USER'S GUIDE

LSI22910
PCI to Dual Channel Ultra2 SCSI Host Adapter

Version 1.1

December 2000

LSI LOGIC®

S14018.A

Electromagnetic Compatibility Notices

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Shielded cables for SCSI connection external to the cabinet are used in the compliance testing of this Product. LSI Logic is not responsible for any radio or television interference caused by unauthorized modification of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by LSI Logic. The correction of interferences caused by such unauthorized modification, substitution, or attachment will be the responsibility of the user.

The LSI Logic LSI22910 is tested to comply with FCC standards for home or office use.

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

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

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取扱説明書に従って正しい取り扱いをして下さい。

This is a Class B product based on the standard of the Voluntary Control Council for Interference from Information Technology Equipment (VCCI). If this is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.

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Document DB15-000105-01, Second Edition (December 2000).
This document describes the LSI Logic LSI22910 PCI to Dual Channel Ultra2 SCSI Host Adapter and will remain the official reference source for all revisions/releases of this product until rescinded by an update.

To receive product literature, visit us at http://www.lsilogic.com.

Preface

This book is the primary reference and user's guide for the LSI Logic LSI22910 PCI to Dual Channel Ultra2 SCSI Host Adapter. It contains a complete functional description for the LSI22910 and includes complete physical and electrical specifications for the LSI22910.

Audience

This document assumes that you have some familiarity with microprocessors and related support devices. The people who benefit from this book are:

- Engineers and managers who are evaluating or designing the host adapter board for possible use in a system
- End users who are installing the host adapter board into their computer

Organization

This document has the following chapters and appendixes:

- Chapter 1, **Using the LSI22910**, defines the interfaces and characteristics of the LSI22910.
- Chapter 2, **Installing the LSI22910**, provides both quick and detailed installation instructions.
- Chapter 3, **Configuring the LSI22910**, describes the SCSI BIOS Configuration Utility to configure adapter and device settings.
- Appendix A, **Technical Specifications**, describes the physical and operational environments of the LSI22910.

- Appendix B, **Glossary of Terms and Abbreviations**, provides definitions of various terminology that is referenced throughout this user's guide.

Related Publications

PCI Storage Device Management System SDMS™ 4.0 User's Guide, Order Number S14007.A

Revision Record

Revision	Date	Remarks
1.0	5/99	Final version.
1.1	12/00	All product names changed from SYM to LSI.

Contents

Tables

Chapter 1
Using the LSI22910

This chapter describes the LSI22910 PCI to Dual Channel Ultra2 SCSI Host Adapter interface to PCI computer systems and includes these topics:

1.1 General Description

The LSI Logic LSI22910 provides two SCSI-3, Ultra2 SCSI interfaces to PCI computer systems that require BIOS support on the add-in SCSI adapter. Installing this adapter in your PCI system allows connection of SCSI devices over a SCSI bus.

The LSI22910 is a 16-bit Low Voltage Differential (LVD) and Single-Ended (SE) SCSI solution for your computer. This board can support legacy Fast SCSI devices, Ultra SCSI devices, and the newest Ultra2 SCSI devices.

The LSI Logic Storage Device Management System (SDMS™) software operates the board. The design of the board does not prevent other SCSI software from being used with it. BIOS support for this host adapter is incorporated on the board in a 128K Flash device.

This guide, along with the *PCI Storage Device Management System SDMS 4.0 User’s Guide,* contains product information and installation instructions to help you gain the full benefits of the LSI22910.

1.2 Features

This section provides a high level overview of the PCI Interface, the SCSI Interface, and Board Characteristics for the LSI22910.

1.2.1 PCI Interface

The PCI interface includes these features:

- Full 32-bit or 64-bit (33 MHz) DMA bus master
- Zero wait-state bus master data bursts
- PCI Universal 3.3 V/5 V bus support

1.2.2 SCSI Interface

The SCSI interface includes these features:

- Two separate SCSI channels
- 16-bit SE/LVD
- Automatically enabled termination
- Two connectors:
  68-pin Very High Density Cable Interconnect (VHDCI) for each external channel
  68-pin high density for each internal channel
- Fast, Ultra, and Ultra2 data transfer capability
- SCSI termination power (TERMPWR) source with autoresetting circuit breaker and TERMPWR shorted LED for each channel
- SCSI Plug and Play
- SCSI Configured AutoMatically (SCAM)
- Flash Electronically Erasable Programmable Read Only Memory (EEPROM) for BIOS storage
- Serial NonVolatile Random Access Memory (NVRAM) on each channel for user configuration utility and SCAM information storage
- SCSI activity LED for each channel

1.2.3 Board Characteristics

The board characteristics for the LSI22910 are:

- PCI board dimensions
  Approximately 9.5 x 4.0 inches
- Universal 64-bit PCI card edge connector
- ISA/EISA bracket

1.3 Interface Descriptions

This section provides a more detailed explanation about the PCI Interface, the SCSI Interface, the SCSI Activity LED Interface, and Wide Ultra2 SCSI.

1.3.1 The PCI Interface

PCI is a high-speed standard local bus for interfacing a number of I/O components to the processor and memory subsystem in a high end PC. The PCI functionality for the LSI22910 is contained within the LSI Logic LSI53C896 PCI to SCSI I/O Processor chip. The LSI53C896 connects directly to the PCI bus and generates timing protocol in compliance with the PCI Local Bus Specification Revision 2.1 standard.

The PCI interface operates as a 32-bit or 64-bit DMA bus master. The connection is made through edge connector J1 (see Figure 2.1 on page 2-5). The signal definitions and pin numbers conform to the PCI Local Bus Specification Revision 2.1 standard. The LSI22910 conforms to the PCI universal signaling environment for a 5 V or 3.3 V PCI bus.

1.3.2 The SCSI Interface

The SCSI functionality for the LSI22910 is contained within the LSI Logic LSI53C896. The LSI53C896 connects directly to the SCSI buses for SE or LVD SCSI applications and generates timing and protocol in compliance with the SCSI standard. Each SCSI interface operates at a burst transfer rate of up to 40 Mbytes/s for wide SE transfers, and up to 80 Mbytes/s for wide LVD SCSI transfers.

The SCSI interfaces on the LSI22910 operate as two 16-bit, synchronous or asynchronous, SE or LVD, and support Ultra2 SCSI protocols and 16-bit arbitration. The interface is made through connectors J2 and J5 for Channel A and J3 and J4 for Channel B. Connectors J2 and J3 are 68-pin VHDCI right-angle receptacles that protrude throughout the ISA/EISA bracket. Connectors J4 and J5 are 68-pin high density latching right-angle receptacles for internal SCSI connections. See Figure 2.1 on page 2-5 for the location of these connectors.

The LSI22910 provides autosensing, dual mode SE/LVD SCSI termination. Termination is normally enabled. When a SCSI device is sensed to be connected to both internal and external connectors, termination for that channel is automatically disabled.

The LSI22910 supplies SCSI bus TERMPWR through a blocking diode and self-resetting 1.5 A short circuit protection device. An on-board LED lights up when TERMPWR is shorted and turns off.

A 40 MHz oscillator is installed on the LSI22910 board to provide the clock frequency to the LSI53C896 that is necessary to support Wide Ultra2 SCSI transfers of up to 80 Mbytes/s.

1.3.3 SCSI Activity LED Interface

The LSI22910 LED interface is a four-wire arrangement that allows you to connect an LED harness to the board. The connector on the LSI22910 is J6 for both channels. See Table A.5 on page A-9 for the signal name and pin numbers for this LED interface.

Four individual LEDs per channel are on the LSI22910 so you can decode the operating state of the board. The four activity LEDs are:

- SCSI Activity – Green LED, right edge of board
- TERMPWR SHORTED – Yellow LED, right edge of board
- LVD Mode – Green LED, right edge of board in LVD Mode
- TERMPWR GOOD – Green LED, right edge of board when TERMPWR is above + 3 V

1.3.4 Wide Ultra2 SCSI

The LSI22910 fully supports Wide Ultra2 SCSI. This interface is an extension of the SCSI-3 family of standards that expands the bandwidth of the SCSI bus to allow faster synchronous data transfers, up to 80 Mbytes/s. Wide Ultra2 SCSI provides a doubling of the data rate over the Ultra2 SCSI interface, while it increases cable lengths and allows a larger number of devices on the cable than Ultra2 SCSI interfaces.

Special SCSI cables are specified for operation with Wide Ultra and Ultra2 SCSI devices. You must consider the total number of devices and the length of your SCSI bus when setting up your system. See Chapter 2, "Installing the LSI22910," for a more detailed explanation of SCSI bus connections.

When you purchased the LSI22910 kit, the cable provided in the kit is matched for a Fast/Ultra/Ultra2 SE or LVD operation. This cable also has built-in LVD termination since most Ultra2 hard disk drives are not made with on-board LVD termination. Table 1.1 provides an overview of standard SCSI cable specifications.

Table 1.1 Standard Cables

STA Term	Maximum Bus Length, Meters[1]		Maximum Devices
	SE	LVD	
Wide Ultra SCSI	1.5	Note[2]	8
Wide Ultra SCSI	3	Note[2]	4
Wide Ultra2 SCSI	Note[3]	12	16

1. This parameter may be exceeded in point-to-point and engineered applications.
2. LVD was not defined in the original SCSI standards for this speed. If all devices on the bus support LVD, then 12-meter operation is possible at this speed. However, if any device on the bus is SE only, then the entire bus switches to SE mode, and the distances in the SE column apply.
3. SE and high power differential are not defined at Ultra2 speeds.

Chapter 2
Installing the LSI22910

This chapter provides instructions on how to install the LSI22910 and includes these topics:

2.1 Quick Installation Procedure

This section is provided for the experienced computer user with prior host adapter installation and SCSI bus setup experience. If you prefer a more detailed guidance for installing the LSI22910, please follow the instructions in Section 2.2, “Detailed Installation Procedure.”

For safe and proper installation, check the user’s manual supplied with your computer and perform the following steps.

Step 1. *Ground yourself* before removing this host adapter board. Remove the LSI22910 from the packing and check that it is not damaged. An example of this host adapter board is shown in Figure 2.1 on page 2-5.

Step 2. Switch off and unplug the system.

Step 3. Remove the cabinet cover on your computer to access the PCI slots.

Caution: *Ground yourself* by touching a metal surface before handling boards. Static charges on your body can damage electronic components. Handle plug-in boards by the edge; do not touch board components or gold connector contacts. The use of a static ground strap is recommended.

Step 4. Locate the slots for PCI plug-in board installation. A 32-bit slot may be used, but full performance requires a 64-bit slot. Refer to the user's manual supplied with your computer to confirm the location of the PCI slots. The LSI22910 requires a PCI slot that allows bus master operation. See Figure 2.2.

Step 5. Remove the blank bracket panel on the back of the computer aligned with the PCI slot you intend to use. Save the bracket screw.

Step 6. Carefully insert edge connector J1 of the host adapter into the PCI slot. Make sure the edge connector is properly aligned before pressing the board into place. See the example shown in Figure 2.2.

Note: You may notice that the components on a PCI host adapter face the opposite way from non-PCI boards you have in your system. This is correct, and the board is keyed to go in only one way.

Step 7. The bracket around the connectors J2 and J3 should fit where the blank panel was removed. Secure it with the bracket screw before making the internal and external SCSI bus connections (see Figure 2.2).

Step 8. If you are connecting any internal SCSI devices, plug a 68-pin connector on the end of the internal SCSI ribbon cable into the connector J4 or J5 (see Figure 2.1). Make certain to match pin 1 on both connectors. Chain your internal devices on this cable.

Step 9. Connect the LED cable if desired. This is designed to drive the front panel LED found on most PC cabinets to indicate activity on the SCSI bus. See Table A.5 on page A-9 for the signal name and pin numbers for this LED interface.

Step 10. Replace the cabinet cover as described in the user's manual for your computer.

Step 11. Make all external SCSI bus connections. Finally, refer to the *PCI Storage Device Management System SDMS 4.0 User's Guide* (or the guide for the software that you will use) to load the driver software for your particular operating system.

Remember: The SCSI bus requires proper termination and no duplicate SCSI IDs.

2.2 Detailed Installation Procedure

This section provides step-by-step instructions for installing the LSI22910, and connecting it to your SCSI peripherals. If you are experienced in these tasks, you may prefer to use the preceding Section 2.1, "Quick Installation Procedure." If you are not confident that you can perform the tasks as described here, LSI Logic suggests getting assistance.

2.2.1 Before You Start

Before starting, look through the following task list to get an overall idea of the steps to perform.

- Open your PC cabinet and select an open PCI slot
- Insert the host adapter
- Connect the internal and external SCSI peripherals
- Terminate the SCSI bus
- Set the SCSI IDs
- Make any configuration changes
- Close your PC cabinet
- Install the software

The SCSI host adapter acts on your computer's behalf as the host to your suite of SCSI peripherals. Each chain of SCSI peripheral devices and their host adapter work together, and they are referred to as a SCSI bus.

Each SCSI host adapter that you install can act as host for up to 15 peripheral devices (depending on the SCSI bus speed), not including the adapter itself.

2.2.2 Inserting the Host Adapter

For safe and proper installation, check the user's manual supplied with your computer and perform the following steps.

Step 1. *Ground yourself* before removing this host adapter board. Remove the LSI22910 from the packing and check that it is not damaged. An example of this host adapter board is shown in Figure 2.1.

Step 2. Switch off and unplug power cords for all components in your system.

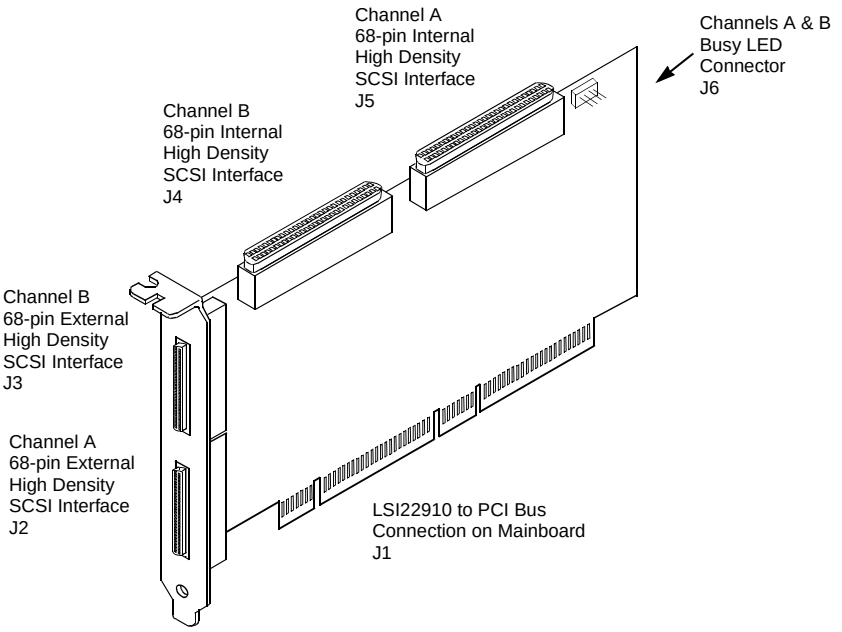
Step 3. Remove the cabinet cover on your computer to access the PCI slots.

Caution: *Ground yourself* by touching a metal surface before removing the cabinet cover. Static charges on your body can damage electronic components. Handle plug-in boards by the edge; do not touch board components or gold connector contacts. The use of a static ground strap is recommended.

Step 4. Locate the slots for PCI plug-in board installation. A 32-bit slot may be used, but full performance requires a 64-bit slot. Refer to the user's manual for your computer to confirm the location of the PCI slots. The LSI22910 requires a PCI slot that allows bus master operation. See Figure 2.2.

Step 5. Remove the blank bracket panel on the back of the computer aligned with the PCI slot that you intend to use. Save the bracket screw.

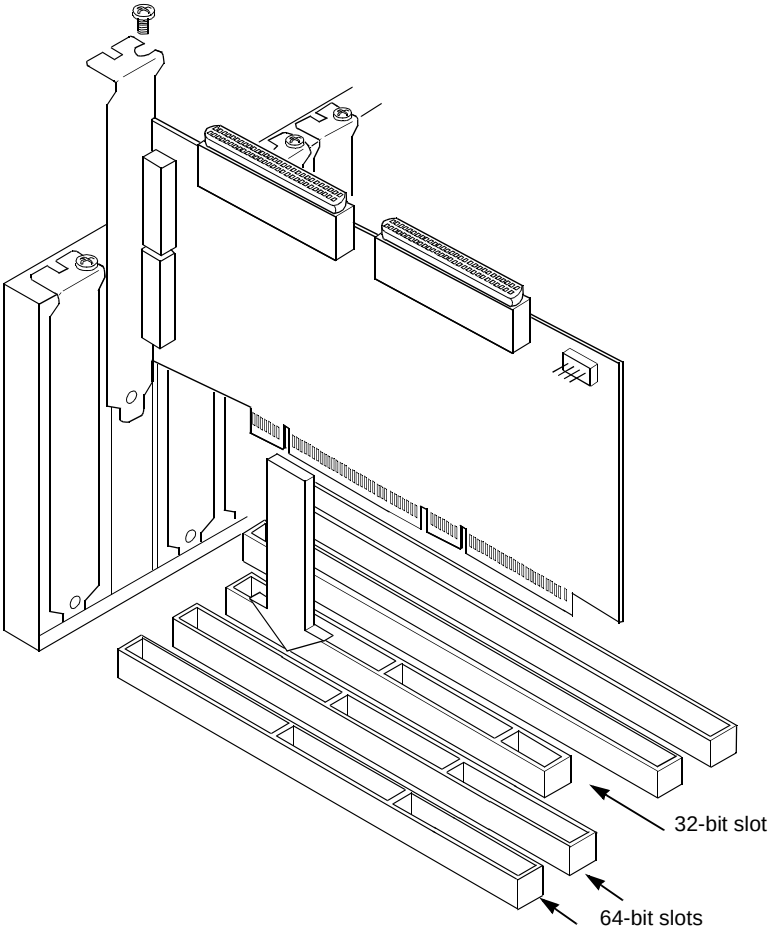
Figure 2.1 Hardware Connections for the LSI22910



Step 6. Carefully insert edge connector J1 (see Figure 2.1) of the host adapter into the PCI slot. Make sure the edge connector is properly aligned before pressing the board into place as shown in Figure 2.2.

Note: You may notice that the components on a PCI host adapter face the opposite way from non-PCI adapter boards you have in your system. This is correct, and the board is keyed to go in only one way.

Figure 2.2 Inserting the Host Adapter



Step 7. The bracket around the connectors J2 and J3 (see Figure 2.1) should fit where you removed the blank panel. Secure it with the bracket screw (see Figure 2.2) before making the internal and external SCSI bus connections.

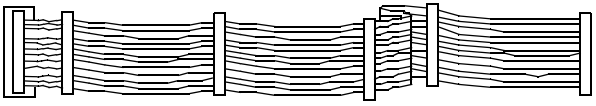
2.2.3 Connecting the SCSI Peripherals

All internal SCSI bus connections to the LSI22910 are made with an unshielded, 68-conductor ribbon cable (see Figure 2.3). One side of this cable is marked with a color to indicate the pin-1 side. The connectors on this cable are keyed to ensure proper pin-1 connection. Use Ultra/Ultra2 rated cables for these bus speeds. (See Table 1.1.)

All external SCSI bus connections to the LSI22910 are made with shielded, 68-conductor cables (see Figure 2.3). The connectors on this cable are always keyed to ensure proper pin-1 connection. Some internal cables come with a SE/LVD on one end. This end should be furthest from the host adapter.

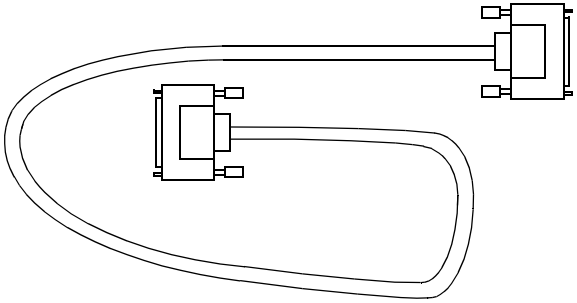
Figure 2.3 SCSI Cables

SCSI Cable for Internal Connections



68-pin
High Density

SCSI Cable for External Connections



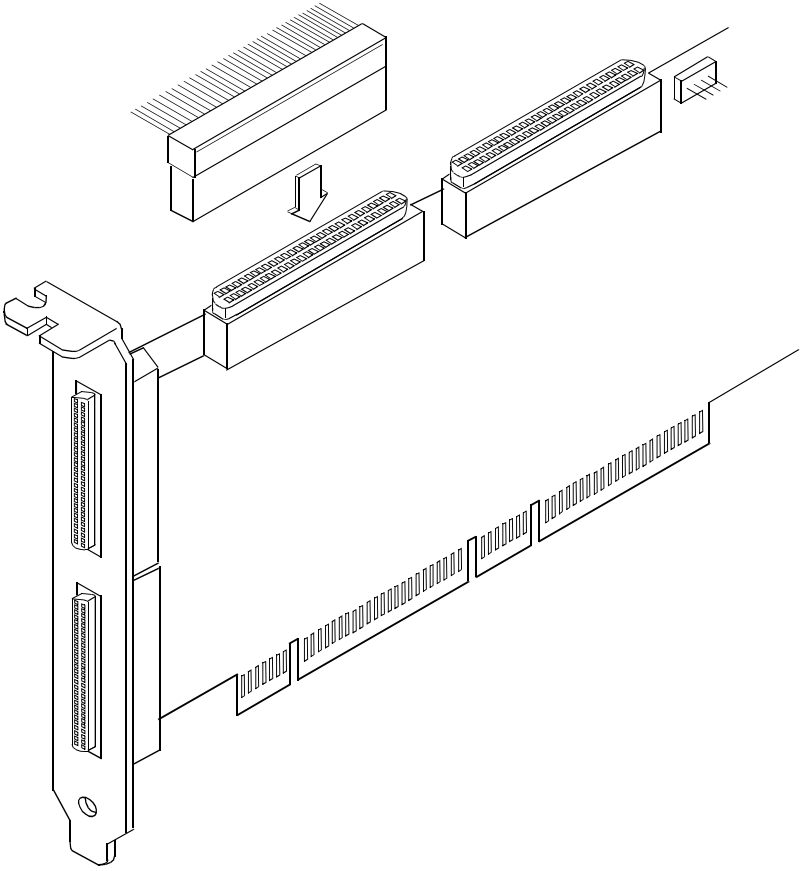
68-pin
VHDCI

2.2.4 Making Internal SCSI Bus Connections

This section provides step-by-step instructions about making internal SCSI bus connections.

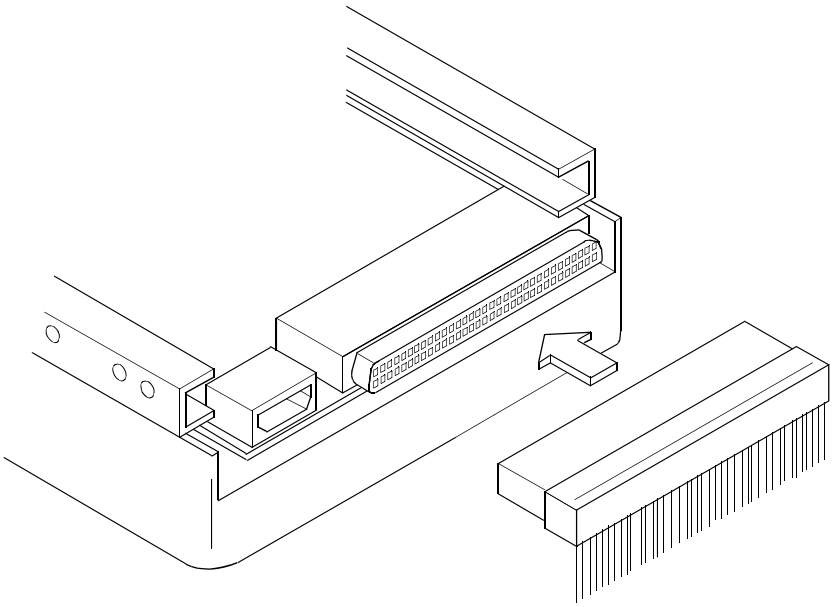
Step 1. To connect an internal SCSI device, plug the 68-pin connector on one end of a wide internal SCSI ribbon cable into the connector J4 or J5. See the example in Figure 2.4.

Figure 2.4 Internal SCSI Ribbon Cable to Host Adapter



Step 2. Plug the 68-pin connector on the other end of the internal SCSI ribbon cable into the SCSI connector on the internal SCSI device. Pin 1 must match on all connections. An example of this connection appears in Figure 2.5.

Figure 2.5 Internal SCSI Ribbon Cable to Internal SCSI Device Connection



Step 3. To plug in additional internal SCSI devices, use an internal SCSI ribbon cable with the required number of connectors attached along its length. See the example in Figure 2.6.

An example of multiple internal SCSI devices chained together is shown in Figure 2.7. Make sure to match pin 1 on all connections.

Figure 2.6 Connecting Additional Internal SCSI Devices

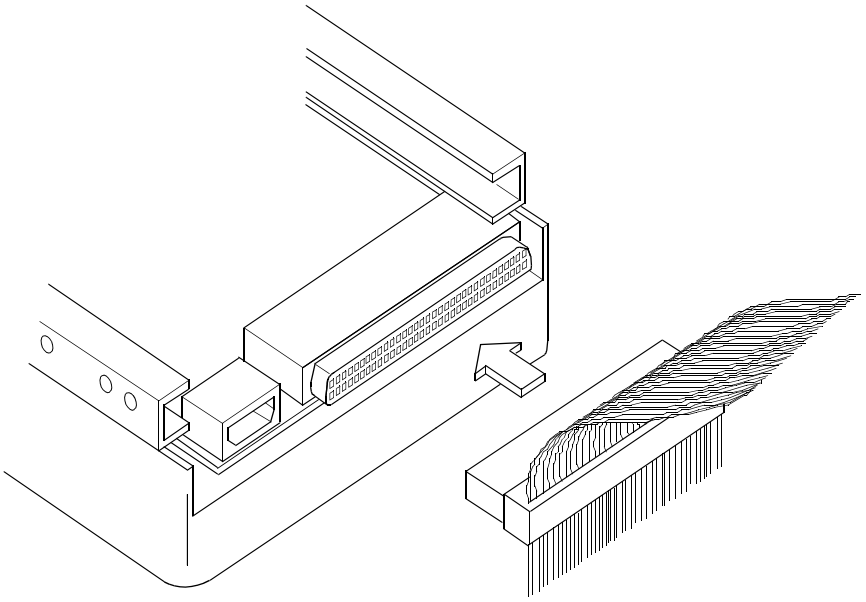
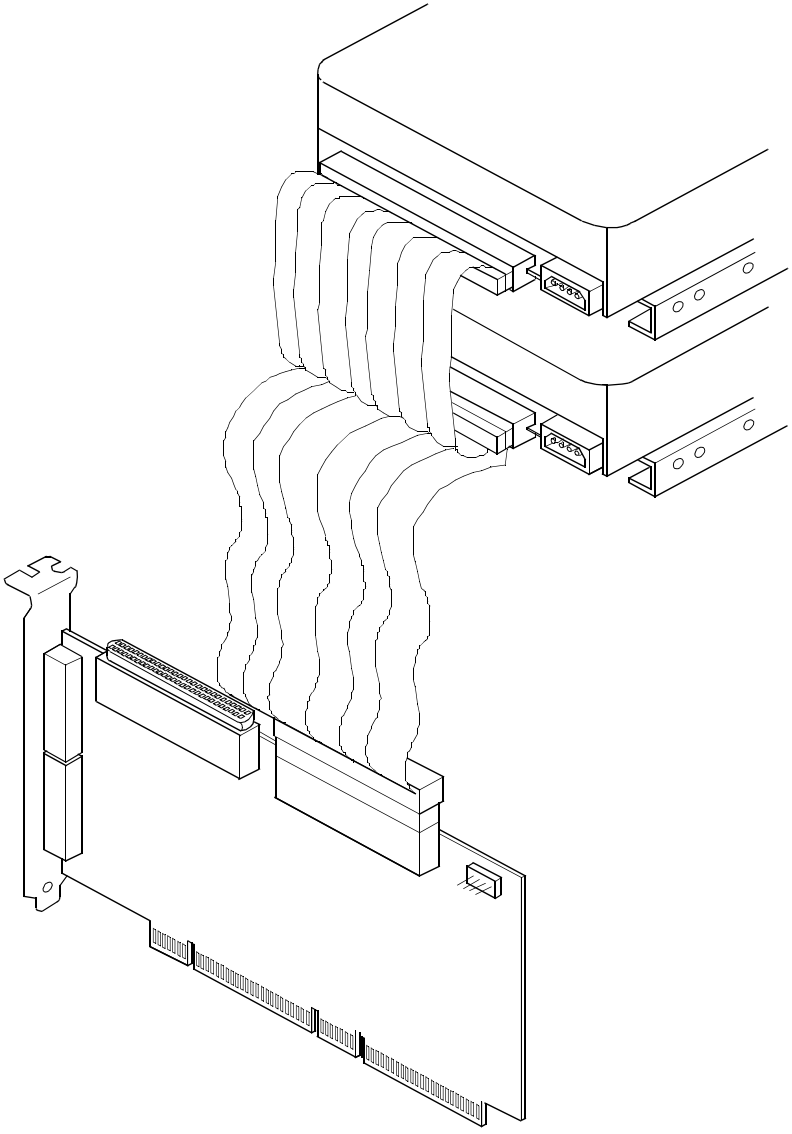


Figure 2.7 Multiple Internal SCSI Devices Chained Together



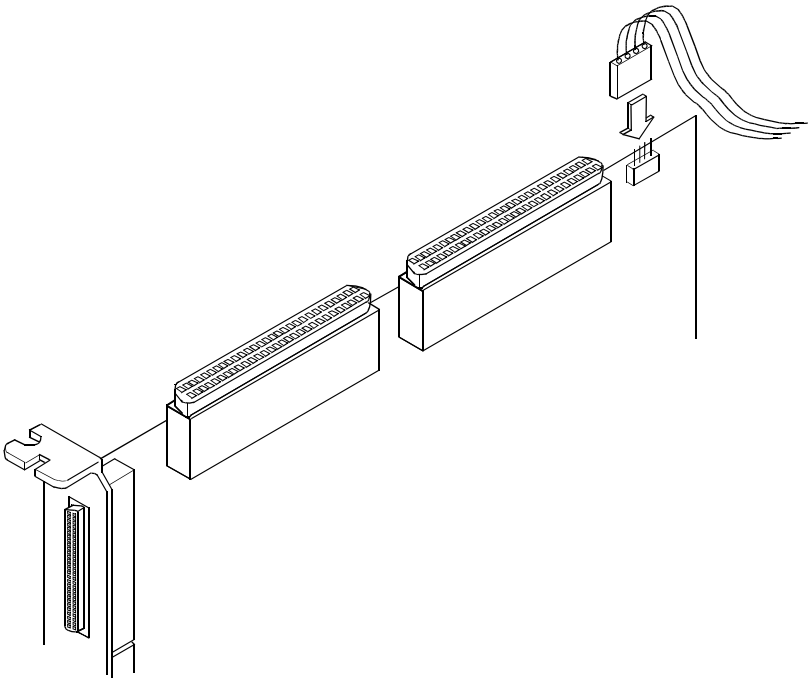
Step 4. Most PC cabinets are designed with a front panel LED, which may already be connected to an existing IDE controller. You may connect this LED cable to your SCSI host adapter, as shown in Figure 2.8. This connection causes the front panel LED to indicate activity on the SCSI bus.

An LED is also on the LSI22910, which indicates activity on the SCSI bus. The Busy LED connector J6, as shown in Figure 2.1, is not keyed. The J6 connector is a 4-pin one row right-angle header for both Channel A and Channel B.

Some LED cables have only two wires. In this case, place the connector on one end of J6. If the LED does not light during SCSI bus activity from this host adapter, you may have to rotate the LED cable 180° on J6.

See Table A.5 on page A-9 for connector pinout information.

Figure 2.8 SCSI LED Connector



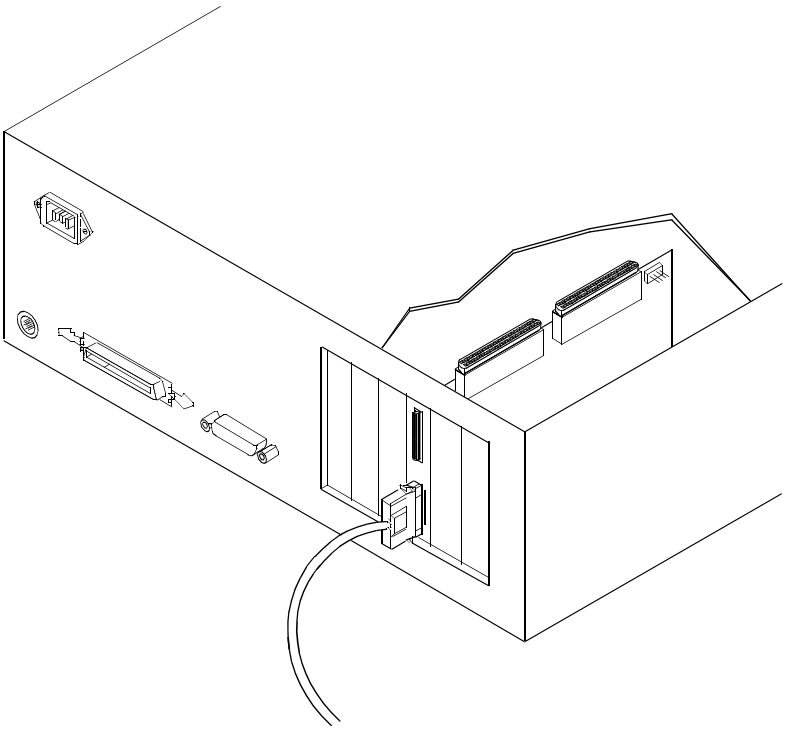
2.2.5 Making External SCSI Bus Connections

This section provides step-by-step instructions about making external SCSI bus connections.

Step 1. If you need to connect external SCSI devices to the LSI22910, plug the 68-pin VHDCI connector on one end of a shielded external high density cable (see Figure 2.3) into the host adapter connector J2 or J3 (see Figure 2.1).

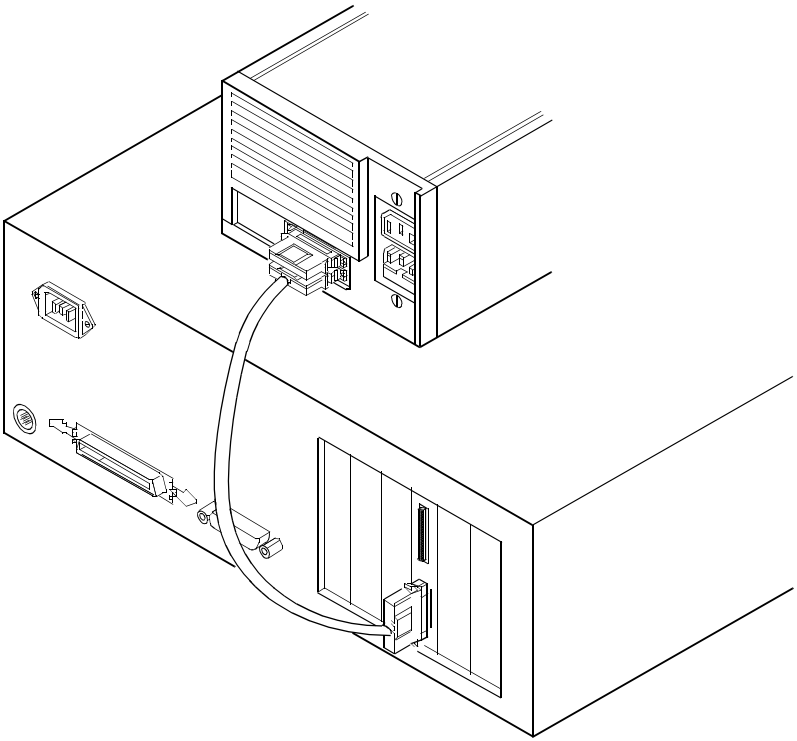
This connector is now bracketed onto the back panel of your computer. Figure 2.9 shows how this connection is made.

Figure 2.9 External Cable to Host Adapter



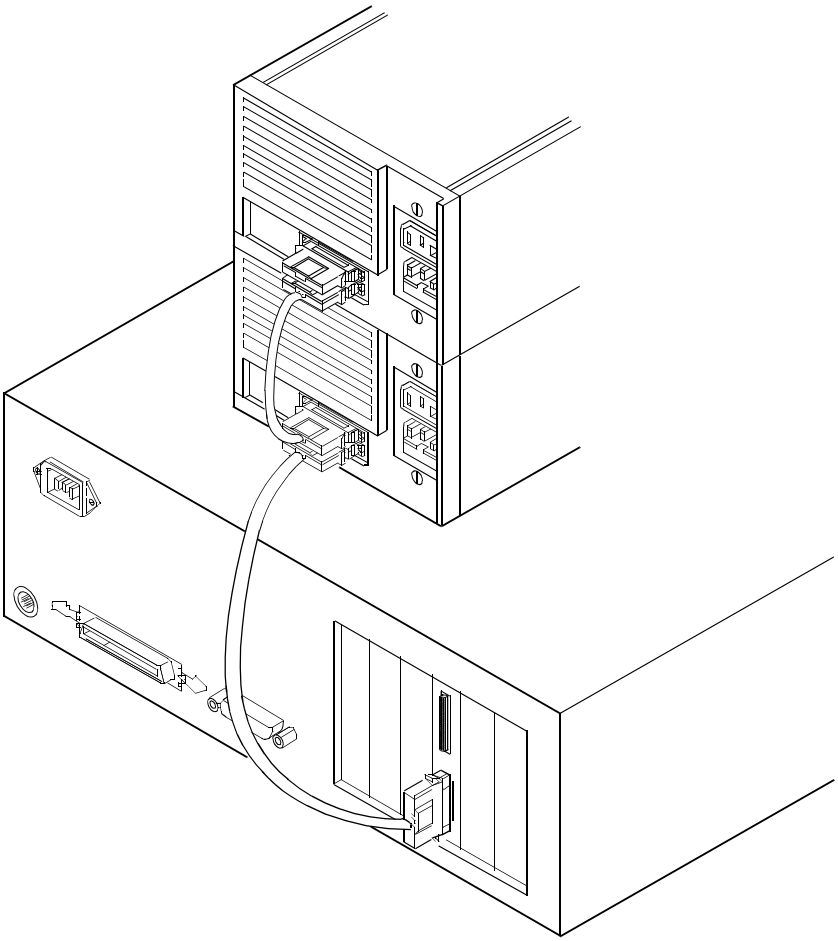
Step 2. Plug the 68-pin connector on the other end of the shielded external SCSI cable into the SCSI connector on your external SCSI device. An example of this connection is shown in Figure 2.10.

Figure 2.10 External Cable to External SCSI Device



Step 3. If you need to connect more than one external SCSI device to your host adapter, chain them together with shielded external SCSI cables. See the example in Figure 2.11.

Figure 2.11 Multiple External SCSI Devices Chained Together



2.2.6 SCSI Bus Termination

The devices making up the SCSI bus are connected serially (chained together) with SCSI cables. The first and last physical SCSI devices connected on the ends of the SCSI bus must have their terminators active. All other SCSI devices on the bus must have their terminators removed or disabled. Remember that your LSI22910 is also on the SCSI bus—its termination is automatically enabled when it is connected to the end of the bus.

LVD peripheral devices are normally terminated with external terminators, but are sometimes set with jumpers or with a switch on the peripheral. Refer to the peripheral manufacturer's instructions and to the user's manual for your computer for information on how to identify the terminator setting of each device and how to change it.

Caution: The autoenable/disable sensing feature on your LSI22910 may enable termination erroneously if it is directly cabled to another SCSI device or host adapter using the same sensing method. The LSI22910 senses SCSI devices by detecting the ground signal on conductor 50 of a 68-conductor SCSI cable.

Two locations for shunts are on the board for autotermination override: A_TERM for Channel A, and B_TERM for Channel B.

When connecting another host adapter to a connector, termination must be disabled on the board that is not at the end of the bus through software control or by adding a shunt.

The LSI22910 automatically controls SCSI bus termination for three different bus configurations, depending on the use of connectors (see Figure 2.1). The three bus configurations are:

- Only for internal SCSI connections,
- Only for external SCSI connections, and
- Connections to both internal and external SCSI connections.

Termination on the LSI22910 for these three different bus configurations are discussed below.

Autotermination enabled

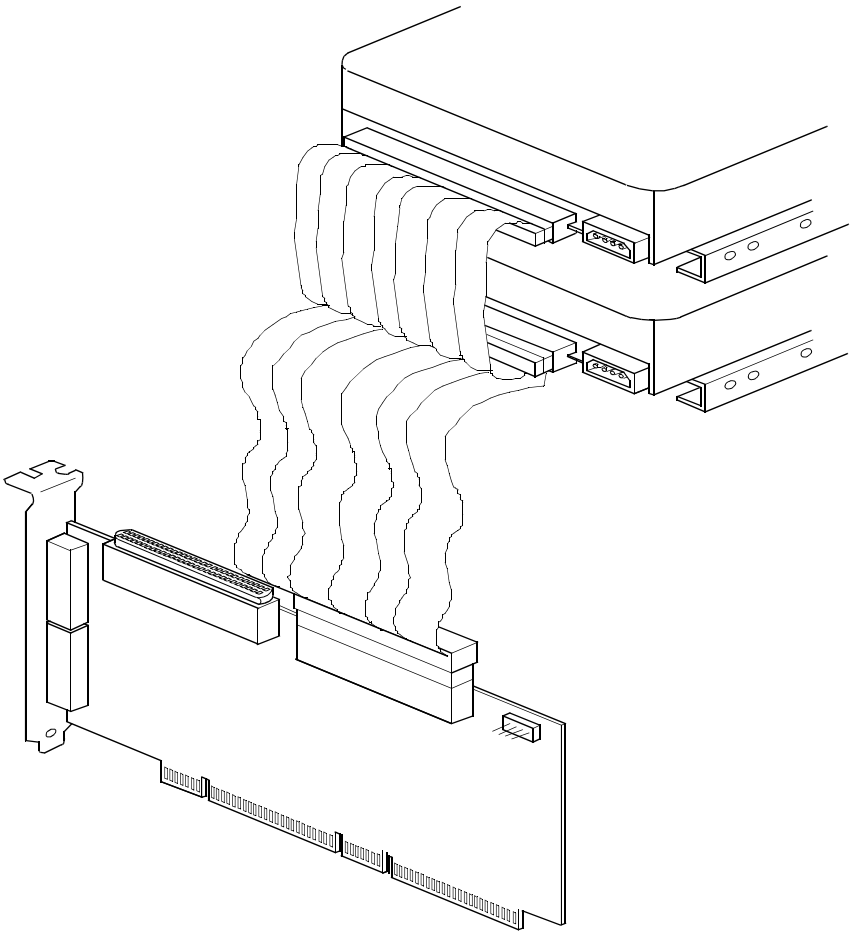
Termination disabled

2.2.7 Internal SCSI Connections

If you have only internal SCSI device connections on your host adapter, you must terminate the last internal device on the SCSI bus. You must disable the termination on all other devices. Termination on your host adapter is automatically enabled in this case.

Figure 2.12 shows an example of how termination is determined for this SCSI bus configuration.

Figure 2.12 Internal SCSI Device Termination

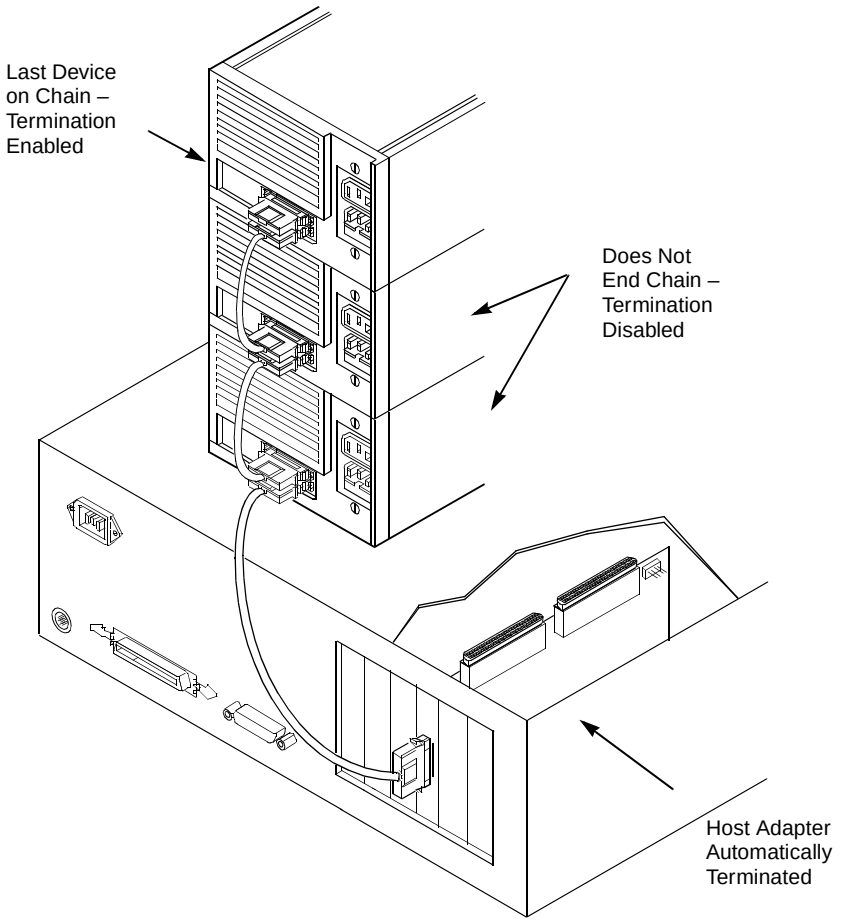


2.2.8 External SCSI Connections

If you have only external SCSI device connections on your host adapter, you must terminate the last external device on the SCSI bus. You must disable the termination on all other devices. Termination on your host adapter is automatically enabled in this case.

Figure 2.13 shows an example of how termination is determined for this SCSI bus configuration on your host adapter Channel B.

Figure 2.13 External SCSI Device Termination

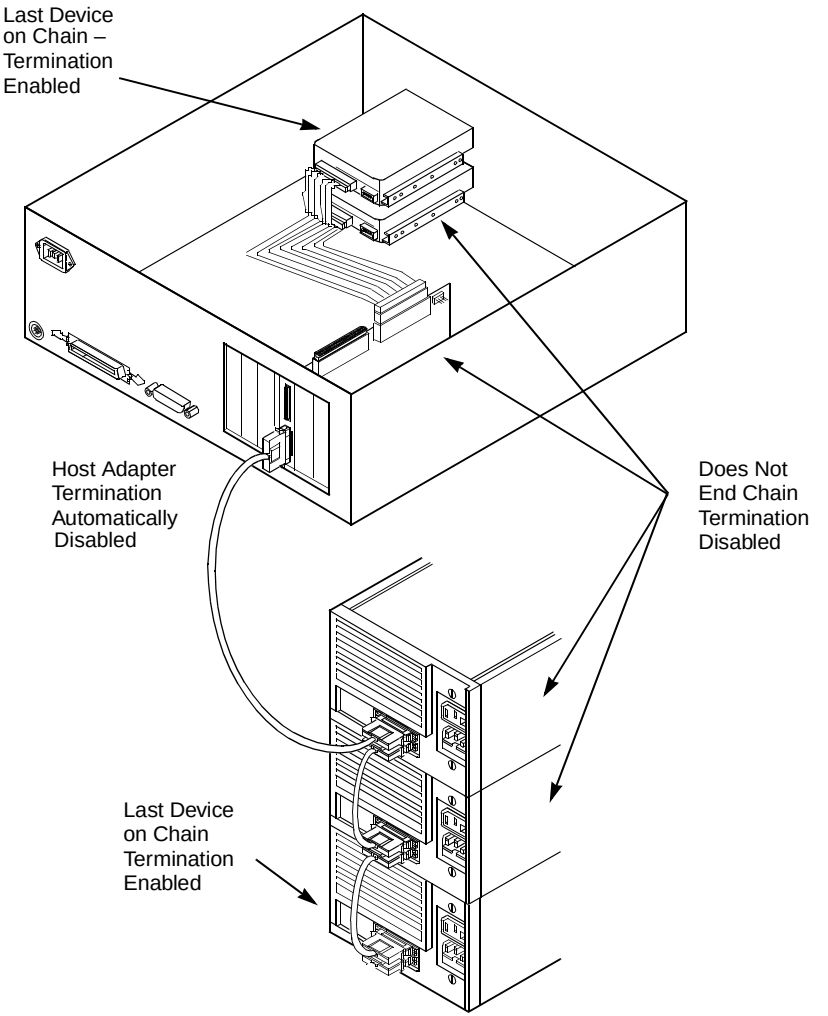


2.2.9 Internal and External SCSI Connections

If internal and external SCSI device connections to the host adapter have been made, then terminate the last internal and external devices on the SCSI bus. You must disable the termination on all other devices. Termination on your host adapter is automatically disabled in this case.

Figure 2.14 shows an example of how termination is determined for this SCSI bus configuration on your host adapter Channel B.

Figure 2.14 Internal and External SCSI Device Termination



Note: If an internal connection to another LSI22910 has been made, or any connection to a device that uses the same sensing method for automatic termination as your LSI22910, override the termination for that channel by adding a shunt or through software control.

2.2.10 Setting SCSI IDs

Set each SCSI device and the host adapter to a separate SCSI ID 0 through 15 for a 16-bit SCSI. SCSI ID 7 is the preset host adapter setting, giving it the highest priority on the SCSI bus. If you plan to boot your computer from a hard disk drive on the SCSI bus, that drive should have SCSI ID 0, or the lowest SCSI ID on the bus. Chapter 3, "Configuring the LSI22910," explains how to set your host adapter ID using the LSI Logic SCSI BIOS Configuration Utility.

The peripheral device SCSI IDs are usually set with jumpers or with a switch on the peripheral. Refer to the peripheral manufacturer's instructions and to the user's manual for your computer to determine the ID of each device and how to change it. No duplication of SCSI IDs is allowed on a SCSI bus.

Note: As SCAM support is off by default for the LSI53C896 Version 4.11.00 and above, you may choose to turn this on to assist in assigning SCSI IDs.

Step 1. Determine the SCSI ID of each device on the SCSI bus. Note any duplications.

Step 2. Make any necessary changes to the SCSI IDs and record the IDs for future reference. Table 2.1 is provided as a place to keep this record.

Table 2.1 SCSI ID Record

SCSI ID	SCSI Device Channel A	SCSI Device Channel B
15		
14		
13		
12		
11		
10		
9		
8		
7	LSI22910 (default)	LSI22910 (default)
6		
5		
4		
3		
2		
1		
0		

2.2.11 Setting Interrupts

Normally, you do not change the default interrupt routing for the LSI22910, since performance is usually increased by having two separate interrupts. However, if your system does not support two separate interrupts, INTA/INTB (see Figure A.1) is provided to change the interrupt routing. Table 2.2 explains the jumper settings.

Table 2.2 Setting Interrupts

Jumper Setting	Condition
Jumper Out (default) 	SCSI Channel B is routed to INTB[1] on the PCI bus.
Jumper In 	SCSI Channel B is rerouted at power up to INTA[1] on the PCI bus.

1. Active LOW signal.

2.3 Completing the Installation

Before replacing the cover on your computer, review this installation procedure check list. This can save you effort later.

Verify Installation Procedures	Done
Host adapter connection in PCI bus slot secure	
Internal SCSI bus connections secure (pin-1 continuity)	
External SCSI bus connections secure	
Proper SCSI bus termination established	
Unique SCSI IDs set and recorded for each device	

Step 1. Replace the cabinet cover on your computer.

Step 2. Plug in all power cords, and switch on power to all devices and your computer.

Step 3. Wait for your computer to boot up.

Step 4. To change the configuration of your host adapter, see Chapter 3, “Configuring the LSI22910.” Finally, refer to the *PCI Storage Device Management System SDMS 4.0 User’s Guide* (or the guide for the software you will use) to load the driver software for your particular operating system.

Chapter 3
Configuring the LSI22910

This chapter describes configuring the LSI22910 and includes these topics:

3.1 When to Configure the LSI22910

In most cases you should not need to change the default configuration of your host adapter. You may decide to alter these default values if there is a conflict between device settings, or if you need to optimize system performance.

Table 3.1 and Table 3.2 list the configuration settings you can change. The global settings affect the host adapter and all SCSI devices that are connected to it. The device settings affect only individual SCSI devices.

Table 3.1 Global Default Settings

Settings for the Host Adapter and All Devices	Default Settings
SCAM Support	Off[1]
Parity Checking	Enabled
Host Adapter SCSI ID	7
Scan Order	Low to High (0-Max)

1. After 4.11.00 version of the BIOS.

Table 3.2 Device Default Settings

Settings for Individual SCSI Devices	Default Settings
Synchronous Transfer Rate (Mbytes/s)	40 or 80
Data Width	16
Disconnect	On
Read/Write I/O Time-out (seconds)	10
Scan for Devices at Boot Time	Yes
Scan for SCSI LUNs[1]	Yes
Queue Tags	Enabled

1. Logical Unit Number.

3.2 Starting the SCSI BIOS Configuration Utility

If you have LSI Logic SCSI BIOS Version 4.0, and it includes the LSI Logic SCSI BIOS Configuration Utility, you can change the default configuration of the SCSI host adapters. You may decide to alter these default values if there is a conflict between device settings or if you need to optimize system performance.

You can see the version number of your SCSI BIOS in a banner displayed on your computer monitor during boot. If the utility is available, the following message also appears on your monitor:

```
Press Ctrl-C to start LSI Logic Configuration Utility...
```

This message remains on your screen for about five seconds, giving you time to start the utility. If you decide to press “Ctrl-C,” the message changes to:

```
Please wait, invoking LSI Logic Configuration Utility...
```

After a brief pause, your computer monitor displays the Main Menu of the LSI Logic SCSI BIOS Configuration Utility.

NVRAM is available on the LSI53C896. Changes can be made and stored to NVRAM using this menu driven utility.

Important: This utility is a powerful tool. If, while using it, you somehow disable all of your controllers, pressing Ctrl-A (or Ctrl-E on version 4.04 or later) after memory initialization during reboot allows you to re-enable and reconfigure.

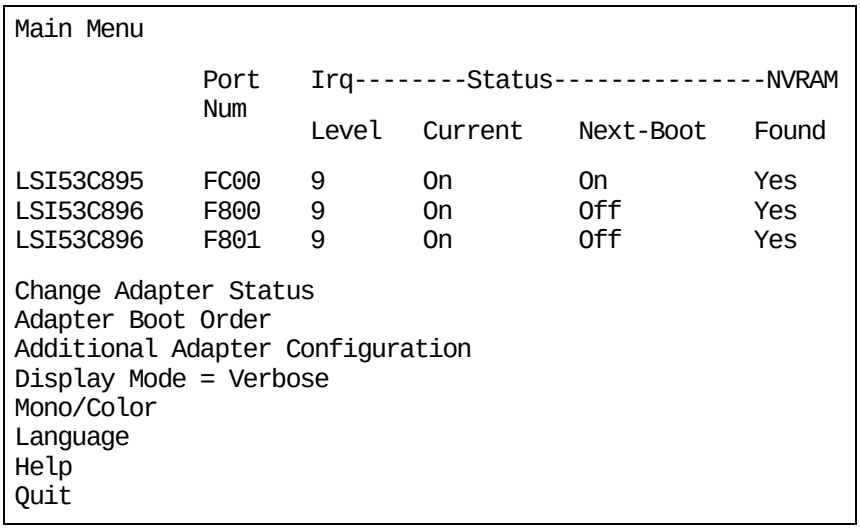
Not all devices detected by the Configuration Utility can be controlled by the BIOS. Devices such as tape drives and scanners require that a device driver specific to that peripheral be loaded. This device driver is provided by the device manufacturer.

3.2.1 Configuration Utility Main Menu

When you start the LSI Logic SCSI BIOS Configuration Utility, the Main Menu appears. This menu displays a list of up to four LSI Logic PCI to SCSI Host Adapters and information about each of them. The LSI22910 appears on the menu as two LSI53C896 entries; one for each channel. To select an adapter, use only the arrow keys and enter key. Then, you can view and/or change the current settings for that adapter and the SCSI devices attached to it.

You can select an adapter only if Current Status is “On”. Changes are possible since NVRAM is present on this host adapter. Figure 3.1 is an example of the Main Menu.

Figure 3.1 Main Menu



Below the list of host adapters on the Main Menu display, you see eight options. They are described in detail below. If these settings are altered, the system reboots upon exit from the Configuration Utility using the Quit option.

3.2.1.1 Change Adapter Status

Change Adapter Status allows you to activate or deactivate a host adapter and all SCSI devices attached to it. When this option is used to make a change, the change takes place after a reboot upon exit from the utility. Figure 3.2 is an example of the Change Status on Next Boot menu.

Figure 3.2 Change Status on Next Boot Menu

```
Main Menu

Change Status on Next Boot:

            Port   Irq----------Status---------NVRAM
            Num
                   Level  Current   Next-Boot  Found

LSI53C895   FC00   9      On        On         Yes
LSI53C896   F800   9      On        Off        Yes
LSI53C896   F801   9      On        Off        Yes
```

To change an adapter's status, select it and press Enter. Press the Escape (Esc) key to exit from this menu.

3.2.1.2 Adapter Boot Order

Adapter Boot Order allows the user to set the order in which host adapters will boot when you have more than one LSI Logic host adapter in your system. When this option is selected, the Boot Order menu appears. Figure 3.3 is an example of the Boot Order menu.

Figure 3.3 Boot Order Menu

```
 Main Menu

 BootSeq      Bus   DevFunc  BootSeq            Bus  DevFunc

0  LSI53C895  00    A0       1        LSI53C896  00   98

2  LSI53C896  00    90
```

To change an adapter's boot order, select it and press Enter. The system prompts the user to enter the new boot sequence number. To remove an adapter's boot order, press Enter again rather than entering a new sequence number. While the maximum capacity is 32 adapters, only 0 through 3 can be assigned a boot order. If an invalid number is entered, an error message appears. When the adapters are ordered as desired, press the Escape (Esc) key to exit from this menu.

3.2.1.3 Additional Adapter Configuration

Additional Adapter Configuration allows the user to configure an adapter that is not assigned a boot order. When this option is selected, the Adapter Configuration menu (as shown in Figure 3.4) appears.

Figure 3.4 Adapter Configuration Menu

```
 Main Menu
 BootSeq      Bus  DevFunc  BootSeq             Bus  DevFunc
1  LSI53C895  00   A0       0        LSI53C896  00   98
   LSI53C896
```

Highlight the adapter to be configured and press Enter. The message `Resetting Adapter, Please wait` appears, and then the system scans for devices. Finally, the Utilities menu appears and lists the available options, which are described below.

3.2.1.4 Display Mode

Display Mode determines how much information about the host adapters and SCSI devices appear on your computer monitor during boot. For more complete information, choose the verbose setting. For a faster boot, choose the terse setting.

3.2.1.5 Mono/Color

Mono/Color allows the user to choose between a monochrome or color display for the SCSI BIOS Configuration Utility. If needed, choose the mono setting to get a more readable screen on a monochrome monitor.

3.2.1.6 Language

If enabled, the Language option allows the user to select from five languages for the Configuration Utility: English, German, French, Italian, and Spanish. Call for support if you have any additional questions.

3.2.1.7 Help

The Help option displays a help screen with information about the Main Menu.

3.2.1.8 Quit

The Quit option allows exiting from the SCSI BIOS Configuration Utility when the Main Menu is displayed.

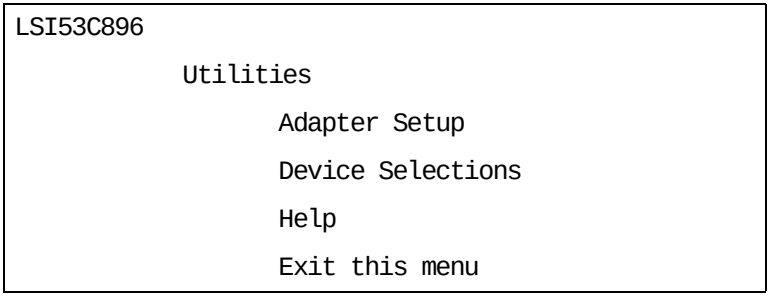
3.2.1.9 Esc

Pressing the Esc key allows exit from all the screens except the Main Menu.

3.2.2 Utilities Menu

When you select a host adapter on the Main menu, the Utilities menu appears. Figure 3.5 is an example of the Utilities menu.

Figure 3.5 Utilities Menu



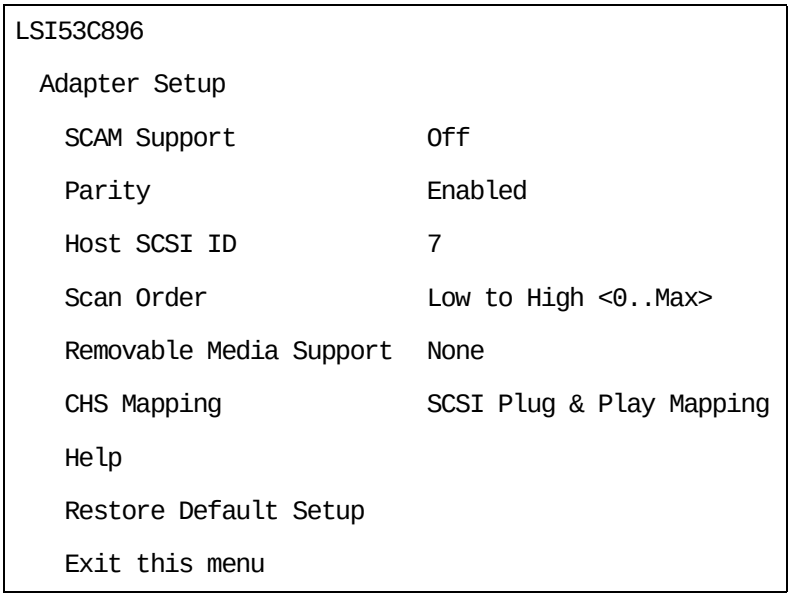
Choose Adapter Setup to view and change the selected adapter settings. Choose Device Selections to view and change settings for the devices attached to the selected adapter.

You are returned to this menu after making changes to the configuration of any host adapter or connected SCSI device. Before you exit this menu, you are prompted to save or cancel any changes.

3.2.2.1 Adapter Setup Menu

When you select Adapter Setup, the corresponding menu appears. Figure 3.6 is an example of the Adapter Setup menu.

Figure 3.6 Adapter Setup Menu



The settings in this menu are global settings that affect the selected host adapter and all SCSI devices attached to it.

SCAM Support – The LSI Logic BIOS Version 4.0 and above supports the SCSI Plug and Play protocol called SCAM. SCAM support by default is off in versions 4.11.00 and later for the LSI53C896. The user may choose to turn this on. Note that if this BIOS is flashed onto a board with existing settings, then these settings will not be changed to reflect the new BIOS defaults. Go into the Configuration Utility to change settings.

Parity – The LSI Logic PCI to SCSI host adapters always generate parity, but some older SCSI devices do not. Therefore, you are offered the option of disabling parity checking.

Note**:** When disabling parity checking, it is also necessary to disable disconnects for all devices, as parity checking for the reselection phase is not disabled. If a device does not generate parity, and it disconnects, the I/O never completes because the reselection never completes.

Host SCSI ID – This option refers to the host adapter's SCSI ID, which is a unique number used to identify the device on the SCSI bus.

Scan Order – This option allows the user to tell the SCSI BIOS and device drivers to scan the SCSI bus from low to high (0 to max) SCSI ID, or from high to low (max to 0) SCSI ID. If you have more than one device on the SCSI bus, changing the scan order changes the order in which drive letters are assigned by the system. Drive order may be reassigned differently in systems supporting the BIOS Boot Specification (BBS).

See the *PCI Storage Device Management System SDMS 4.0 User's Guide,* Chapter 2 "SCSI BIOS," for additional information regarding BBS.

Note: This scan order option may conflict with operating systems that automatically assign a drive order.

Removable Media Support – This option defines the removable media support for a specific drive. When this option is selected, a window appears with three choices:

- None
- Boot Drive Only
- With Media Installed

None indicates there is no removable media support whether the drive is selected in BBS as being first, or first in scan order in non-BBS.

Boot Drive Only provides removable media support for a removable hard drive if it is first in the scan order.

With Media Installed provides removable media support wherever the drive(s) actually resides.

One of these choices can be selected by highlighting it and pressing Enter.

CHS Mapping – This option defines the cylinder head sector (CHS) values that will be mapped onto a disk without pre-existing partitioning information. SCSI Plug and Play Mapping is the default value.

To support interchange with noncompatible systems, there is another option that can be selected by choosing CHS Mapping and then moving the cursor to `Alternate CHS Mapping`.

Note: Neither of these options will have any affect after the disk has been partitioned with the FDISK command.

To remove partitioning, two options are available:

- Reformat the disk using the Format Device option. See Section 3.2.3, “Device Selections Menu,” below.
- Use the FDISK/MBR command at the `C:\` prompt, where MBR represents master boot record.

Important: Reformatting the disk or using FDISK/MBR erases all partitioning and data that exists. Be careful when using either the Format utility or the FDISK/MBR command that you target the correct disk.

After clearing the partitions and data, it is necessary to reboot and clear memory or the old partitioning data will be reused, thus nullifying the previous operation.

3.2.3 Device Selections Menu

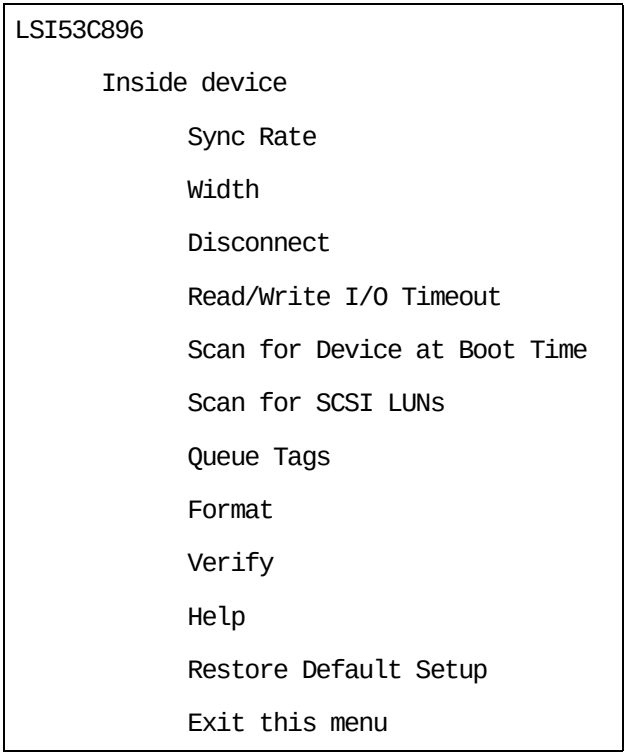
When you select the Device Selections option, the menu shown in Figure 3.7 appears.

Figure 3.7 Device Selections Menu

```
LSI53C896
Device Selections 0-7
             Sync  Data   Disc  Time  Scan        Queue
             Rate  Width        Out   Bus   LUNS  Tags
0-Dev0 N/A   80    16     On    10    Yes   Yes   Enabled
1-Dev1 N/A   80    16     On    10    Yes   Yes   Enabled
2-Dev2 N/A   80    16     On    10    Yes   Yes   Enabled
3-Dev3 N/A   80    16     On    10    Yes   Yes   Enabled
4-Dev4 N/A   80    16     On    10    Yes   Yes   Enabled
5-Dev5 N/A   80    16     On    10    Yes   Yes   Enabled
6-Dev6 N/A   80    16     On    10    Yes   Yes   Enabled
LSI53C895
Device Selections 8-15
Help
Exit this menu
```

The settings in this menu affect individual SCSI devices attached to the selected host adapter. Changes made from this menu do not cause the system to reboot upon exit from the SCSI BIOS Configuration Utility. To change a value, select the required device by using the arrow keys and press Enter. A new menu (as shown in Figure 3.8) appears providing the options and utilities available. For example, you could cursor to Sync Rate to change the Sync Rate value of the chosen device.

Figure 3.8 Device Selections Menu (Cont.)



Sync Rate (Mbytes/s) – This option defines the maximum data transfer rate the host adapter attempts to negotiate. The host adapter and a SCSI device must agree to a rate they can both handle.

Width (bits) – This option defines the maximum SCSI data width the host adapter will attempt to negotiate. The host adapter and a SCSI device must agree to a width they can both handle. Only host adapters that can do 16-bit data transfers have this option enabled.

Disconnect – SCSI devices have the ability to disconnect from the initiator during an I/O transfer. This disconnect option frees the SCSI Bus to allow other I/O processes. Additionally, it tells the host adapter whether or not to allow a device to disconnect. Some devices run faster with disconnects enabled (typically newer devices), while some run faster with disconnects disabled (typically older devices).

Read/Write I/O Time-out (seconds) – This option sets the amount of time the host adapter waits for a read, write, or seek command to complete before trying the I/O transfer again. Since this provides a safeguard allowing the system to recover if an I/O operation fails, it is recommended that you always set the time-out to a value greater than zero.

Note: If the time-out is set to zero, then the I/O will never time-out.

Scan for Device at Boot Time – Set this option to `No` when there is a device you do not want to be available to the system. Also, on a bus with only a few devices attached, you can speed up boot time by changing this setting to `No` for all unused SCSI IDs.

Scan for SCSI Logical Units (LUNs) – Set this option to `No` if you have problems with a device that responds to all LUNs whether they are occupied or not. For example, if there is a SCSI device with multiple LUNs but you do not want all of those LUNs to be available to the system, then set this option to `No`. This will limit the scan to LUN 0 only.

Queue Tags – This option allows the user to enable or disable the issuing of queue tags during I/O requests when your device driver can do this.

Format Device – If enabled, this option allows the user to low-level format a magnetic disk drive. Low-level formatting will completely and irreversibly erase all data on the drive. Note that this utility will only format 512 byte sectors. For other sector sizes, do not use this utility.

Verify – This option allows you to read all the sectors on a disk looking for errors. When selected, this option displays the following message:

```
Verify all sectors on the device
  Press ESC to abort
  Else press any key to continue
```

Help – This option brings up a help screen with information about the current menu.

Restore Default Setup – This option resets all device selections back to their optimal settings. Select this option to restore all manufacturing defaults for the specified adapter. Note that all user customized options will be lost upon saving after restoring default setup.

Exit this menu – This option allows you to leave the current menu and return to the previous screen.

3.3 Exiting the SCSI BIOS Configuration Utility

Since some changes only take effect after your system reboots, it is important that you exit this Configuration Utility properly. Return to the Main Menu and exit by using the Quit option.

Important: Rebooting the system without properly exiting from this utility may cause some changes to not take effect.

Appendix A
Technical Specifications

This section discusses the physical environment associated with the LSI22910. It includes a mechanical drawing of this board, which is shown in Figure A.1. It also includes these topics:

A.1 Physical Environment

This section discusses the physical, electrical, thermal, and safety characteristics of the LSI22910. Additionally, this board is compliant with electromagnetic standards set by the FCC.

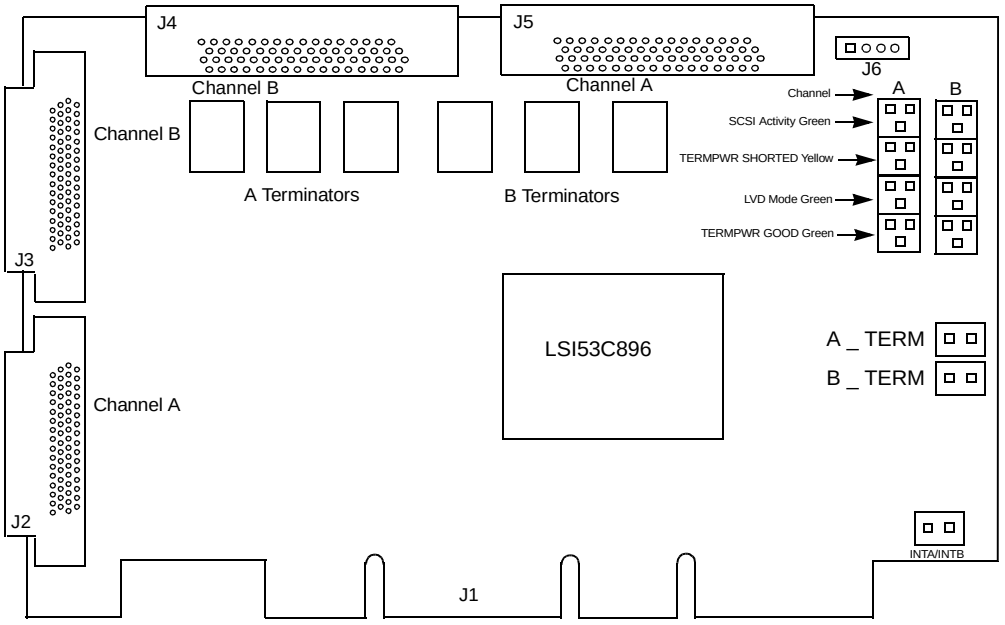
A.1.1 Physical Characteristics

The dimensions of the LSI22910 are approximately 9.5 x 4.0 inches. PCI connection is made through edge connector J1. The component height on the top and bottom of the LSI22910 follows the PCI Local Bus Specification Revision 2.1 standard.

Internal 16-bit SCSI connection is made through the 68-pin high density connector J5 (or J4 for Channel B). External SCSI connection is made through the 68-pin VHDCI connector J3 (J2 for Channel B).

The J3 and J2 connectors extend through the ISA/EISA bracket, which is attached to the face of the connector outside of the cabinet where the LSI22910 is installed. The J6 connector is used to connect the Busy LED. It is a 4-pin one row right-angle header for both Channel A and Channel B.

Figure A.1 LSI22910 Mechanical Drawing



A.1.2 Electrical Characteristics

The LSI22910 maximum power requirements, which include SCSI TERMPWR, under normal operation are as follows:

Table A.1 Maximum Power Requirements

+5 V DC	±5%	3.0 A	Over the operating range 5–55 °C
+3.3 V DC	±0.3 V	130 mA	Over the operating range 5–55 °C when operating in a 3.3 V PCI slot
+12 V DC	±5%	0.1 A	Over the operating range 5–55 °C (used while programming Flash BIOS)

The PCI PRSNT1 and PRSNT2 pins are set to indicate a 15 W maximum configuration.

Under abnormal conditions, such as a short on SCSI TERMPWR, + 5 V current may be higher. At temperatures of at least 25 °C, a current of 4 A is sustained no longer than 30 seconds before the self-resetting TERMPWR short circuit protection device opens.

A.1.3 Thermal, Atmospheric Characteristics

The board is designed to operate in an environment, which is defined by the following parameters:

- Temperature range: 5 °C to 55 °C (dry bulb)
- Relative humidity range: 5% to 90% noncondensing
- Maximum dew point temperature: 32 °C

The board is designed for a storage and transit environment, which is defined by the following parameters:

- Temperature range: – 45 °C to + 105 °C (dry bulb)
- Relative humidity range: 5% to 90% noncondensing

A.1.4 Electromagnetic Compliance

The board is designed and implemented so as to minimize electromagnetic emissions, susceptibility, and the effects of electrostatic discharge. The board carries the CE mark, and meets the requirements of FCC and CISPR Class B. It is also marked with the FCC Self Certification logo.

A.1.5 Safety Characteristics

The bare board meets or exceeds the requirements of UL flammability rating 94 V0. The bare board is also marked with the supplier's name or trademark, type, and UL flammability rating. Since this board is installed in a PCI bus slot, all voltages are below the SELV 42.4 V limit.

A.2 Operational Environment

The LSI22910 is designed for use in PCI computer systems with an ISA/EISA bracket type. The SDMS software operates the board, but the design of the board does not prevent the use of other software.

A.2.1 The PCI Interface

The PCI interface operates as a 32-bit or 64-bit DMA bus master. The connection is made through edge connector J1, which provides connections on both the front and back of the board. The signal definitions and pin numbers conform to the PCI Local Bus Specification Revision 2.1 standard. The signal assignments appear in Table A.2, Table A.3, and Table A.4.

Note: The + 3.3 V pins are tied together and decoupled with high frequency bypass capacitors to ground. No current from these 3.3 V pins is used on the board. The PCI portion of the LSI53C896 is powered from the 3 V/5 V pins.

Table A.2 PCI Connector J1 (Front)[1]

Signal Name	Pin	Signal Name	Pin	Signal Name	Pin
–12 V	1	C_BE2[2]	33	RESERVED[2]	63
TCK	2	GND	34	GND	64
GND	3	IRDY[2]	35	C_BE6[2]	65
TDO	4	+3.3 V	36	C_BE4[2]	66
+5 V	5	DEVSEL[2]	37	GND	67
+5 V	6	GND[2]	38	AD63	68
INTB[2]	7	LOCK[2]	39	AD61	69
INTD[2]	8	PERR[2]	40	3 V/5 V	70
GND(PRSNT1[2])	9	+3.3 V	41	AD59	71
RESERVED	10	SERR[2]	42	AD57	72
GND(PRSNT2[2])	11	+3.3 V	43	GND	73
KEYWAY	12	C_BE1[2]	44	AD55	74
KEYWAY	13	AD14	45	AD53	75
RESERVED	14	GND	46	GND	76
GND	15	AD12	47	AD51	77
CLK	16	AD10	48	AD49	78
GND	17	GND	49	3 V/5 V	79
REQ[2]	18	KEYWAY	50	AD47	80
3 V/5 V	19	KEYWAY	51	AD45	81
AD31	20	AD08	52	GND	82
AD29	21	AD07	53	AD43	83
GND	22	+3.3 V	54	AD41	84
AD27	23	AD05	55	GND	85
AD25	24	AD03	56	AD39	86
+3.3 V	25	GND	57	AD37	87
C_BE3[2]	26	AD01	58	3 V/5 V	88
AD23	27	3 V/5 V	59	AD35	89
GND	28	ACK64[2]	60	AD33	90
AD21	29	+5 V	61	GND	91
AD19	30	+5 V	62	RESERVED	92
+3.3 V	31	KEYWAY	XX	RESERVED	93
AD17	32	KEYWAY	XX	GND	94

1. Shaded lines are not connected.
2. Active LOW signal.

Table A.3 PCI Connector J1 (Back)[1]

Signal Name	Pin	Signal Name	Pin	Signal Name	Pin
TRST[2]	1	+3.3 V	33	GND	63
+12 V	2	FRAME[2]	34	C_BE7[2]	64
TMS	3	GND	35	C_BE5[2]	65
TDI	4	TRDY[2]	36	3 V/5 V	66
+5 V	5	GND	37	PAR64	67
INTA[2]	6	STOP[2]	38	AD62	68
INTC[2]	7	+3.3 V	39	GND	69
+5 V	8	SDONE	40	AD60	70
RESERVED	9	SBO[2]	41	AD58	71
3 V/5 V	10	GND	42	GND	72
RESERVED	11	PAR	43	AD56	73
KEYWAY	12	AD15	44	AD54	74
KEYWAY	13	+3.3 V	45	3 V/5 V	75
RESERVED	14	AD13	46	AD52	76
RST[2]	15	AD11	47	AD50	77
3 V/5 V	16	GND	48	GND	78
GNT[2]	17	AD09	49	AD48	79
GND	18	KEYWAY	50	AD46	80
RESERVED	19	KEYWAY	51	GND	81
AD30	20	C_BE0[2]	52	AD44	82
+3.3 V	21	+3.3 V	53	AD42	83
AD28	22	AD06	54	3 V/5 V	84
AD26	23	AD04	55	AD40	85
GND	24	GND	56	AD38	86
AD24	25	AD02	57	GND	87
IDSEL	26	AD00	58	AD36	88
+3.3 V	27	3 V/5 V	59	AD34	89
AD22	28	REQ64[2]	60	GND	90
AD20	29	+5 V	61	AD32	91
GND	30	+5 V	62	RESERVED	92
AD18	31	KEYWAY	XX	GND	93
AD16	32	KEYWAY	XX	RESERVED	94

1. Shaded lines are not connected.
2. Active LOW signal.

A.2.2 The SCSI Interface

The SCSI interface operates as two 16-bit, synchronous or asynchronous, SE or LVD bus, and supports Ultra2 SCSI protocols and 16-bit arbitration. The interface is made through connectors J2 and J5 for Channel A and J4 and J3 for Channel B.

Connectors J2 and J3 are 68-pin VHDCI right-angle receptacles that protrude through the ISA/EISA bracket. Connectors J4 and J5 are a 68-pin high density latching right-angle receptacles for internal SCSI connections.

Active differential SCSI termination is provided automatically. SCSI TERMPWR is also supplied by the board. Table A.4 shows the signal assignments for J2, J3, J4, and J5.

Table A.4 SCSI Interface

Signal Name	Pin	Signal Name	Pin	Signal Name	Pin
SD12+	1	SACK+	24	SD7–	47
SD13+	2	SRST+	25	SDP–	48
SD14+	3	SMSG+	26	GND	49
SD15+	4	SSEL+	27	CPRSNT[1]	50
SDP1+	5	SC_D+	28	TERMPWR	51
SD0+	6	SREQ+	29	TERMPWR	52
SD1+	7	SI_O+	30	N/C	53
SD2+	8	SD8+	31	GND	54
SD3+	9	SD9+	32	SATN–	55
SD4+	10	SD10+	33	GND	56
SD5+	11	SD11+	34	SBSY–	57
SD6+	12	SD12–	35	SACK–	58
SD7+	13	SD13–	36	SRST–	59
SDP+	14	SD14–	37	SMSG–	60
GND	15	SD15–	38	SSEL–	61
DIFFSENS	16	SDP1–	39	SC_D–	62
TERMPWR	17	SD0–	40	SREQ–	63
TERMPWR	18	SD1–	41	SI_O–	64
N/C	19	SD2–	42	SD8–	65
GND	20	SD3–	43	SD9–	66
SATN+	21	SD4–	44	SD10–	67
GND	22	SD5–	45	SD11–	68
SBSY+	23	SD6–	46		

1. CPRSNT is used to sense the connection of a standard SCSI device by sensing SCSI standard GND on this pin.

SCSI Activity LED Interface – The LSI22910 LED interface is a four-wire arrangement that allows you to connect an LED harness to the board. The connector on the LSI22910 is J6 for both channels. Table A.5 lists the signal and pin numbers for the LED interface for this SCSI host adapter.

Table A.5 Connector Pinout

Signal Name	Pin
A_LED+	1
A_LED–	2
B_LED–	3
B_LED+	4

Appendix B
Glossary of Terms and Abbreviations

Address	A specific location memory, designated either numerically or by a symbolic name.
Asynchronous Data Transfer	A method of transmission which does not require a common clock, but separates fields of data by stop and start bits. It is slower than synchronous data transfer.
BIOS	Basic Input/Output System. Software that provides basic read/write capability. Usually kept as firmware (ROM based). The system BIOS on the mainboard of a computer is used to boot and control the system. The SCSI BIOS on the host adapter acts as an extension of the system BIOS.
Bit	A binary digit. The smallest unit of information a computer uses. The value of a bit (0 or 1) represents a two-way choice, such as on or off, true or false, and so on.
Bus	A collection of unbroken signal lines across which information is transmitted from one part of a computer system to another. Connections to the bus are made using taps on the lines.
Bus Mastering	A high-performance way to transfer data. The host adapter controls the transfer of data directly to and from system memory without bothering the computer's microprocessor. This is the fastest way for multitasking operating systems to transfer data.
Byte	A unit of information consisting of eight bits.
Chain	A topology in which every processor is connected to two others, except for two end processors that are connected to only one other.
CISPR	A special international committee on radio interference (Committee, International and Special, for Protection in Radio).

Configuration	Refers to the way a computer is set up; the combined hardware components (computer, monitor, keyboard, and peripheral devices) that make up a computer system; or the software settings that allow the hardware components to communicate with each other.
CPU	Central Processing Unit. The “brain” of the computer that performs the actual computations. The term Microprocessor Unit (MPU) is also used.
DMA	Direct Memory Access. A method of moving data from a storage device directly to RAM, without using the CPU’s resources.
DMA Bus Master	A feature that allows a peripheral to control the flow of data to and from system memory by blocks, as opposed to PIO (Programmed I/O) where the processor is in control and the flow is by byte.
Device Driver	A program that allows a microprocessor (through the operating system) to direct the operation of a peripheral device.
Differential	A hardware configuration for connecting SCSI devices. It uses a pair of lines for each signal transfer (as opposed to Single-Ended SCSI which references each SCSI signal to a common ground).
Dword	A double word is a group of four consecutive bytes or characters that are stored, addressed, transmitted, and operated on as a unit. The lower two address bits of the least significant byte must equal zero in order to be Dword aligned.
EEPROM	Electronically Erasable Programmable Read Only Memory. A memory chip typically used to store configuration information. See NVRAM.
EISA	Extended Industry Standard Architecture. An extension of the 16-bit ISA bus standard. It allows devices to perform 32-bit data transfers.
External SCSI Device	A SCSI device installed outside the computer cabinet. These devices are connected in a continuous chain using specific types of shielded cables.
Fast SCSI	A standard for SCSI data transfers. It allows a transfer rate of up to 10 Mbytes/s over an 8-bit SCSI bus and up to 20 Mbytes/s over a 16-bit SCSI bus.
FCC	Federal Communications Commission.
File	A named collection of information stored on a disk.

Firmware	Software that is permanently stored in ROM. Therefore, it can be accessed during boot time.
Hard Disk	A disk made of metal and permanently sealed into a drive cartridge. A hard disk can store very large amounts of information.
Host	The computer system in which a SCSI host adapter is installed. It uses the SCSI host adapter to transfer information to and from devices attached to the SCSI bus.
Host Adapter	A circuit board or integrated circuit that provides a SCSI bus connection to the computer system.
Internal SCSI Device	A SCSI device installed inside the computer cabinet. These devices are connected in a continuous chain using an unshielded ribbon cable.
IRQ	Interrupt Request Channel. A path through which a device can get the immediate attention of the computer's CPU. The PCI bus assigns an IRQ path for each SCSI host adapter.
ISA	Industry Standard Architecture. A type of computer bus used in most PCs. It allows devices to send and receive data up to 16-bits at a time.
Kbyte	Kilobyte. A measure of computer storage equal to 1024 bytes.
Local Bus	A way to connect peripherals directly to computer memory. It bypasses the slower ISA and EISA buses. PCI is a local bus standard.
Logical Unit	A subdivision, either logical or physical, of a SCSI device (actually the place for the device on the SCSI bus). Most devices have only one logical unit, but up to eight are allowed for each of the eight possible devices on a SCSI bus.
LUN	Logical Unit Number. An identifier, zero to seven, for a logical unit.
LVD	Low Voltage Differential. LVD is a robust design methodology that improves power consumption, data integrity, cable lengths and support for multiple devices, while providing a migration path for increased I/O performance.
Mbyte	Megabyte. A measure of computer storage equal to 1024 kilobytes.
Mainboard	A large circuit board that holds RAM, ROM, the microprocessor, custom integrated circuits, and other components that make a computer work. It also has expansion slots for host adapters and other expansion boards.

Main Memory The part of a computer's memory which is directly accessible by the CPU (usually synonymous with RAM).

Motherboard See Mainboard. In some countries, the term Motherboard is not appropriate.

Multitasking The executing of more than one command at the same time. This allows programs to operate in parallel.

Multithreading The simultaneous accessing of data by more than one SCSI device. This increases the data throughput.

NVRAM NonVolatile Random Access Memory. Actually an EEPROM (Electronically Erasable Programmable Read Only Memory chip) used to store configuration information. See EEPROM.

Operating System A program that organizes the internal activities of the computer and its peripheral devices. An operating system performs basic tasks such as moving data to and from devices, and managing information in memory. It also provides the user interface.

Parity Checking A way to verify the accuracy of data transmitted over the SCSI bus. One bit in the transfer is used to make the sum of all the 1 bits either odd or even (for odd or even parity). If the sum is not correct, an error message appears.

PCI Peripheral Component Interconnect. A local bus specification that allows connection of peripherals directly to computer memory. It bypasses the slower ISA and EISA buses.

Peripheral Devices A piece of hardware (such as a video monitor, disk drive, printer, or CD-ROM) used with a computer and under the computer's control. SCSI peripherals are controlled through a SCSI host adapter.

Pin-1 Orientation The alignment of pin 1 on a SCSI cable connector and the pin-1 position on the SCSI connector into which it is inserted. External SCSI cables are always keyed to ensure proper alignment, but internal SCSI ribbon cables are sometimes not keyed.

PIO Programmed Input/Output. A way the CPU can transfer data to and from memory using the computer's I/O ports. PIO is usually faster than DMA, but requires CPU time.

Port Address Also Port Number. The address through which commands are sent to a host adapter board. This address is assigned by the PCI bus.

Port Number See Port Address.

Queue Tags A way to keep track of multiple commands that allows for increased throughput on the SCSI bus.

RAM Random Access Memory. The computer's primary working memory in which program instructions and data are stored and are accessible to the CPU. Information can be written to and read from RAM. The contents of RAM are lost when the computer is turned off.

RISC Core LSI Logic SCSI chips contain a RISC (Reduced Instruction Set Computer) processor, programmed through microcode scripts.

ROM Read Only Memory. Memory from which information can be read but not changed. The contents of ROM are not erased when the computer is turned off.

SCAM SCSI Configured AutoMatically. A method to automatically allocate SCSI IDs using software when SCAM compliant SCSI devices are attached.

SCSI Small Computer System Interface. A specification for a high-performance peripheral bus and command set. The original standard is referred to as SCSI-1.

SCSI-2 The current SCSI specification which adds features to the original SCSI-1 standard.

SCSI-3 The next SCSI specification, which adds features to the SCSI-2 standard. Although this version is still in development, parts of the SCSI-3 standard are already in use.

SCSI Bus A host adapter and one or more SCSI peripherals connected by cables in a linear chain configuration. The host adapter may exist anywhere on the chain, allowing connection of both internal and external SCSI devices. A system may have more than one SCSI bus by using multiple host adapters.

SCSI Device Any device that conforms to the SCSI standard and is attached to the SCSI bus by a SCSI cable. This includes SCSI host adapters and SCSI peripherals.

SCSI ID	A way to uniquely identify each SCSI device on the SCSI bus. Each SCSI bus has eight available SCSI IDs numbered 0 through 7 (or 0 through 15 for Wide SCSI). The host adapter usually gets ID 7 giving it priority to control the bus.
SDMS	Storage Device Management System. An LSI Logic software product that manages SCSI system I/O.
STA	SCSI Trade Association. A group of companies that cooperate to promote SCSI parallel interface technology as a viable mainstream I/O interconnect for commercial computing.
Single-Ended SCSI	A hardware specification for connecting SCSI devices. It references each SCSI signal to a common ground. This is the most common method (as opposed to differential SCSI which uses a separate ground for each signal).
Synchronous Data Transfer	One of the ways data is transferred over the SCSI bus. Transfers are clocked with fixed frequency pulses. This is faster than asynchronous data transfer. Synchronous data transfers are negotiated between the SCSI host adapter and each SCSI device.
System BIOS	Controls the low-level POST (Power-On Self-Test), and basic operation of the CPU and computer system.
Termination	The electrical connection required at each end of the SCSI bus, composed of a set of resistors. It improves the integrity of bus signals.
Ultra SCSI	A standard for SCSI data transfers. It allows a transfer rate of up to 20 Mbytes/s over an 8-bit SCSI bus and up to 40 Mbytes/s over a 16-bit SCSI bus. STA (SCSI Trade Association) supports using the term “Ultra SCSI” over the term “Fast-20”.
Ultra2 SCSI	A standard for SCSI data transfers. It allows a transfer rate of up to 40 Mbytes/s over an 8-bit SCSI bus, and up to 80 Mbytes/s over a 16-bit SCSI bus. STA (SCSI Trade Association) supports using the term “Ultra2 SCSI” over the older term “Fast-40”.
VCCI	Voluntary Control Council for Interference.
VHDCI	Very High Density Cable Interconnect. A trapezoidal shielded connector that has a 0.8 mm pitch.

Wide SCSI	A SCSI-2 feature allowing 16-bit or 32-bit transfers on the SCSI bus. This dramatically increases the transfer rate over the standard 8-bit SCSI bus.
Wide Ultra SCSI	The STA (SCSI Trade Association) term for SCSI bus width 16-bits, SCSI bus speed maximum data rate 40 Mbytes/s.
Wide Ultra2 SCSI	The STA (SCSI Trade Association) term for SCSI bus width 16-bits, SCSI bus speed maximum data rate 80 Mbytes/s.
Word	A two byte (or 16-bit) unit of information.

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