or later) to SCSI devices, and the HP A3644A adapter connects an HP 9000 Series T6xx computer (using the HP-UX operating system release 10.3 or later) to SCSI devices.

This book contains reference information, installation procedures, and service information.

The reference information provides a description and technical specifications for the adapters.

The installation procedures contain the steps necessary to install the adapter in your computer.

The service information defines the steps and procedures to follow if you experience trouble with the adapter. The information includes troubleshooting tools, removal and replacement instructions, and reshipment guidelines.

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## Description

The Hewlett-Packard High-Speed System Connect (HP-HSC) Fast/Wide Differential SCSI Adapter provides the hardware needed to connect an HP 9000 Series computer to 16-bit SCSI devices.

## Product Contents

Your product will consist of one set of the following items, depending on whether the product is an A2969A SCSI adapter or an A3644A SCSI adapter.

<u>Item</u>	<u>A2969A</u>	<u>A3644A</u>
HP-HSC Fast/Wide Differential SCSI Adapter	A2969AX	A3644AX
SCSI Terminator Product Number:	A1658-62024 C2905A	A1658-62024 C2905A
2.5-meter cable (16-bit high-density)	A1658-62020	A1658-62020
Grounding wrist strap	9300-1408	9300-1408
Installation and Service Manual	A2969-90002	A2969-90002



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## Specifications

<b>General Features</b>	Supported Systems	HP A2969A	HP A3644A
		HP 9000 Series Kxxx computers using HP-UX 10.0 or later	HP 9000 Series T6xx computer using HP-UX 10.3 or later
	Standards	Complies with ANSI X3T9.2 SCSI specifications	
	Performance	20-Mbyte/sec peak synchronous transfer rate	
	Connector	68-pin high-density P-type	
<b>Electrical</b>	Power Consumption	6.75 W @ 5.0V 0.75 W @ 3.3V	

**Specifications** (continued)

<b>Physical</b>	Length	15.11 cm (5.95 in.)	
	Width	8.76 cm (3.45 in.)	
	Height	2.54 cm (1.0 in.)	
	Board Thickness	1.5 mm (0.06 in.)	
	Weight	114 g (4.02 oz)	
<b>Environmental</b>		<b>Operating</b>	<b>Non-Operating</b>
	<b>Temperature</b>	5°C to 40°C (41°F to 104°F)	-40°C to 70°C (-40°F to 158°F)
	<b>Relative Humidity (non-condensing)</b>	15% to 80% at 40°C (104°F)	15% to 95% at 65°C (149°F)
<b>Maximum Altitude</b>	4.6 km (15,000 ft)	4.6 km (15,000 ft)	

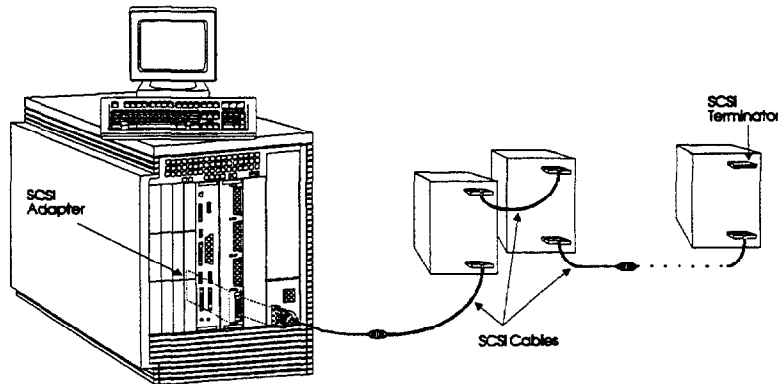
## Installation Procedures

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## Installation Overview



**Figure 1. Installing a SCSI adapter, overview**

Figure 1 presents an overview of installing the adapter in an HP 9000 Series Kxxx computer system. The procedure is slightly different for the HP 9000 Series T6xx and will be noted where different. Installing the SCSI adapter consists of the following major steps:

- Shut down the operating system using `shutdown -h 0` (not `reboot`) and turn computer power off.
- Install the adapter
- Connect cables and peripheral devices, and check for no duplicate ADDX.
- Terminate the SCSI bus.
- Switch power on to the peripherals, then to the computer.
- Configure the software to include the adapter.
- Verify operation.

---

## Prepare to Install the Adapter

Refer to your computer manuals for any additional information necessary to install the adapter in your computer system.

Before installing the adapter, you should perform the following steps:

- Observe antistatic precautions.
- Verify product contents.
- Record adapter identification information.
- Gather tools and accessories.

### Observe Antistatic Precautions

This product contains electronic components that can be damaged by an electrostatic discharge. To avoid damage, follow these guidelines:

- Store the adapter in a conductive plastic bag until you are ready to install it.
- If possible, work in a static-free area.
- Use a grounding wrist strap connected to the metallic chassis of the computer.

### Verify Product Contents

- See “Product Contents” on page 8 and make sure you have all contents.

## Record Adapter Information

Record the part number and date code of the adapter for future reference. If your adapter requires service in the future, the part number and date code will be needed by HP service personnel. This information is provided on stickers affixed to the adapter. See the example below (note that your information might differ from the example).



**A2969-60001**

**B-3XXX  
3XXX Made in USA**

## Gather Tools and Accessories

The only tools required when installing the SCSI adapter are a #10 Torx driver or a small flat-blade screwdriver, and a grounding wrist strap.

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## **Shut Down the Operating System and Switch Off the Computer**

1. Before installing the adapter, shut down the computer operating system (using shutdown -h 0, not reboot). Refer to your computer system manual for proper shutdown procedures to avoid corruption or loss of data.
2. Turn computer system power off.
3. Unplug the computer's power cord.
4. Turn power off on all peripheral devices.

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**WARNING** Unless otherwise noted in your computer system manuals, failure to properly shut down the system and remove power may create a personal hazard, or may result in hardware damage or data corruption.

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## Set SCSI Adapter DIP Switches

DIP switches on the SCSI adapter are used to set the SCSI address of the adapter. These switches are preset at the factory at address 7 and should not need to be changed unless there are multiple SCSI initiators on the same SCSI bus. This situation would only occur in a multi-host environment, that is, if you are using the ServiceGuard product.

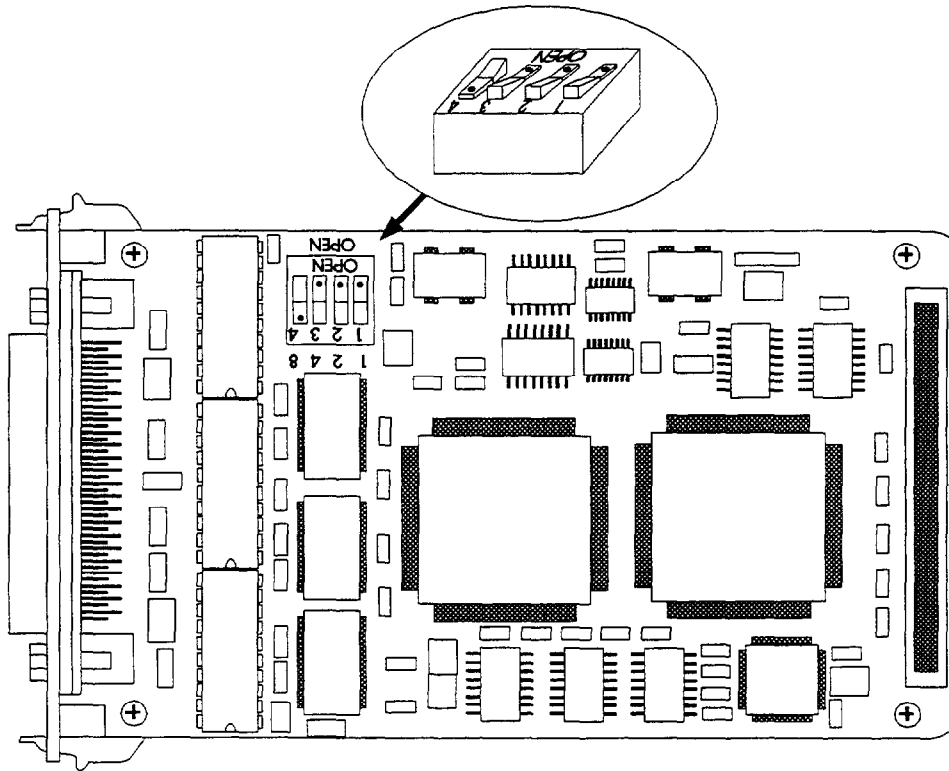
If you need to set the DIP switches, the location of the switches on the SCSI adapter is shown in figure 2. Component locations are the same for the HP A2969A and HP A3644A SCSI adapters. The only physical difference in the two adapters is in the type of front faceplate (also called bulkhead). The table on page 18 shows the SCSI addresses for the various switch settings. For bus arbitration the order of priority with the highest priority first is: 7, 6, 5, 4, 3, 2, 1, 0, 15, 14, 13, 12, 11, 10, 9, 8.

---

**Note**            The SCSI adapter is factory set to SCSI bus address '7' and should not be changed unless it is used in a multi-initiator system. If there are two adapters on the same SCSI bus, one should be set to '7' and the other to '6'. Address '7' is the highest priority address on the SCSI bus followed by '6'. If the SCSI host adapter doesn't have the highest priority, performance will degrade or the SCSI bus may hang.

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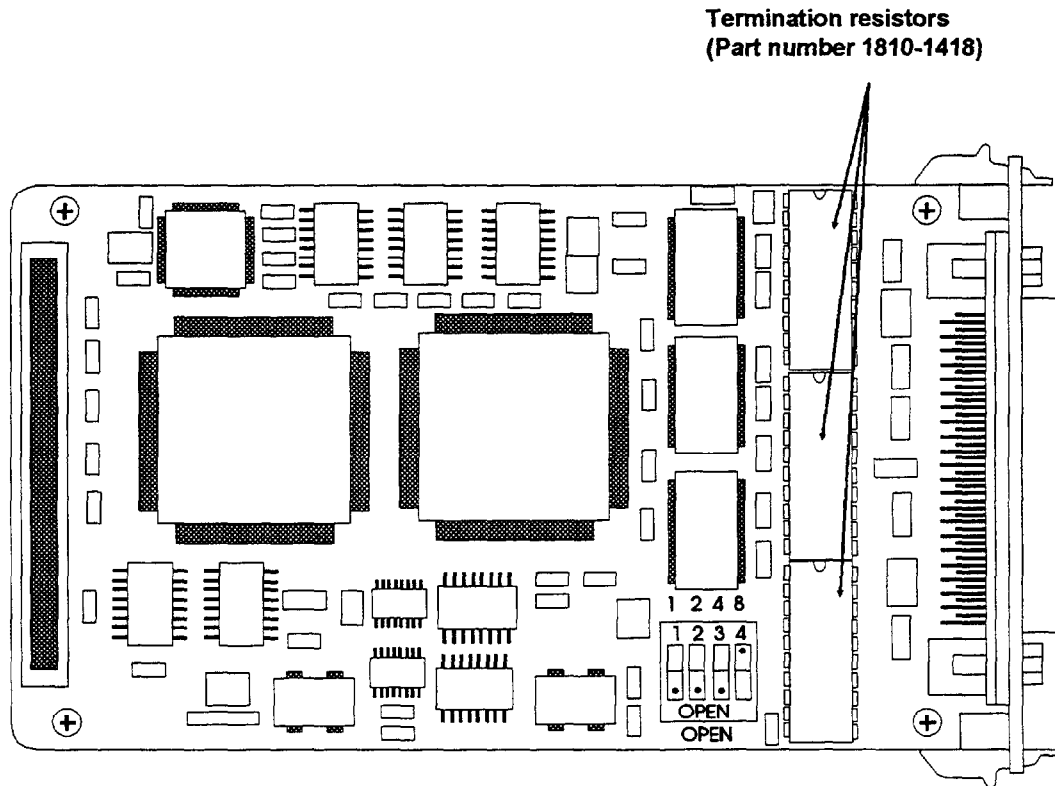


**Figure 2. DIP switch location**

Address	Numbers on Printed-Circuit Card			
	8	4	2	1
	Numbers on Switch Body			
	4	3	2	1
0	closed	closed	closed	closed
1	closed	closed	closed	open
2	closed	closed	open	closed
3	closed	closed	open	open
4	closed	open	closed	closed
5	closed	open	closed	open
6	closed	open	open	closed
7 (Highest)	closed	open	open	open
8 (Lowest)	open	closed	closed	closed
9	open	closed	closed	open
10	open	closed	open	closed
11	open	closed	open	open
12	open	open	closed	closed
13	open	open	closed	open
14	open	open	open	closed
15	open	open	open	open

## If Necessary, Remove the Termination Resistors

If the SCSI Adapter is installed in the middle of a SCSI bus, that is, not at the end as shown in figure 1 on page 12, the termination resistors on the SCSI Adapter should be removed. (This would only occur in an HA solution with greater than two CPUs, or if a V cable is used.) See figure 3 for the locations of the termination resistors (remember, the component locations on the two adapters are identical except for the front faceplate).



**Figure 3. Termination resistor locations**

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## **Install the Adapter**

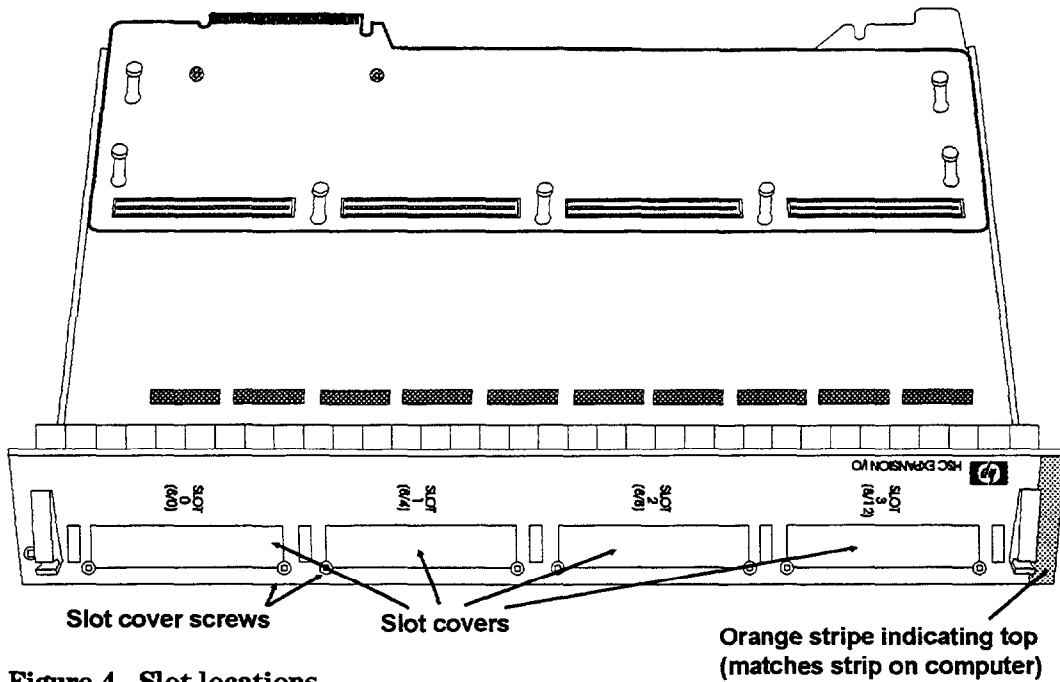
For the HP 9000 Series Kxxx computer system, the HP A2969A SCSI adapter can be installed in a slot in either the core I/O or the HP-HSC expansion I/O.

For the HP 9000 Series T6xx computer system, the HP A3644A SCSI adapter is installed in a slot in the HP-HSC I/O bus converter.

## **Install the HP A2969A SCSI Adapter in an HP 9000 Series Kxxx**

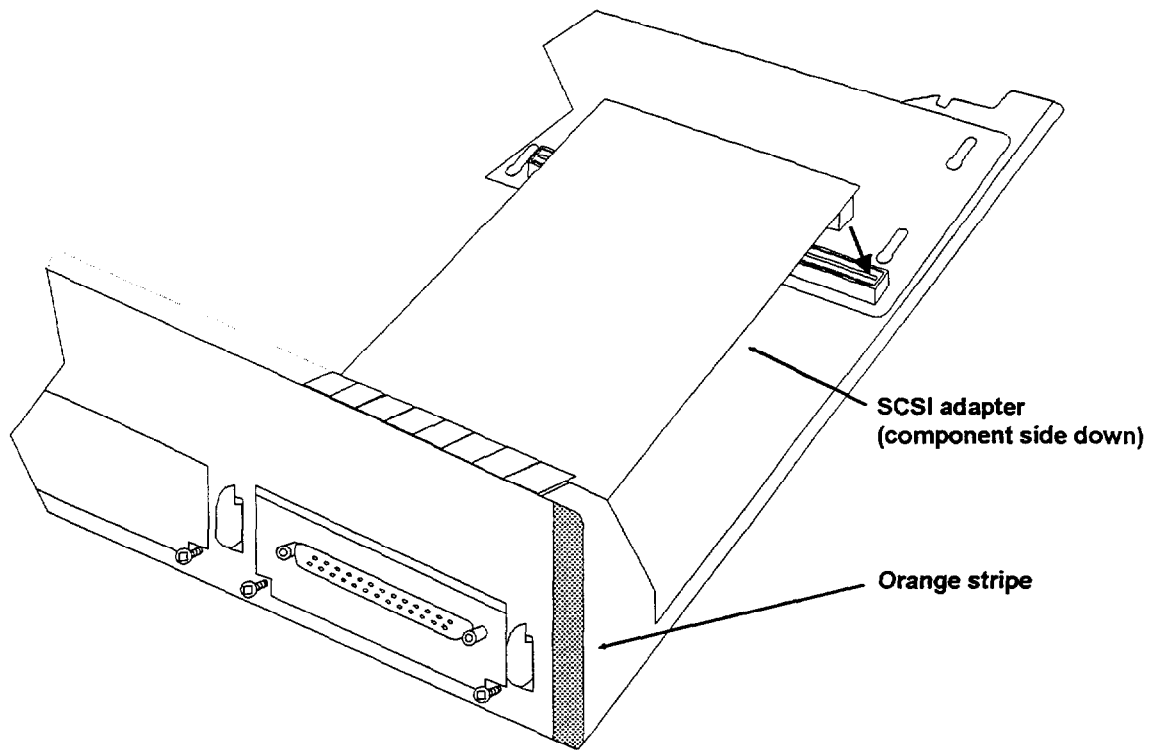
To install the HP A2969A SCSI adapter in an HP 9000 Series Kxxx computer, perform the following steps:

1. Shut down the operating system and turn power off to the computer. (See page 15.)
2. Wear a grounding wrist strap that is connected to the core I/O or expansion I/O bulkhead.
3. Remove the core I/O or expansion I/O from the computer. Refer to the computer system manual for the necessary steps to remove the core I/O or expansion I/O.
4. Grasp the SCSI adapter by its edges or faceplate. Do not touch electronic components or electrical traces. Recheck the DIP switches on the SCSI adapter for the correct setting.
5. If the SCSI adapter is to be installed in the core I/O, use the slot labeled 'OPTIONAL I/O (X/8)\*'. If the SCSI adapter is to be installed in the expansion I/O, select an empty slot on the expansion I/O. See figure 4 for slot identifications.



**Figure 4. Slot locations**

6. Install the SCSI adapter into the slot in the core I/O or expansion I/O.
7. Insert the mounting tabs (located on the SCSI adapter faceplate) into the slots in the core I/O or expansion I/O bulkhead, then line up the SCSI adapter connector with the receptacle on the core I/O or expansion I/O adapter. Figure 5 shows the SCSI adapter being installed on the expansion I/O. The procedure is the same for the core I/O except that the adapter is installed in the slot labeled 'OPTIONAL I/O (X/8)'.



**Figure 5. Installing the adapter in the I/O bulkhead**

8. Press down on the rear of the SCSI adapter until its connector is fully inserted into the receptacle on the core I/O or expansion I/O adapter.
9. Secure the adapter by tightening the two retaining screws (located on the front of the core I/O or expansion I/O bulkhead).
10. If the SCSI adapter was installed in the expansion I/O, record the expansion I/O slot number for future reference.
11. Re-install the core I/O or expansion I/O. Refer to the computer system manual for information on re-installing the core I/O or expansion I/O.

## Install the HP A3644A SCSI Adapter in an HP 9000 Series T6xx

The HP A3644A SCSI adapter (see figure 6) is physically identical to the HP A2969A adapter except for the front bulkhead, thus, the locations of the DIP switch and the termination resistors are the same.

The HP A3644A adapter is installed in an HP-HSC I/O bus converter, which is then installed in the HP 9000 Series T6xx computer. The HP-HSC I/O bus converter is shown in figure 7. Four SCSI adapters can be installed in one HP-HSC I/O bus converter.

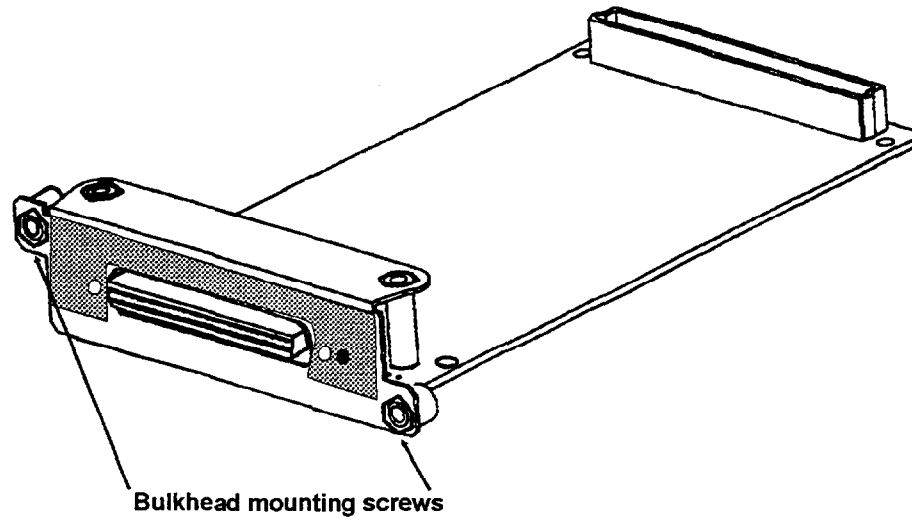
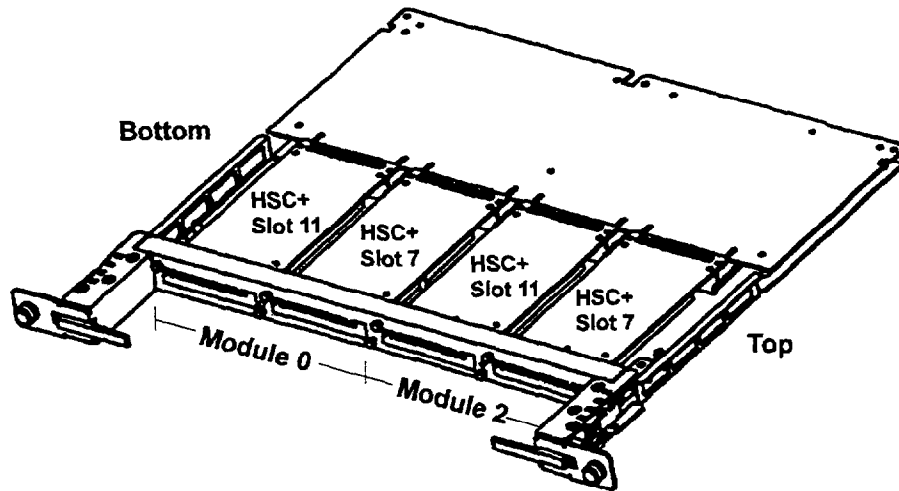


Figure 6. HP A3644A SCSI adapter



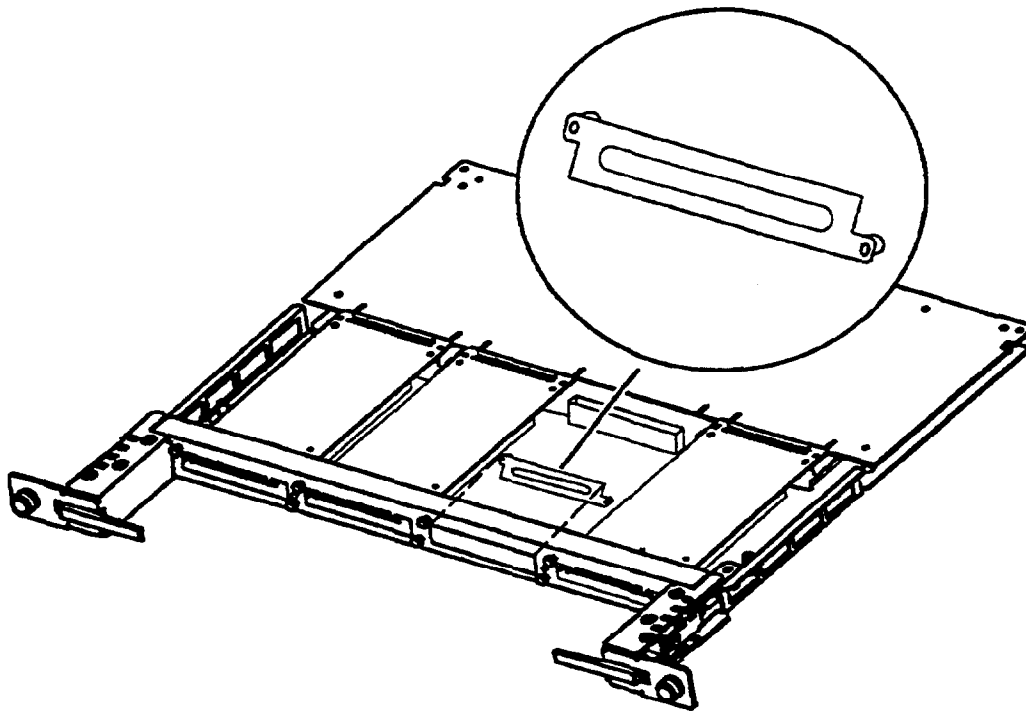


**Figure 7. HP-HSC I/O bus converter**

To install the HP A3644A SCSI adapter in an HP 9000 Series T6xx computer, perform the following steps:

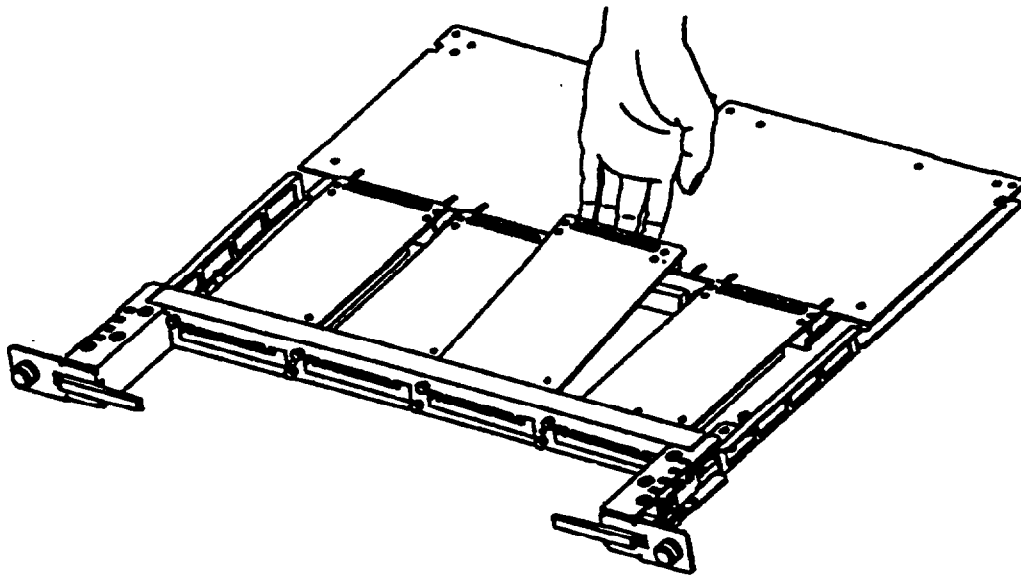
1. Shut down the operating system and turn power off to the computer. (See page 15.)
2. Wear a grounding wrist strap that is connected to the HP-HSC I/O bus converter bulkhead.
3. Remove the HP-HSC I/O bus converter from the computer. Refer to the computer system manual for instructions.
4. Grasp the SCSI adapter by its edges or faceplate. Do not touch electronic components or electrical traces. Recheck the DIP switches on the SCSI adapter for the correct settings.

5. Remove the cover blank from the slot where the SCSI adapter is to be mounted. See figure 8. To remove the cover blank, remove the two screws holding the blank in place. The screws are spring loaded. Apply slight upward pressure to prevent the screw from separating from the spring.



**Figure 8. Removing a cover blank**

6. Install the SCSI card in the HP-HSC converter by pressing the card against the bulkhead of the HP-HSC converter. See figure 9.



**Figure 9. Installing the HP A3644A card**

7. Before you push the connector on the SCSI card into the mating connector on the HP-HSC bus converter, turn the captive screws on the HP-HSC bus converter until they engage the SCSI card, but do not tighten the screws.
8. Align the connectors, then press them together securely.
9. Tighten the HP-HSC bulkhead screws to secure the SCSI adapter to the HP-HSC I/O bus converter.
10. Re-install the HP-HSC I/O bus converter in the computer system. Refer to the computer system manual for instructions on installing the HP-HSC bus converter.

---

## Connect Cable and Peripheral Devices

With the adapter installed in the computer, you can now connect the adapter cable and the peripheral devices.

### SCSI Cable Connection

Attach the SCSI cable to the adapter as follows:

1. Inspect the connector pins to be sure they are straight.
2. Carefully plug the cable connector into the SCSI adapter receptacle on the computer system. See figure 10. Note that figure 10 shows the cable being attached to an HP 9000 Series Kxxx computer; the procedure for the HP 9000 Series T6xx computer is very similar.

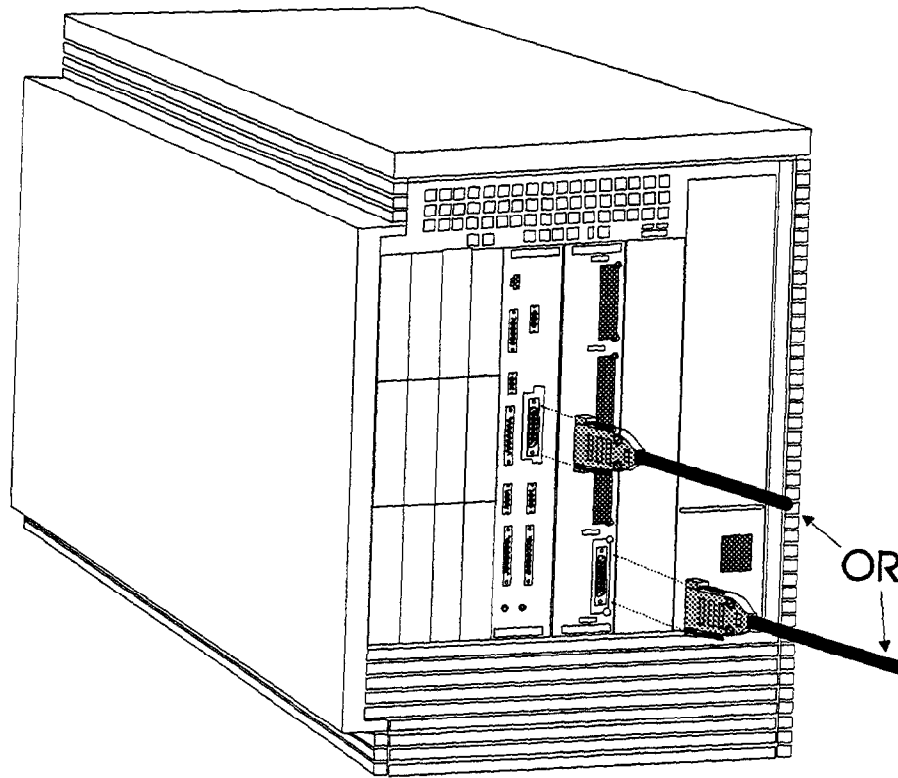
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**CAUTION**

***Do not*** bend any of the cable connector pins.  
Insert connectors by pushing straight in  
and remove them by pulling straight out.  
Do not rock connector top to bottom or side to side.

---

3. Secure the connector with the attached thumbscrews.
4. Secure the other end of the cable to a SCSI device.



**Figure 10. Connecting cables to the computer**

## Peripheral Device Connections

When connecting SCSI devices, follow these guidelines:

- Verify the host computer system is shut down. There should be no data transfer activity on the SCSI bus.
- Verify power is off to the peripheral device before connecting it to the SCSI bus.
- Check whether your devices contain internal SCSI bus terminators or require special terminators. If so, refer to your device manuals for instructions on how to prevent excessive or improper SCSI bus termination.
- Set switches or jumpers on your device(s) as appropriate. Be sure each SCSI device has a unique SCSI address. Remember the default address of the SCSI adapter is 7.
- If a device other than the adapter also supplies termination power, its optimal location is at the end of the SCSI bus. However, devices that supply termination power can be distributed anywhere along the bus.
- Use HP-supplied cables.
- Do not exceed the maximum SCSI bus length of 25 meters. This includes any bus lengths internal to peripheral devices. Refer to peripheral device or system configuration manuals for internal device lengths.
- Do not exceed the maximum number of devices supported. (The differential SCSI bus can support 16 devices including the SCSI adapter; however, only 7 SCSI Cascade Arrays can be connected. Note that SCSI Cascade Arrays are only supported on HSC for the HP 9000 Series 700 on NIO adapters.)

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## Terminate the SCSI Bus

Unless the SCSI bus is properly terminated, the bus will not operate properly. Terminators provide matching impedance on SCSI bus signal lines.

This product includes an external SCSI bus terminator to terminate the peripheral end of a differential SCSI bus. The terminator consists of a 68-pin, high density male connector with thumb screws.

Install the external terminator on the end of the SCSI bus (opposite the SCSI host adapter). If an intermediate device has internal terminations installed, remove them before attaching the external terminator.

---

**CAUTION** Only the two ends of a SCSI bus should be terminated. Excessive or improper termination may overload the adapter's termination power circuitry. Refer to device manuals for their proper operation on the SCSI bus.

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See figure 1 on page 12 for an example of SCSI bus termination.



---

## Switch Power on to Peripherals, then to the Computer

Before applying power to your system, follow these guidelines:

1. Verify all cables are connected and securely fastened.
2. Switch power on to your peripheral devices and wait for them to become ready *before* you switch power on to your computer.
3. Switch power on for your computer.

When the computer's power is switched on, power is supplied to the SCSI adapter. The SCSI adapter supplies termination power to the SCSI bus. Some peripheral devices may also supply SCSI bus termination power.

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**CAUTION** Do not switch power on or off on any device connected to an active SCSI bus. Similarly, devices should not be added to, or removed from, an active SCSI bus. Failure to comply may result in data corruption or loss, or damage to hardware.

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## **Configure the Operating System and the Adapter**

The HP-HSC Fast/Wide Differential SCSI adapter should auto-configure into supported HP-UX systems. When the operating system reboots it will determine your adapter has been installed and will install the correct software device files necessary for the operating system to communicate with peripherals connected to the adapter.

---

## **Verify Operation**

The only indication of proper operation on the adapter is the green TERM POWER LED located on the adapter bulkhead. If this LED is on, it indicates the adapter is supplying termination power to the SCSI bus.

If the TERM POWER LED is off, refer to the Service Information chapter of this manual for help.

If the TERM POWER LED is on but the SCSI device connected to the adapter does not operate properly and you suspect the adapter is malfunctioning, refer to the Service Information chapter of this manual for help.

## Service Information

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## Field Replaceable Units

Field replaceable units (FRUs) are assemblies or components that are authorized for field replacement.

Replaceable FRUs on the HSC Fast/Wide Differential SCSI adapter:

<b>Description</b>	<b>Part Number</b>
125V, 2A, LF Fuse	2110-0517
Termination resistors (Removed only during the installation procedure in a multi-initiator situation.)	1810-1418

## Exchange Assembly

The adapter may be replaced under the HP exchange program. Adapter part numbers are listed below:

	<b>HP A2969A</b>	<b>HP A3644A</b>
New adapter	A2969AX	A3644AX
Exchange adapter	A2969-69001	A3329-69109

---

## Troubleshooting Tools

Troubleshooting tools are used to identify faulty adapters. For this product, the following tools are available:

- Term Power LED
- Off-line diagnostics

### Term Power LED

The termination power (Term Power) LED is green and indicates the adapter is supplying termination power to the SCSI bus. During proper operation, this LED is on.

If the Term Power LED is off, this adapter is not supplying power to the SCSI bus. Possible faults include:

- Blown fuse
- Faulty adapter
- Faulty SCSI device
- Faulty cable connection (bent pins or improper seating of cable connector)

## Replacing the Term Power Fuse

To remove and replace the Term Power fuse (F3), proceed as follows:

1. Remove the SCSI adapter from the computer. See the removal instructions on page 42.
2. Pull the fuse out of its socket. The location of the fuse on the SCSI adapter is shown in figure 11. Visually verify if the fuse is open, or by using a continuity tester.

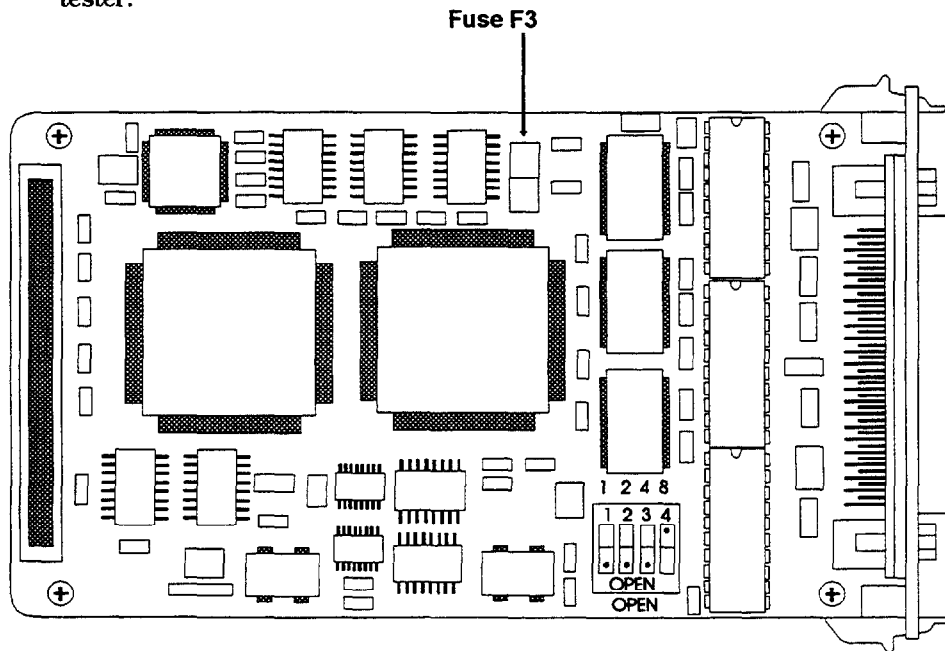
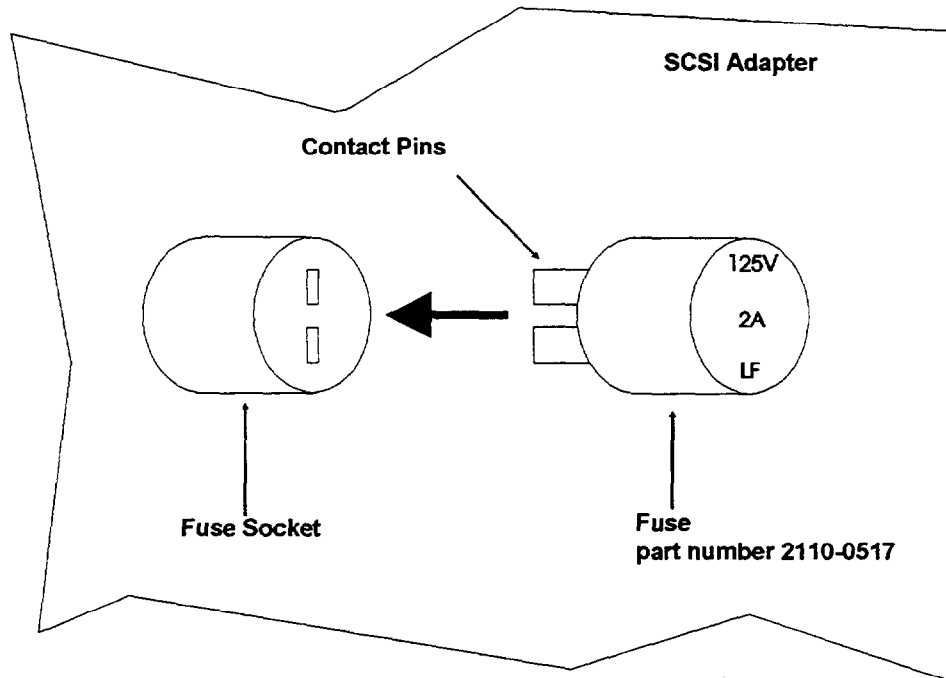


Figure 11. Term power fuse location

3. To install the replacement fuse, carefully align the two contact pins with the socket holes. Then press the fuse in (refer to figure 12). The fuse has no polarity, so the pins can go into either socket hole.



**Figure 12. Installing a replacement fuse**

## **Off-Line Diagnostics**

The Off-Line Diagnostic Environment (ODE) is used to test to the I/O adapter level in the computer system. IOTEST and MAPPER are modules of ODE that check the functionality of the I/O modules in the computer system. ODE is run from the Initial System Loader (ISL) on the system console.

### **MAPPER**

```
ODE> mapper  
MAPPER>run
```

The MAPPER utility provides the following hardware information:

1. Path #
2. Type ID (Architecture Module)
3. Hardware Version
4. Hardware and Firmware Versions
5. SCSI bus address of host adapter
6. Names and addresses of devices on the SCSI bus.

MAPPER automatically resets the SCSI bus.



## **IOTEST**

```
ODE> iotest  
IOTEST> run
```

The IOTEST's strategy is to systematically check the basic functionality of I/O modules in the system. This is accomplished by either making a PDC\_IODC call to invoke selftest, or by running a test within the diagnostic. IOTEST doesn't test the functionality of devices.

IOTEST is currently divided into 23 sections. Each section performs basic tests on a particular module.

---

**Note**            No on-line diagnostics are available for the HP-HSC SCSI adapter.

---

---

## Removal/Replacement Instructions

Removal of the SCSI adapter is the opposite of installation. Follow the instructions presented here and refer to the installation procedures on page 20.

- 
- CAUTION** The adapter contains electronic components that can be damaged by static electricity. To avoid damage, follow these guidelines:
- Store adapters in their conductive plastic bags.
  - If possible, work in a static-free area.
  - Handle adapters only by the edges. Do not touch electronic components or electrical traces. Use a grounding wrist strap connected to the metallic chassis of the host computer.
- 

### Removal/Replacement of the Adapter

For adapter removal, follow the procedures below:

1. Before removing the adapter, ensure the operating system is shut down and power to the computer and all devices is switched off and disconnected. Consult your computer documentation for proper shutdown procedures to avoid file corruption or loss of data.
2. Disconnect all cabling from the adapter.
3. Refer to the installation procedures on page 20.

To install a replacement adapter, follow the procedures described on page 20.

---

## **Reshipment Guidelines**

If any item of the product is to be returned to Hewlett-Packard for any reason, contact your HP Sales and Support Office to coordinate the return.

When returning the item, attach a tag that identifies the owner and indicates the reason for shipment. Include the part number of the item and date code.

Pack the item in the original factory packaging material if available, or a suitable substitute. Provide antistatic protection to applicable components or assemblies.



# Glossary

---

## **adapter**

A computer interface card and circuitry that provides the physical connection and data translation between the host computer's I/O bus and external devices or networks.

## **adapter slot**

The location where adapters attach to the backplane. See **Slot**.

## **backplane**

For an I/O bus, the computer's circuitry and connectors to which adapter cards connect.

## **HP-HSC**

Hewlett-Packard High-Speed System Connect. Name given to one of the computer system I/O buses.

## **ISL**

Initial System Loader. ISL implements the operating system independent portion of the bootstrap process. ISL is loaded and executed after self-test and initialization have completed successfully. When executed, it loads HP-UX or other operating environments (e.g., ODE "Offline Diagnostic Environment") as specified.

## **LED**

See light emitting diode.

**light emitting diode**

A small light emitting device used to provide status information.

**Mbits/sec**

Megabits per second (1,000,000 bits per second).

**medium, media**

The transmission connection between nodes. Most current LANs use cables (fiberoptic or copper), although radio and other broadcast media are possible.

**ODE**

Off-line Diagnostic Environment. A distributed diagnostic execution environment launched from ISL.

**SCSI**

Small Computer System Interface, often pronounced "skuzzy".

**SCSI address**

The binary representation of the unique address (0 to 15) assigned to each device and adapter on the SCSI bus. For bus arbitration the order of priority with highest first is: 7, 6, 5, 4, 3, 2, 1, 0, 15, 14, 13, 12, 11, 10, 9, 8. SCSI addresses are typically assigned during installation. The SCSI adapter is typically assigned address "7".

**SCSI bus**

The collection of SCSI signal lines that interconnect SCSI devices and adapters.

**SCSI ID**

SCSI identification. The bit-significant representation of the SCSI address referring to one of the bus signal lines DB (7 - 0, 15 - 8). See also SCSI address.

**slot**

The physical place in the back of the computer where an adapter plugs in. Each slot has a number, which in its hexadecimal form is used as part of the hardware address of the device. See adapter slot.

**terminator**

A device that contains a resistive network to terminate the peripheral end of a SCSI bus. The peripheral end of the SCSI bus may not need a terminator if the last peripheral device on the bus already contains SCSI termination resistors.

**termination**

To complete the bus circuitry at each end of a SCSI bus, the electrical lines (at each end only) must be terminated with a resistive network. The HP-HSC Fast/Wide Differential SCSI adapter contains termination resistor packs on the adapter and must be located at one end of the SCSI bus. See also terminator.





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# Reader Comment Sheet

## Fast/Wide Differential SCSI Adapter Installation and Service

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