USER'S GUIDE

LSIU160
PCI to Single Channel
Ultra160 SCSI
Host Adapter

Version 1.2

August 2002

LSI LOGIC ®

DB15-000173-02

FC   CE

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 LSIU160 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.

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

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.

LSI Logic Corporation
North American Headquarters
Milpitas, CA
408.433.8000

This document contains proprietary information of LSI Logic Corporation. The information contained herein is not to be used by or disclosed to third parties without the express written permission of an officer of LSI Logic Corporation.

LSI Logic products are not intended for use in life-support appliances, devices, or systems. Use of any LSI Logic product in such applications without written consent of the appropriate LSI Logic officer is prohibited.

Document DB15-000173-02, Third Edition (August 2002)
This document describes the LSI Logic LSIU160 PCI to Single Channel Ultra160 SCSI Host Adapter and will remain the official reference source for all revisions/releases of this product until rescinded by an update.

LSI Logic Corporation reserves the right to make changes to any products herein at any time without notice. LSI Logic does not assume any responsibility or liability arising out of the application or use of any product described herein, except as expressly agreed to in writing by LSI Logic; nor does the purchase or use of a product from LSI Logic convey a license under any patent rights, copyrights, trademark rights, or any other of the intellectual property rights of LSI Logic or third parties.

TRADEMARK ACKNOWLEDGMENT
LSI Logic, the LSI Logic logo design, SDMS, SCRIPTS, SureLINK, TolerANT, and LVDlink are registered trademarks or trademarks of LSI Logic Corporation. All other brand and product names may be trademarks of their respective companies.

DB

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

For a current list of our distributors, sales offices, and design resource centers, view our web page located at

http://www.lsilogic.com/contacts/na_salesoffices.html

Preface

This book is the primary reference and user's guide for the LSI Logic LSIU160 PCI to Single Channel Ultra160 SCSI Host Adapter. It contains a complete functional description for the LSIU160 as well as complete physical and electrical specifications.

Audience

This document assumes that you have some familiarity with SCSI protocol and related support devices and will benefit persons installing and using the LSIU160.

Organization

This document has the following chapters and appendix:

- Chapter 1, **Using the LSIU160**, defines the interfaces and characteristics of the LSIU160.

- Chapter 2, **Installing the LSIU160**, provides both quick and detailed installation instructions.

- Chapter 3, **Configuring the LSIU160**, describes the SCSI BIOS Configuration Utility to configure adapter and device settings.

- Appendix A, **Technical Specifications**, describes the physical and operational environments of the LSIU160.

- 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

LSI53C1010-33 PCI to Dual Channel Ultra3 SCSI Multifunction Controller Technical Manual, Order Number S14025.C

Revision Record

Revision	Date	Remarks
1.0	1/00	Final version.
1.2	8/02	Product name changed from LSI8955U to LSIU160.

Contents

Figures

Tables

Chapter 1
Using the LSIU160

This chapter describes the LSIU160 PCI to Single Channel Ultra160 SCSI Host Adapter interface to PCI computer systems and includes these topics:

1.1   General Description

The LSIU160 provides an Ultra160 SCSI interface to PCI computer systems. It is referred to as the LSIU160 throughout this guide. Installing this adapter in your PCI system allows connection of up to 15 SCSI devices.

The LSIU160 is a 16-bit, Low Voltage Differential (LVD)/Single-Ended (SE) SCSI solution for your computer. This board supports legacy Fast SCSI and Ultra SCSI devices, and the newest LVD Ultra160 SCSI devices. It is also backwards compatible with existing wide SCSI applications for the LSI8251S and LSI8751SP/E host adapters.

The Storage Device Management System (SDMS™) software operates the board. SCSI software provided by other vendors that works with the LSI53C1010-33 PCI to Ultra160 Multifunction Controller chip can also be

used. BIOS support for this adapter is incorporated on the board in a Flash memory device. The LSIU160 has a serial EEPROM device for storing the user's SCSI bus configuration.

The LSI53C1010 also contains a SCSI SCRIPTS™ processor that permits both DMA and SCSI commands to be fetched from host memory or internal SCRIPTS RAM. Algorithms written in SCSI SCRIPTS control the actions of the SCSI and DMA cores. The SCRIPTS processor executes complex SCSI bus sequences independently of the host CPU. For more information on the SCSI SCRIPTS Instruction Set used to write these algorithms, refer to the *LSI53C1010-33 PCI to Dual Channel Ultra3 SCSI Multifunction Controller Technical Manual*.

This user's guide, along with the *PCI Storage Device Management System SDMS 4.0 User's Guide,* contains a complete library of product information and installation instructions. With this information, the full benefits of the LSIU160 are available to you.

1.2 Features

This section provides a high-level overview of the PCI Interface, the SCSI Interface, and Board Characteristics for the LSIU160.

1.2.1 PCI Interface

The PCI interface includes these features:

- Complies with PCI 2.2 specification
- Supports a 64-bit/33 MHz PCI interface for 264 Mbytes/s bandwidth that:
    - Supports 64-bit DMA bus mastership with 64-bit addressing
    - Operates at 33 MHz
    - Supports dual address cycle generation for all SCRIPTS
    - Presents a single electrical load to the PCI Bus (True PCI Multifunction Device)
- Bursts 4/8, 8/16, 16/32, 32/64, or 64/128 Qword/Dword transfers across the PCI bus
- Supports 32-bit or 64-bit word data bursts with variable burst lengths

- Bursts up to 264 Mbytes/s (@ 33 MHz) with zero wait-state bus master data

- Supports the PCI Cache Line Size (CLS) register

- Prefetches up to 8 Dwords of SCRIPTS instructions

- Supports PCI Write and Invalidate, Read Line, and Read Multiple commands

- Bursts SCRIPTS opcode fetches across the PCI bus

- Supports universal 3.3 V and 5 V PCI bus voltage

- Complies with PCI Bus Power Management Specification Revision 1.1

- Complies with PC99

1.2.2   SCSI Interface

The SCSI interface includes these features:

- Performs wide, Ultra160 SCSI synchronous data transfers as fast as 160 Mbytes/s using Double Transition (DT) clocking

- Supports Cyclic Redundancy Check (CRC) checking and generation in DT phases

- Protects nondata phases with Asynchronous Information Protection (AIP)

- Automatically enables LVD or SE termination

- Contains external 68-pin High Density (HD) and internal 68-pin HD latching connectors

- Provides SCSI termination power (TERMPWR) source with autoresetting circuit protection device

- Supports Basic (level 1), Enhanced (level 2), and Margined (level 3) Domain Validation

- Includes integrated LVDlink™ universal transceivers:

    – Supports 16-bit SE and LVD signals

    – Allows greater device connectivity and longer cable length

    – LVDlink transceivers save the cost of external differential transceivers

    – Supports a long-term performance migration path

- Supports SCRIPTS:
  - Includes 8 Kbytes RAM for SCRIPTS instruction storage
  - Supports multithreaded I/O algorithms in SCSI SCRIPTS with fast I/O context switching
  - Handles phase mismatches in SCRIPTS without interrupting the system processor
  - Supports Load/Store SCRIPTS instructions without use of PCI cycles
- Supports 31 levels of SCSI synchronous offset in the Single Transition (ST) mode and 62 levels in the DT mode
- Performs sustained memory-to-memory DMA transfers to approximately 100 Mbytes/s
- Performs complex bus sequences without interrupts, including restoring data pointers
- Supports target disconnect and later reconnect with no interrupt to the system processor
- Contains a serial EEPROM for user configuration utility
- Provides SCSI bus activity LED connector

1.2.3   Board Characteristics

The LSIU160 board characteristics are:

- PCI board dimensions,
  174.6 x 101.6 mm (6.875 x 4.0 inches)
- PCI Universal 64-bit card edge connector
- HD 68-pin external connector
- HD 68-pin internal connector

A mechanical drawing showing board dimensions and component layout is located in Appendix A, "Technical Specifications."

1.3   Interface Descriptions

This section provides a more detailed explanation about the PCI Interface, the SCSI Interface, Ultra160 SCSI Technology, and LVDlink Technology.

1.3.1   The PCI Interface

PCI, a high-speed standard local bus, interfaces I/O components to the processor and memory subsystems in equipment ranging from PCs to servers. The PCI functionality for the LSIU160 is contained within the LSI53C1010. The LSI53C1010 connects directly to the PCI bus and generates signal timing and bus protocol in compliance with the PCI Specification Revision 2.2.

The PCI interface operates as a 64-bit DMA bus master capable of 64-bit addressing. The connection is made through edge connector J1, shown in Figure 2.1 on page 2-5. The signal definitions and pin numbers conform to the PCI Local Bus Specification Revision 2.2 standard. The LSIU160 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 LSIU160 is contained within the LSI53C1010. This chip is a PCI to Ultra160 SCSI Controller with LVDlink Universal Transceivers. It connects directly to the SCSI bus and generates signal timing and bus protocol in compliance with SCSI standards.

The SCSI interface on the LSIU160 operates as an 8-bit or 16-bit interface. It supports 8-bit or 16-bit, synchronous and asynchronous, LVD or SE, Fast, Ultra, Ultra2, and Ultra160 SCSI protocols in various combinations. The interface is made through connectors J3 and J4 (see Figure 2.1). Internal connector J4 is a 68-pin HD right angle latching connector. External connector J3 is a shielded 68-pin HD right angle connector exposed in the back panel bracket. LVD/SE dual mode, active termination is provided on the LSIU160. Termination is automatically disabled when both SCSI connectors are used. The LSIU160 supplies SCSI bus TERMPWR through a blocking diode and a self-resetting 1.5 A short circuit protection device. A 40 MHz oscillator is installed on the

LSIU160. This oscillator provides the clock frequency necessary to support Ultra160 SCSI transfers of up to 160 Mbytes/s.

1.3.3 SCSI Bus Activity LED Connector

A SCSI Bus Activity LED connector indicates the status of the SCSI bus when a LED is attached. This LED lights when the SCSI bus is transferring information.

1.4 Benefits of Ultra160 SCSI

Ultra160 SCSI delivers data up to two times faster than Ultra2 SCSI. Ultra160 SCSI is an extension of the SPI-3 draft standard that allows faster synchronous SCSI data transfer rates than Ultra2 SCSI. When enabled, Ultra160 SCSI performs 80 megatransfers per second resulting in approximately double the synchronous data transfer rates of Ultra2 SCSI. The LSI53C1010 performs 16-bit, Ultra160 SCSI synchronous data transfers as fast as 160 Mbytes/s. This advantage is most noticeable in heavily loaded systems or large block size applications such as video on-demand and image processing.

The Ultra160 data transfer speed is accomplished using DT clocking. DT clocking refers to transferring data on both polarity edges of the request or acknowledge signals. Data is clocked on both rising and falling edges of the request and acknowledge signals. Double-edge clocking doubles data transfer speeds without increasing the clock rate.

1.4.1 Cyclic Redundancy Check (CRC)

Ultra160 SCSI includes CRC which offers higher levels of data reliability by ensuring complete integrity of transferred data. CRC is a 32-bit scheme, referred to as CRC-32. CRC is guaranteed to detect all single bit errors, any two bits in error, or any combination of errors within a single 32-bit range.

1.4.2 Asynchronous Information Protection (AIP)

AIP is also supported by the LSI53C1010, protecting all non-data phases, including command, status, and messages. CRC, along with AIP, provides end-to-end protection of the SCSI I/O.

1.5   Benefits of LVDlink Technology

To support greater device connectivity and a longer SCSI cable, the LSIU160 features LVDlink technology, the LSI Logic implementation of Universal LVD SCSI. LVDlink transceivers provide the inherent reliability of differential SCSI, and a long-term migration path to faster SCSI transfer rates.

The LVDlink transceivers reduce the power needed to drive the SCSI bus, so that the I/O drivers can be integrated directly into the chip. LVDlink technology lowers the amplitude of noise reflections and allows higher transmission frequencies.

The LVDlink transceivers operate in LVD and SE modes. They also allow the chip to detect a High Voltage Differential (HVD) signal when the chip is mistakenly connected to external HVD transceivers. When connected, the LSI53C1010 automatically detects the signal type, based on the voltage detected. It automatically switches to the SE or LVD mode, as appropriate.

Important: All bus devices must be LVD or SE. If a HVD device is detected, the board puts the SCSI bus in the high impedance state and shuts down.

1.6   Benefits of TolerANT® Technology

The LSI53C1010 features TolerANT technology, which includes active negation on the SCSI drivers and input signal filtering on the SCSI receivers. Active negation causes the SCSI Request, Acknowledge, Data, and Parity signals to be actively driven HIGH rather than passively pulled up by terminators.

TolerANT receiver technology improves data integrity in unreliable cabling environments where other devices would be subject to data corruption. TolerANT receivers filter the SCSI bus signals to eliminate unwanted transitions, without the long signal delay associated with RC-type input filters. This improved driver and receiver technology helps eliminate double clocking of data which is the single biggest reliability issue with SCSI operations. TolerANT input signal filtering is a built-in feature of the LSI53C1010 and all LSI Logic Fast SCSI, Ultra SCSI, Ultra2 SCSI, and Ultra160 SCSI devices.

The benefits of TolerANT technology include increased noise immunity when the signal transitions to HIGH, better performance due to balanced duty cycles, and improved fast SCSI transfer rates. In addition, TolerANT SCSI devices do not cause glitches on the SCSI bus at power-up or power-down. This protects other devices on the bus from data corruption. When it is used with the LVDlink transceivers, TolerANT technology provides excellent signal quality and data reliability in real world cabling environments. TolerANT technology is compatible with both the Alternative One and Alternative Two termination schemes proposed by the American National Standards Institute.

1.7   Benefits of SureLINK™ (Ultra160 SCSI Domain Validation)

SureLINK represents the very latest SCSI interconnect management solution. It ensures robust and low risk Ultra160 SCSI implementations by extending the Domain Validation guidelines documented in the ANSI T10 SPI-3 specifications. Domain Validation verifies that the system is capable of transferring data at Ultra160 speeds, allowing it to renegotiate to lower speed and bus width if necessary. SureLINK is the software control for the manageability enhancements in the LSI53C1010. Fully integrated in the SDMS software solution, SureLINK provides Domain Validation at boot time as well as throughout system operation. SureLINK extends to the Desktop Management Interface (DMI) based System Management components of SDMS, providing the network administrator remote management capability.

SureLINK Domain Validation provides three levels of integrity checking: Basic (level 1), Enhanced (level 2), and Margined (level 3). The basic check consists of an inquiry command to detect gross problems. The enhanced check sends a known data pattern using the Read and Write Buffer commands to detect additional problems. Margined check verifies that the physical parameters have some degree of margin. By varying LVD drive strength and REQ/ACK timing characteristics, level 3 verifies that no errors occur on the transfers. These altered signals are only used during the diagnostic check and not during normal system operation. Should errors occur with any of these checks, the system can drop back to a lower transmission speed, on a per-target basis, to ensure robust system operation.

Chapter 2
Installing the LSIU160

This chapter provides instructions on how to install the LSIU160 and includes these topics:

2.1 Quick Installation Procedure

This section provides an overview of the installation procedure. If you are an experienced computer user with prior host adapter installation and SCSI bus setup experience, this section may sufficiently describe the procedure for you. If you prefer a more detailed guidance for installing the LSIU160, proceed to 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.

Step 2.   Remove the LSIU160 from the packing and check that it is not damaged.

An example of this host adapter board is shown in Figure 2.1. A more detailed drawing is located in Figure A.1.

Step 3.   Switch off and unplug the system.

Step 4.   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 5. Locate the slots for installing a PCI plug-in board.

The LSIU160 requires a 32-bit or 64-bit PCI slot that allows bus master operation. If a 32-bit PCI slot is used, bits [31:1] of the J1 connector are inserted while bits [64:32] remain uninserted. See Figure 2.2.

Note: For the LSIU160 to function as a 64 bit-device, it must inserted in a 64-bit PCI slot. If the LSIU160 is inserted in a 32-bit PCI slot, it will function as a 32-bit device.

Step 6. Remove the blank bracket panel on the back of the computer aligned with the PCI slot you intend to use.

Save the bracket screw for securing the installed board.

Step 7. Carefully insert the 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 Figure 2.2.

The bracket around connector J3 (see Figure 2.1) should fit where the blank bracket panel was removed.

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 orientation is correct. The board is keyed and will only go in one way.

Step 8. Secure the bracket with the bracket screw before making the internal and external SCSI bus connections.

Step 9. If you are connecting any internal SCSI devices, plug a 68-pin connector on the *end* of the internal SCSI ribbon cable into connector J2 (see Figure 2.1).

Be sure you match pin 1 on both connectors.

Step 10. Connect the LED cable to J4 if desired.

This is designed to drive an off-board system LED and indicates activity on the SCSI bus. The off-board LED will operate at the same time as the on-board SCSI Activity LED.

Step 11. Replace the cabinet cover as described in the user's manual for your computer.

Step 12. Make all external SCSI bus connections.

Step 13. 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.

<u>Remember:</u> 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 LSIU160, and connecting it to your SCSI peripherals. If you are experienced in these tasks, you may prefer to use Section 2.1, "Quick Installation Procedure."

2.2.1   Before You Start

Before starting, look through the following task list to get an overall idea of the steps you will be performing. If you are not confident you can perform the tasks as described here, LSI Logic suggests getting assistance.

- Open your PC cabinet and select an appropriate open PCI slot
- Insert the host adapter board
- Connect the internal and external SCSI peripherals
- Terminate the SCSI bus
- Set the peripheral 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 are referred to as a SCSI bus.

Each SCSI host adapter that you install can act as host for up to 15 peripheral devices, not including the adapter itself.

2.2.2   Inserting the Host Adapter

For safe and proper installation, you will need the user's manual supplied with your computer. Perform the following steps to install the LSIU160.

Step 1.   *Ground yourself* before removing this host adapter board.

Step 2.   Remove the LSIU160 from the packing and check that it is not damaged.

An example of this host adapter board is shown in Figure 2.1. A more detailed drawing is located in Figure A.1.

Step 3.   Switch off the computer and unplug power cords for all components in your system.

Step 4.   Remove the cover from your computer per the instructions in the user's manual for your system to access the PCI slots.

Caution: *Ground yourself* by touching a metal surface before removing the cabinet top. 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 5.   Locate the slots for PCI plug-in board installation.

Refer to the user's manual for your computer to confirm the location of the PCI slots.

The LSIU160 requires a 32-bit or 64-bit PCI slot that allows bus master operation. If a 32-bit PCI slot is used, bits [31:1] of the J1 connector are inserted while bits [64:32] remain uninserted. See Figure 2.2.

Note: For the LSIU160 to function as a 64-bit device, it must inserted in a 64-bit PCI slot. If the LSIU160 is inserted in a 32-bit PCI slot, it will function as a 32-bit device.

Step 6.   Remove the blank bracket panel on the back of the computer aligned with the PCI slot you intend to use.

Save the bracket screw.

Figure 2.1   Hardware Connections for the LSIU160
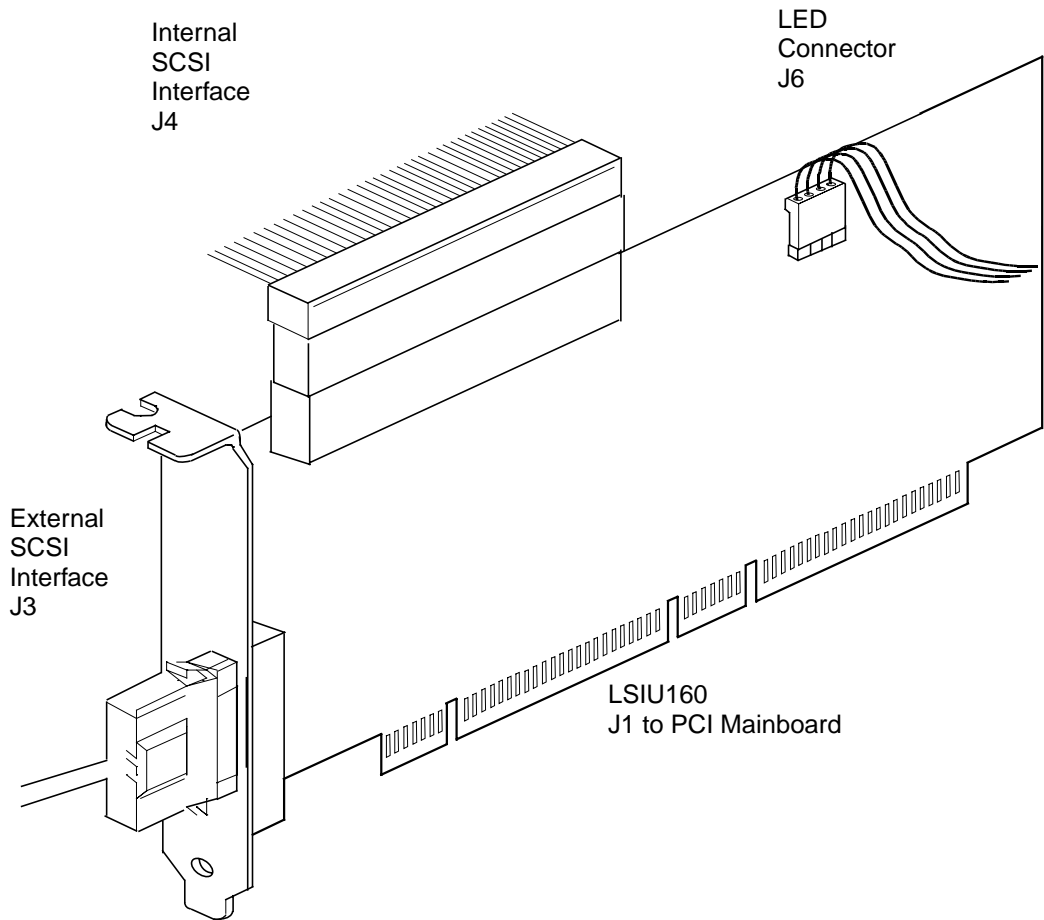
Step 7.   Carefully insert edge connector J1 (see Figure 2.1) of the host adapter into the PCI slot.

Make sure the edge connector is properly aligned before pressing the board into place as shown in Figure 2.2. The bracket around connector J3 should fit where you removed the blank panel.

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 orientation is correct. The board is keyed and will only go in one way.

Figure 2.2   Inserting the Host Adapter
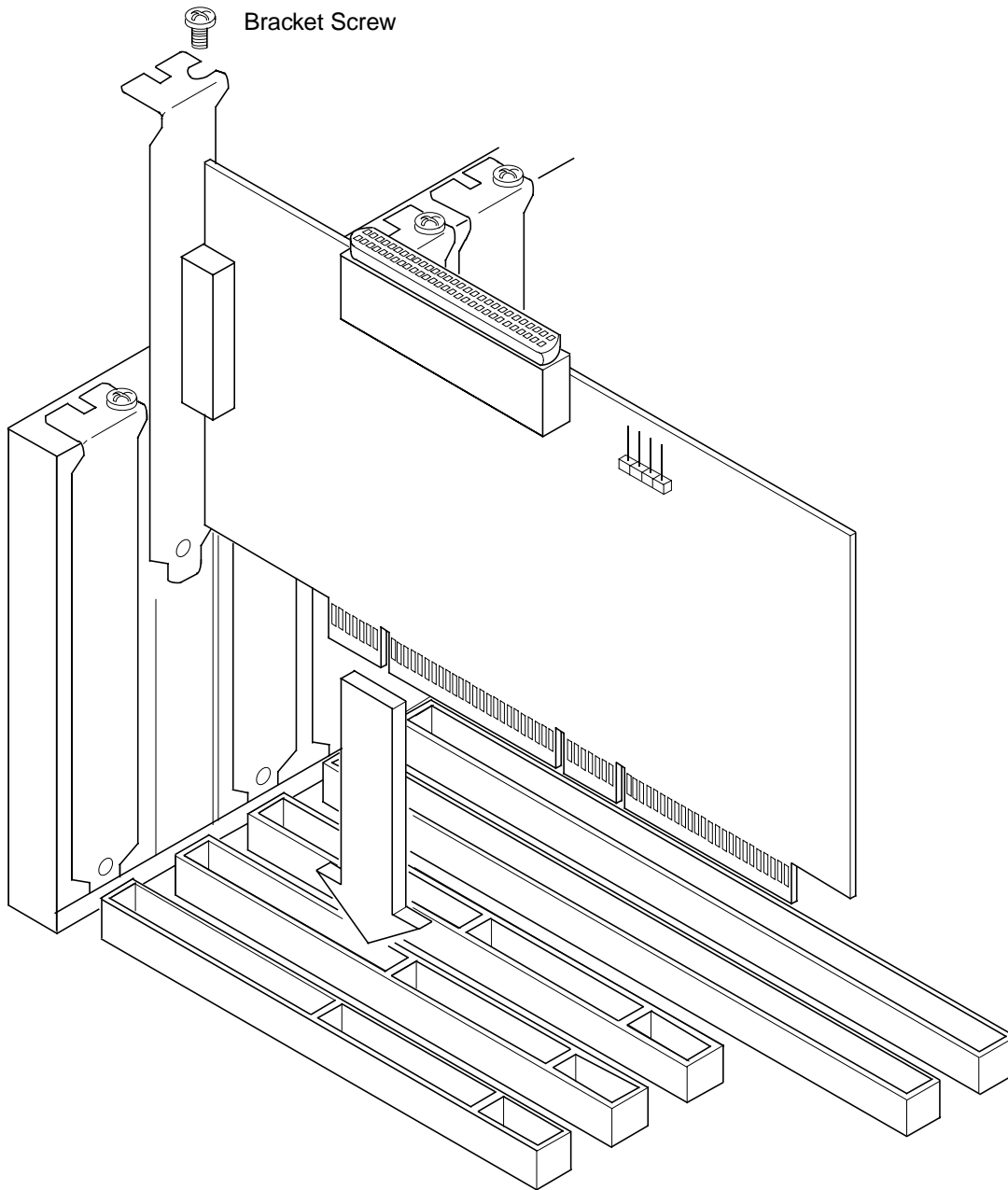
Bracket Screw

Step 8.   Secure the board with the bracket screw (see Figure 2.2) before making the internal and external SCSI bus connections.

2.2.3 Connecting the SCSI Peripherals

SCSI bus connections to the LSIU160 inside your computer can be made with an unshielded 68 conductor Ultra SCSI TPE ribbon cable (see Figure 2.3). The lead connected to pin 1 on the cable is marked with a colored stripe. The connectors on this cable may also be keyed to ensure proper pin-1 connection.

All external SCSI bus connections to the LSIU160 are made with high quality shielded 68 conductor cables (see Figure 2.3). The connectors on this cable are always keyed to ensure proper pin-1 connection.

> Note: All the cables shown in Figure 2.3 are included in the LSI Logic Adapter Board Kit for the LSIU160.

A list of the SCSI bus width and maximum data transfer rate, for various SCSI definitions, is provided in Table 2.1.

Table 2.1   SCSI Bus Widths and Speeds

STA Terms	SCSI Bus Width, Bits	SCSI Bus Speed Maximum Data Rate, Mbytes/s
SCSI-1	8	5
Fast SCSI	8	10
Fast Wide SCSI	16	20
Ultra SCSI	8	20
Wide Ultra SCSI	16	40
Ultra2 SCSI	8	40
Wide Ultra2 SCSI	16	80
Ultra160 SCSI	16	160

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

You can connect up to four devices if they are evenly spaced on a 3-meter Ultra SCSI cable (0.75 m between devices). Your SE SCSI bus should not exceed 3 meters (total internal and external cable lengths), even with fewer than four devices.

For LVD applications, you can connect up to 16 devices including the host adapter if they are evenly spaced on a 12-meter Ultra SCSI cable (0.19 m minimum between devices). A list of the maximum bus length and the maximum number of devices, for various SCSI definitions, is provided in Table 2.2.

Table 2.2   SCSI Bus Lengths

	Maximum Bus Length, Meters[1]			
	SE	Differential	LVD	Maximum # of Devices
SCSI-1	6	25	12	8
Fast SCSI	3	25	12	8
Fast Wide SCSI	3	25	12	16
Ultra SCSI	1.5[2]	25	12	8
Ultra SCSI	3[2]	–	–	4
Wide Ultra SCSI	–	25	12	16
Wide Ultra SCSI	1.5	–	–	8
Wide Ultra SCSI	3	–	–	4
Ultra2 SCSI	Note[3]	Note[3]	12	8
Wide Ultra2 SCSI	Note[3]	Note[3]	12	16
Ultra160 SCSI	Note[3]	Note[3]	12	16

1. This parameter may be exceeded in point-to-point and engineered applications.
2. Additional spacing rules apply.
3. SE and high power differential are not defined at Ultra2 or Ultra160 speeds.

Figure 2.3   SCSI Cables

Terminated SCSI Cable for Internal Connections
(for use with nonterminated internal devices)

68-pin HD

Terminated End

SCSI Cable for Internal Connections

68-pin HD
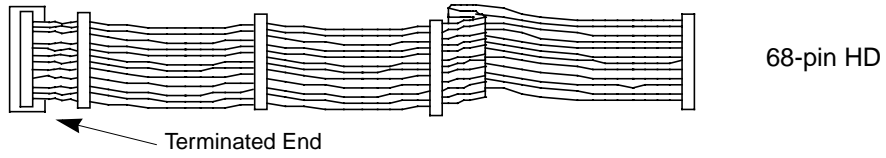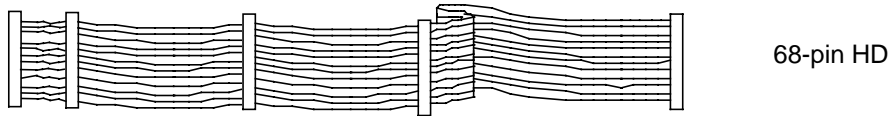
SCSI Cable for External Connections

68-pin HD
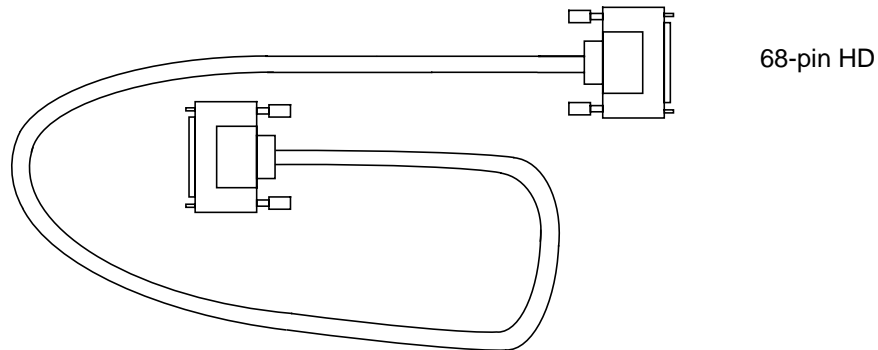
2.2.4   Making Internal SCSI Bus Connections

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

Step 1.   Plug one end of the 68-pin internal SCSI ribbon cable into connector J4 (see Figure 2.4).

Important: You must match pin 1 on this and all subsequent connections.

Figure 2.4   Internal SCSI Ribbon Cable to Host Adapter Connection

Internal
SCSI Interface
J4
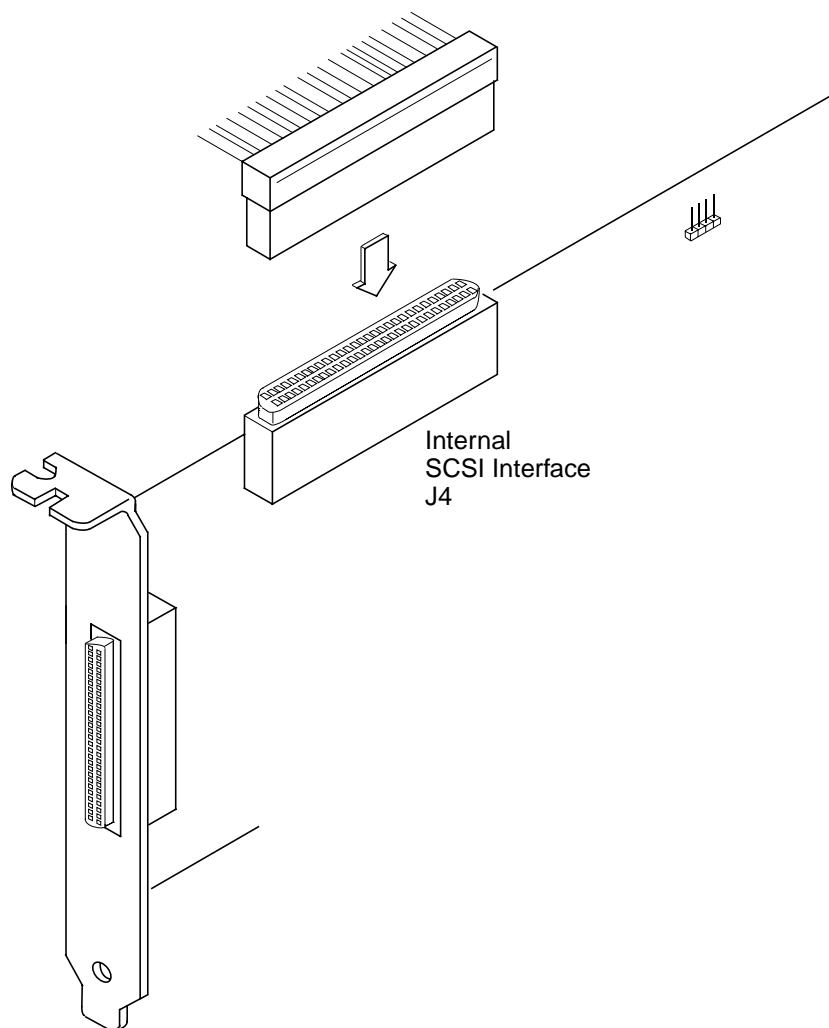
Step 2.   If you have only two internal devices to connect, plug the other end of the internal SCSI ribbon cable into the SCSI connector on your internal SCSI device. An example of this connection is shown in Figure 2.5.

Note: For nonterminated internal SCSI devices, a terminated cable will be required. This connector must be on the *end* of the SCSI cable.

Figure 2.5   Internal SCSI Ribbon Cable to Internal SCSI Device Connection
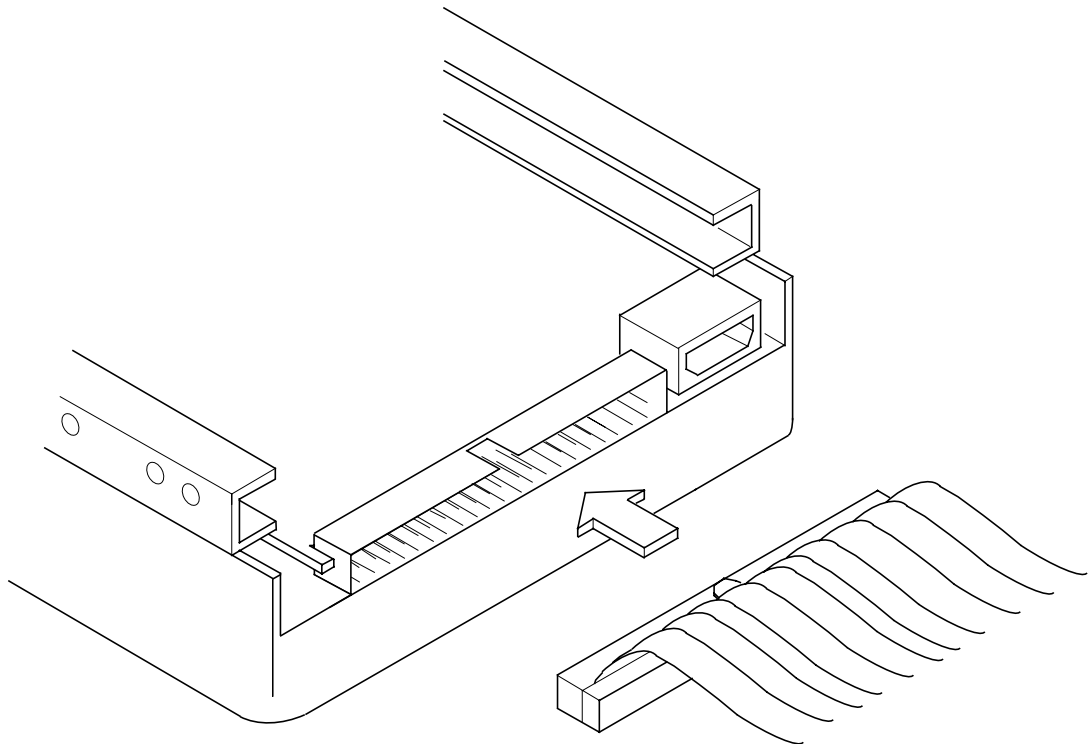
If you have more than one internal device to connect, use an internal SCSI ribbon cable with the required number of connectors attached along its length and proceed to the next step. An example of this type of connection is provided in Figure 2.6. If you have only one internal device, proceed to Step 4 on page 2-14.

Step 3.   Plug the cable into each additional device as needed.

An example of this type of chained connection is shown in Figure 2.7. Make sure to match pin 1 on all connections.

Figure 2.6   Connecting Additional Internal SCSI Devices
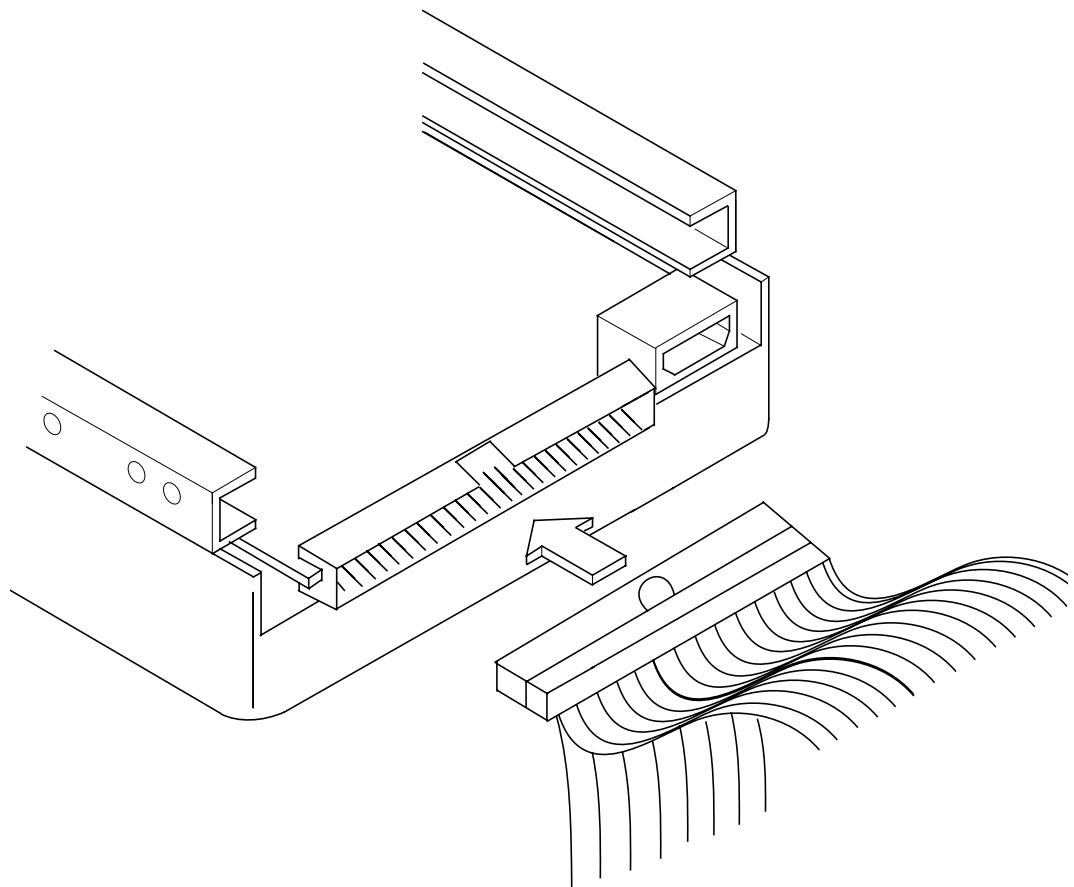
Figure 2.7   Multiple Internal SCSI Devices Chained Together
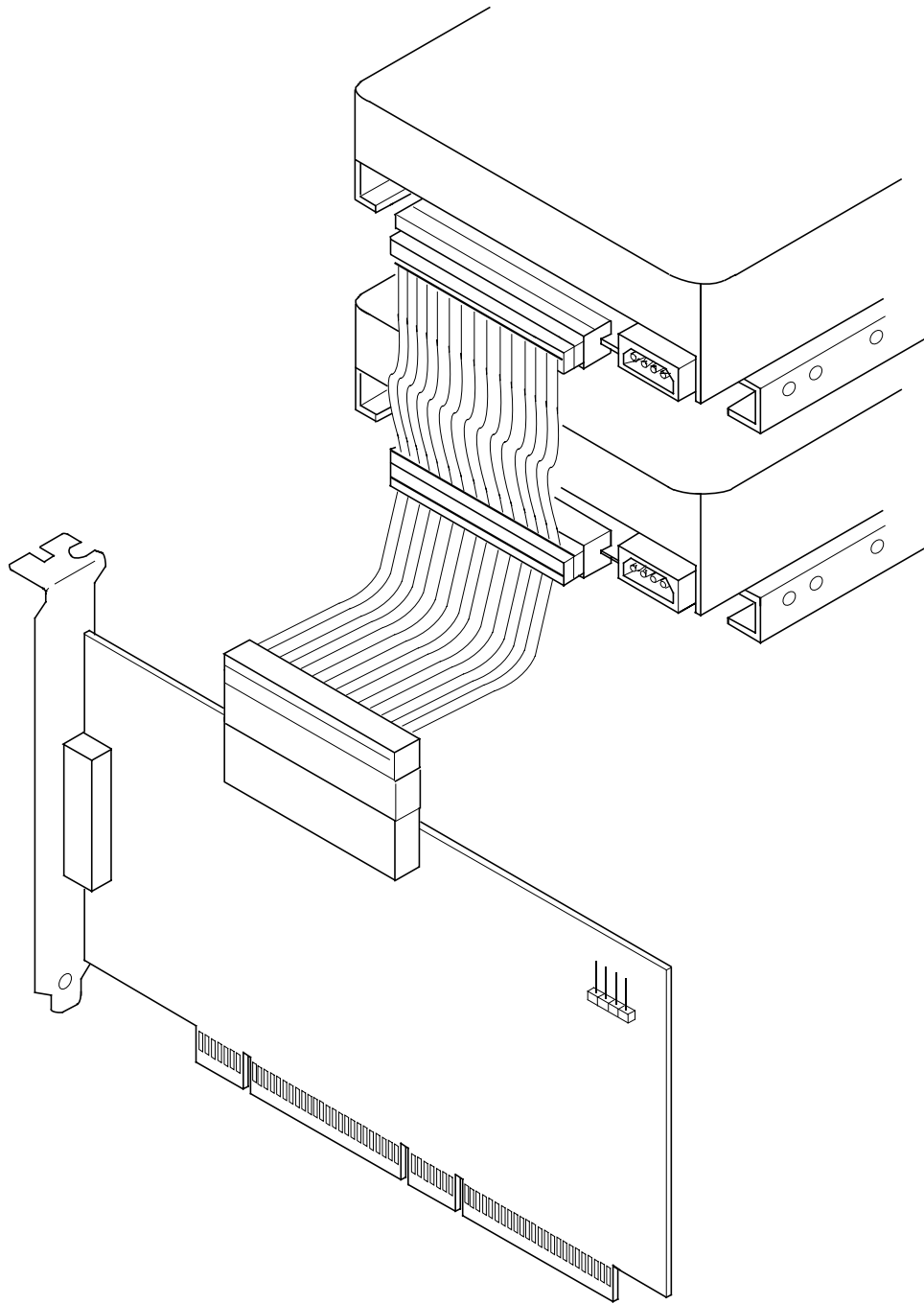
Most PC cabinets are designed with a front panel LED.

Step 4. Connect the LED cable to connector J6 on the host adapter, as shown in Figure 2.8.

When properly connected, the front panel LED lights when there is activity on the SCSI bus.

Connector J6 is not keyed. The orientation of the LED cable should not matter as long as all four pins are connected. If the LED does not light during SCSI bus activity from this host adapter, you may have to rotate the LED cable connector 180° on J6.

Figure 2.8   SCSI LED Connector

LED
Connector
J6
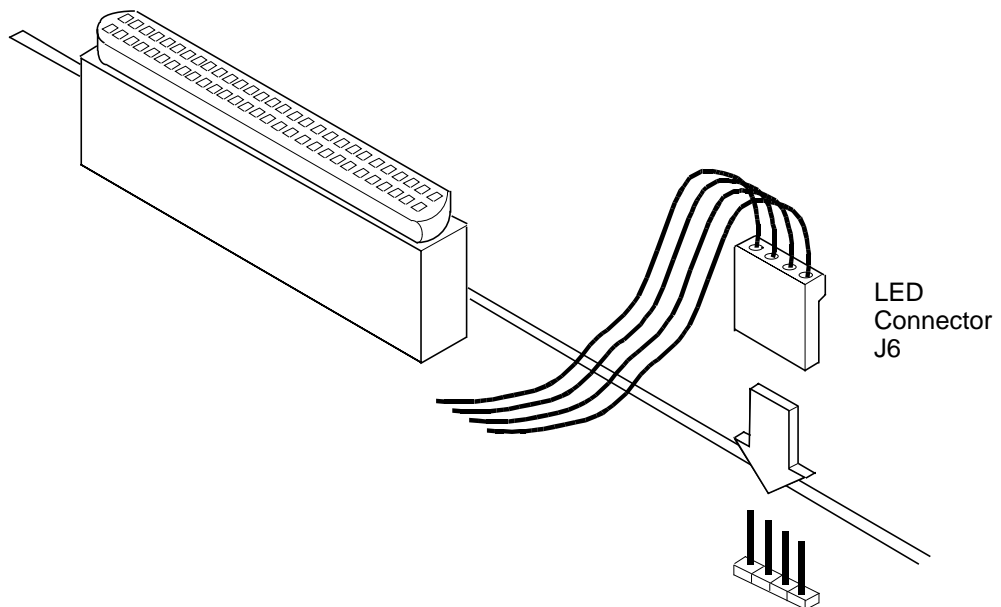
Some LED cables have only two wires. In this case, place the connector on one end or the other of J6. If the LED does not light when there is SCSI activity, put the connector on the other half of J6.

2.2.5 Making External SCSI Bus Connections

This section provides step-by-step instructions about making external SCSI bus connections. To connect external SCSI devices to the LSIU160:

Step 1.   Plug the 68-pin HD connector on one end of a shielded external SCSI cable (see Figure 2.3) into the host adapter connector J3 (see Figure 2.1).

This connector is in the bracket attached to the back panel of your computer. Figure 2.9 shows how this connection is made.

Figure 2.9   External Cable to Host Adapter
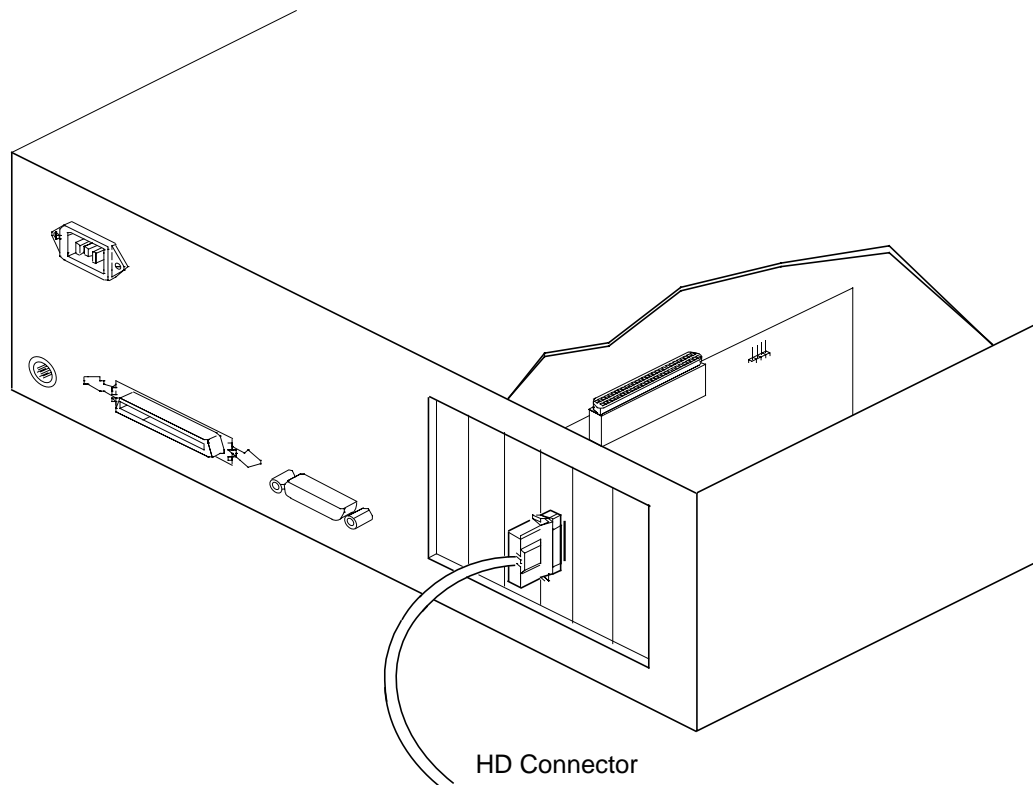
HD Connector

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 SCSI Device Cable

HD Connectors
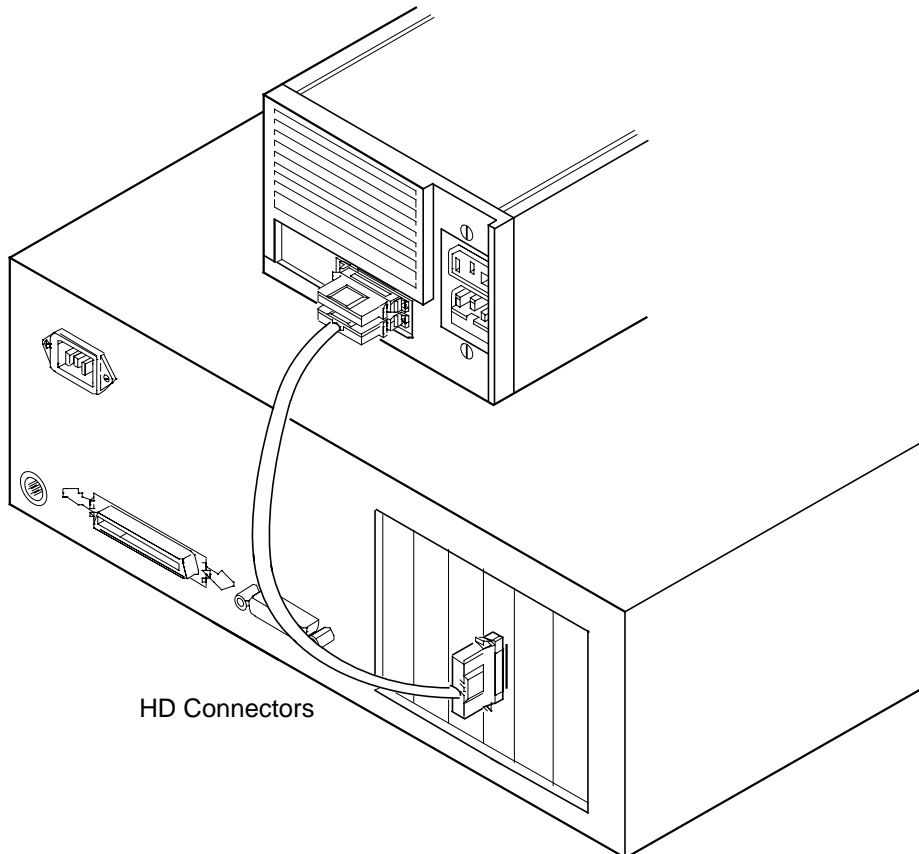
If this is the only external SCSI device on your system, proceed to Section 2.2.6, "SCSI Bus Termination," page 2-18 for termination instructions. If you have multiple SCSI devices, proceed to the next page.

Step 3. Chain multiple devices together with shielded external SCSI cables.

An example of these chained connections is shown in Figure 2.11.

Figure 2.11   Multiple External SCSI Devices Chained Together

HD Connectors
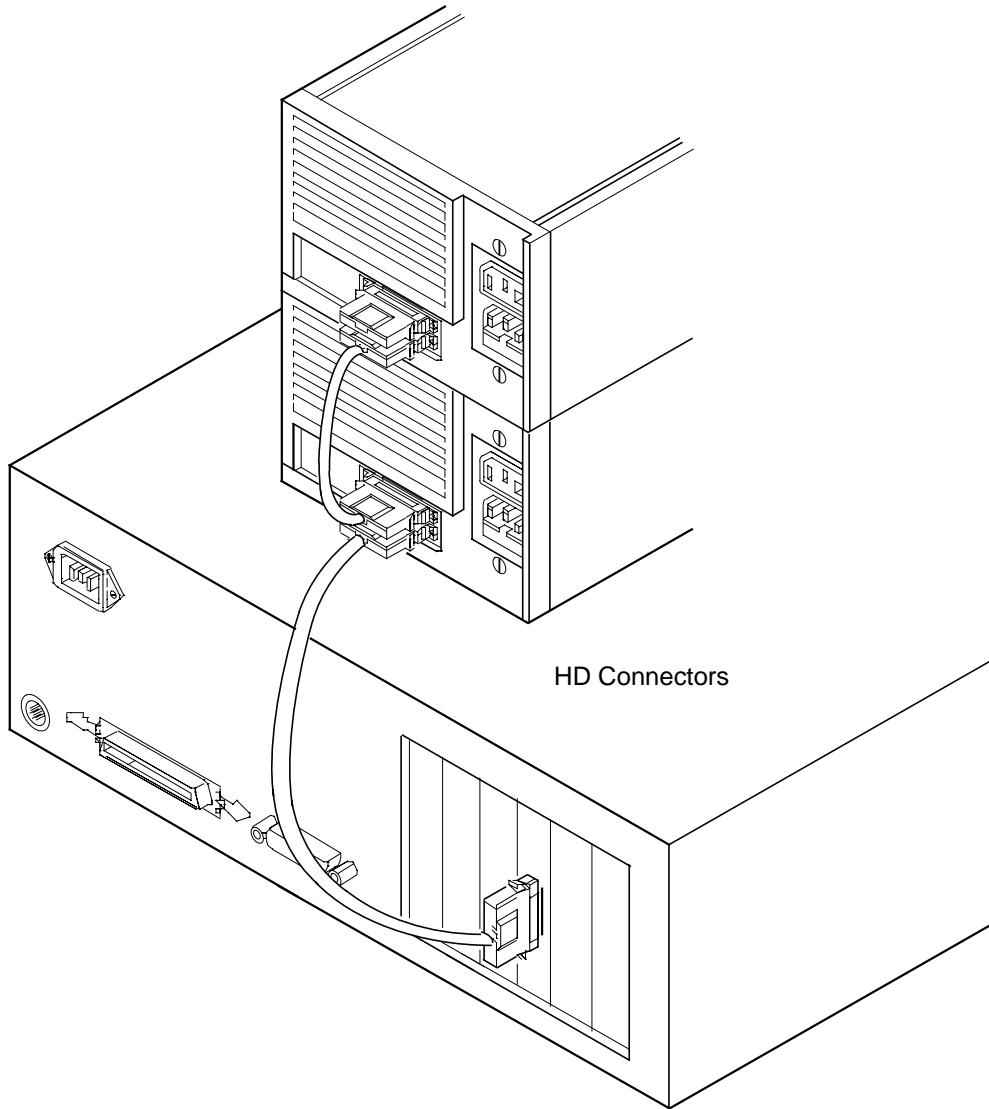
After you have connected all of your internal and external devices, proceed to Section 2.2.6, "SCSI Bus Termination."

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 the LSIU160 is also on the SCSI bus—its termination is automatically enabled when it is connected to the end of the bus.

Important: To utilize Ultra2 and faster SCSI performance, you must only have LVD devices on the bus. Do not mix any SE devices with LVD devices or the entire bus will drop to SE, limiting bus performance to Ultra SCSI levels.

The peripheral device terminators are usually set with jumpers, resistor modules, 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 type/setting for each device and how to set/change it.

Caution: The autoenable/disable sensing feature on the LSIU160 may enable termination erroneously if it is directly cabled to another SCSI device or host adapter using the same sensing method. The LSIU160 senses the presence of SCSI devices by detecting the ground signal on conductor 50 of the SCSI cable.

The LSIU160 automatically controls SCSI bus termination for three different bus configurations, depending on how it is connected (see Figure 2.1). The three bus configurations are:

- Section 2.2.6.1, "Internal Bus Connections"
- Section 2.2.6.2, "External Bus Connections"
- Section 2.2.6.3, "Internal and External Bus Connections"

Termination on the LSIU160 host adapter for these three different bus configurations is discussed below.

2.2.6.1 Internal Bus Connections

If you have only internal SCSI device connections to your host adapter, you must terminate the last internal device on the SCSI bus. You must disable the terminators 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

Last Device on Bus – Terminators Enabled

Does not end Bus – Terminators Disabled

Host Adapter Automatically Terminated
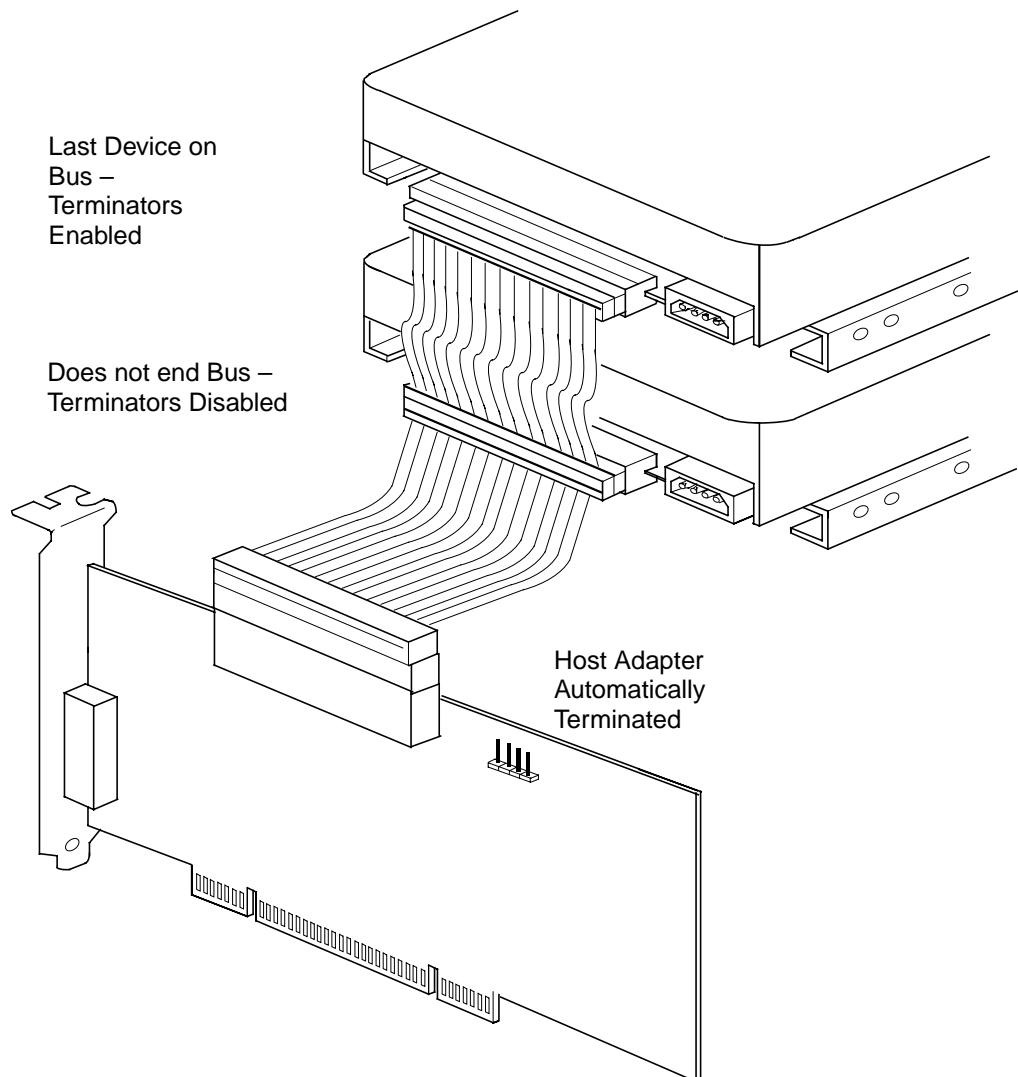
2.2.6.2 External Bus Connections

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

Figure 2.13 shows an example of how termination is determined for this SCSI bus configuration.

Figure 2.13 External SCSI Device Termination
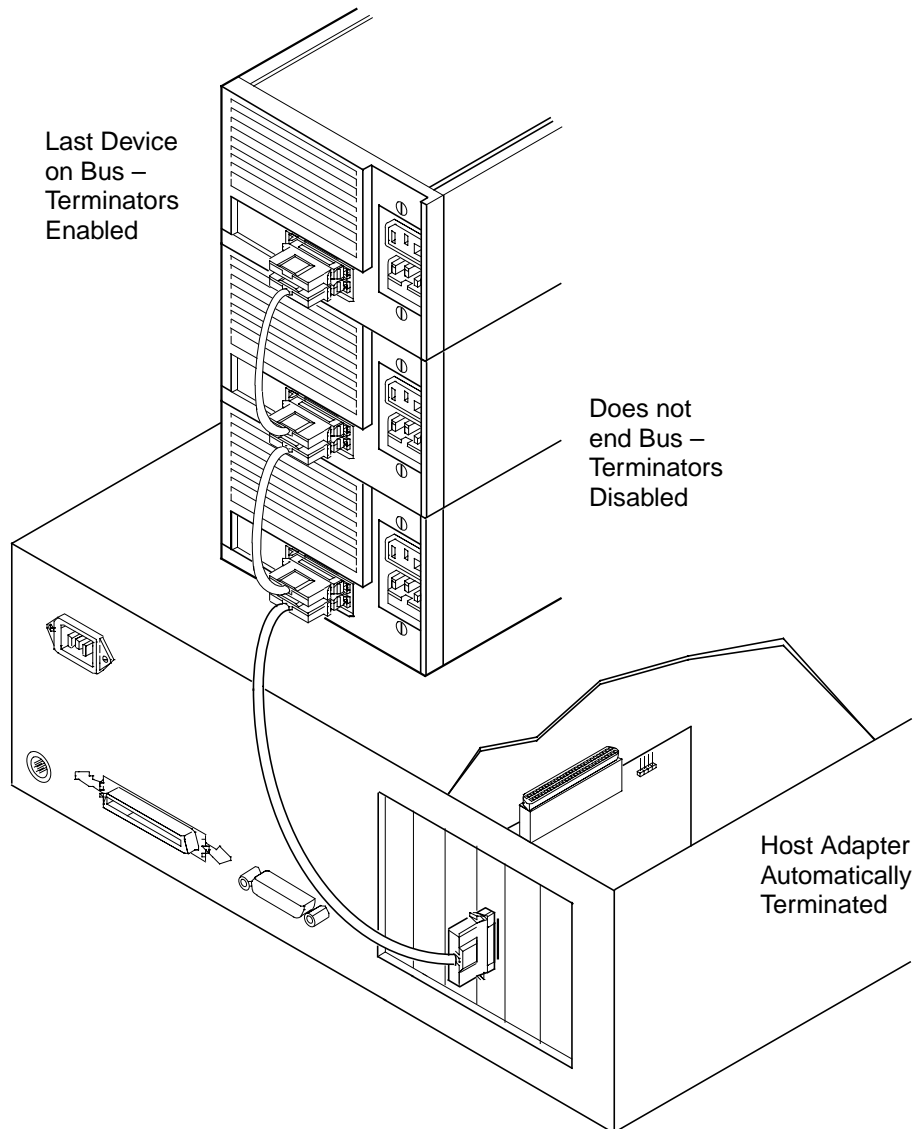
2.2.6.3 Internal and External Bus Connections

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

Figure 2.14 shows an example of how termination is determined for this SCSI bus configuration.

Figure 2.14   Internal and External SCSI Device Termination

Last device on Bus –
Terminators Enabled

Does not end Bus –
Terminators Disabled

Host Adapter Termination
Automatically Disabled

Do not end Bus –
Terminators Disabled

Last Device on Bus –
Terminators Enabled
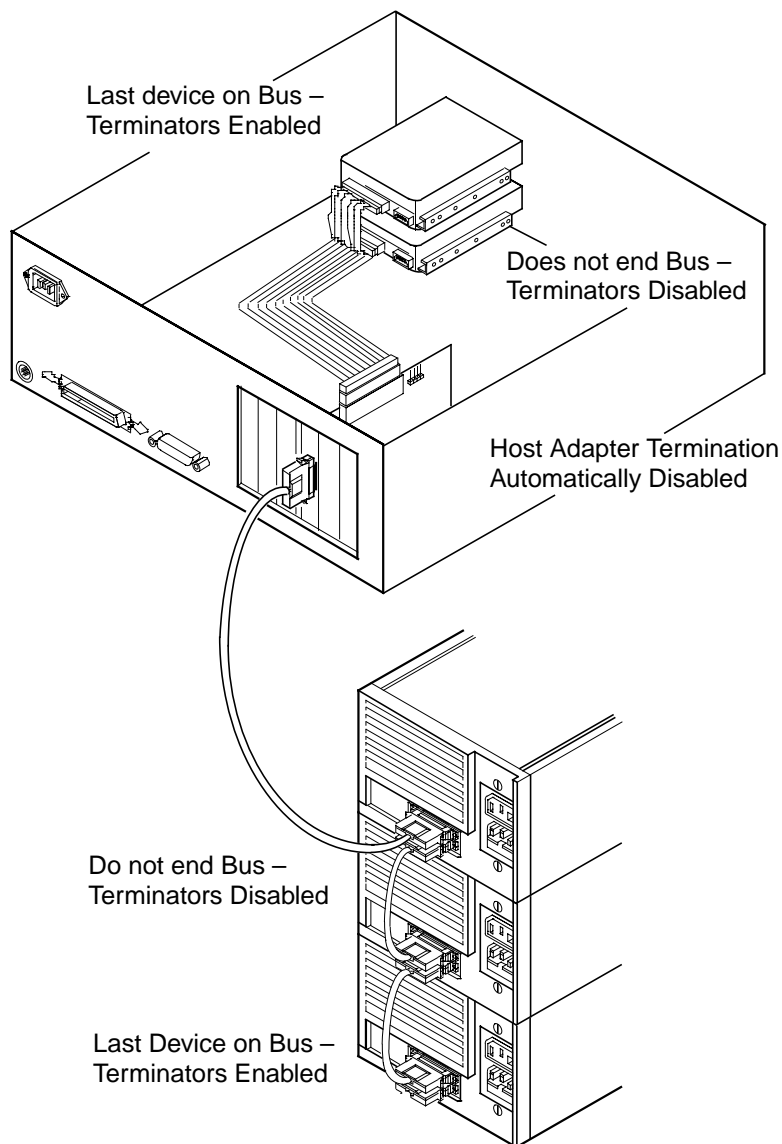
2.2.7 Setting SCSI IDs

You must set each SCSI device and the host adapter to a separate SCSI ID 0 through 15. 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 SCSI hard disk drive on the SCSI bus, that drive should have the lowest SCSI ID on the bus. Typically, SCSI ID 0 is used; however, for system performance optimization, an ID other than 0 (zero) can be used. Chapter 3, "Configuring the LSIU160," explains how to set the 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.

> Note: You must not have any duplication of SCSI IDs on a SCSI bus.

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 to eliminate duplicates and record the IDs for future reference.

Table 2.3 is provided as a place to keep this record.

Table 2.3   SCSI ID Record

SCSI ID	SCSI Device
15	
14	
13	
12	
11	
10	
9	
8	
7	LSIU160 (default)
6	
5	
4	
3	
2	
1	
0	

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.

Step 3. Switch power on to all devices and your computer.

Step 4. Wait for your computer to boot up.

Step 5. To change the configuration of the host adapter, see Chapter 3, "Configuring the LSIU160."

Step 6. Load the software and drivers suitable to your application and system.

Refer to the *PCI Storage Device Management System SDMS 4.0 User's Guide* or the guide for the software you plan to use.

Chapter 3
Configuring the LSIU160

This chapter describes configuring the LSIU160 and includes these topics:

3.1   Overview of the SCSI BIOS Configuration Utility

The LSIU160 is loaded with LSI Logic SCSI BIOS and Configuration Utility Version 4.16 (or greater). This section describes the process you need to follow to change configuration settings on your board.

The SDMS SCSI BIOS provides support for the BIOS Boot Specification (BBS), which allows you to choose which device to boot from by selecting the priority.

To use this feature, the system BIOS must also be compatible with the BBS. If your system supports the BBS, then you will use the system BIOS setup menu to select the boot and drive order. In the system BIOS setup, the Boot Connection Devices menu appears with a list of available boot options. Use that menu to select the device and rearrange the order. Then exit to continue the boot process.

In most cases you should not need to change the default configuration of the 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.

There are four sets of configurations you can change. You make changes on subordinate menus called from the Main Menu, which is opened when

you start the Configuration Menu. The subordinate menus are listed below.

- Adapter properties
- Device properties
- Adapter boot list
- Global properties

All these properties are controlled by menus you access through the configuration utility Main Menu. The Main Menu also gives an overview of some properties of installed LSI Logic host adapter boards.

3.1.1 Starting the Configuration Utility

You can see the version number of your LSI Logic 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 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.

These messages may appear during the boot process:

- "Adapter removed from boot order, parameters will be updated accordingly" appears when an adapter is removed from the system or relocated behind a PCI bridge.

- "Configuration data invalid, saving default configuration!" appears if none of the information in the NVRAM is valid.

- "Found SCSI Controller not in following Boot Order List, to Add: Press Ctrl-C to start LSI Logic Configuration Utility..." appears when less than four adapters are in the boot order and more adapters exist than are shown.

NonVolatile Random Access Memory (NVRAM) is available on the LSIU160. Changes can be made and stored using this menu driven utility.

Important: This utility is a powerful tool. If, while using it, you somehow disable all of your controllers you can recover. Pressing Ctrl-E after memory initialization during a reboot allows you to re-enable and reconfigure.

Note: 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.

3.1.2 Exiting the SCSI BIOS Configuration Utility

Since most changes only take effect after the system reboots, you must exit properly from the Configuration Utility. The proper exit technique is described in Section 3.2.7, "Exit Menu," page 3-20. It also describes exiting the subordinate menus.

3.2 The LSI Logic SCSI BIOS Configuration Utility Menus

This section describes the menu system of the LSI Logic SCSI BIOS Configuration Menu System.

3.2.1 Using the Menus

You make your configuration changes in the main area of the menu. As in the example menus, it is lighter in color than the header or footer areas. The commands you use to make changes are shown in the footer area and described in Table 3.1. Settings with black text can be changed, settings with white text cannot. This is true regardless of whether the Color or Mono setting is chosen in the Global Properties Menu (Figure 3.6).

Table 3.1   Configuration Commands

Command	Description
F1 = Help	Provides context sensitive help for the cursor resident field.
Arrow Keys = Select Item	Move the cursor up, down, left, or right.
+/− = Change [Item]	Changes items with values in [ ] brackets. Only the numeric keypad '+' and '−' are enabled. When pressed, they toggle modifiable field to its next relative value. '+' toggles the value up and '−' toggles the value down.
Esc = Abort/Exit	Aborts the current context operation and/or exits the current screen. This option calls an Exit menu, described further in Section 3.2.7.
Home/End = Select Item	Moves the cursor to the start/end of a scrollable field.
Enter = Execute <Item>	Executes options with values in < > brackets. Press Enter to execute the field's associated function.
F2 = Menu	Sets cursor context to the Optional Menu area. Select a menu item and press Enter. This option is only available from the Main and Adapter Properties menus.

3.2.2   Main Menu

When you start the LSI Logic SCSI BIOS Configuration Utility, the Main Menu, shown in Figure 3.1, appears. This menu displays a list of installed LSI Logic PCI to SCSI host adapters, information about each of them, and a series of other menu options. This list displays up to four boards.

At the opening menu, the cursor is on one of the listed adapters. If you need to change the configuration of an adapter, move to the board you want to change with the arrow keys and press Enter. This calls the menu described in detail in Section 3.2.3, "Adapter Properties Menu." From this menu 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 Configuration Utilities Main Menu.
Table 3.2 lists the Main Menu fields and their descriptions.

Figure 3.1   Main Menu

```
LSI Logic PCI SCSI Configuration Utility Version PCI
4.16.00

<Boot Adapter List>      <Global  Properties>



LSI Logic Host Bus Adapters

Adapter        PCI  Dev/  Port      IRQ  NVM   Boot    LSI Logic
               Bus  Func  Number                Order   Control

<LSI53C1010    0    98>   FC00      9    Yes   2       Enabled

<LSI53C896     0    88>   F800      10   Yes   3       Disabled

<LSI53C896     0    58>   E400      11   Yes   1       Enabled




F1 = Help            ↑↓→←= Select Item   -/+ = [Change Item]

Esc = Abort/Exit  Home/End = Scroll    Enter= Execute <Item>

F2 = Menu
```

Table 3.2   Main Menu Fields and Descriptions

Field	Description
Adapter	Indicates the specific LSI53CXXXX Host Adapter.
PCI Bus	Indicates the PCI Bus number (range 0x00–0xFF, 0–255 decimal) assigned by the system BIOS to an adapter.

Table 3.2   Main Menu Fields and Descriptions (Cont.)

Field	Description
Dev/Func	Indicates the PCI Device/Function assigned by the system BIOS to an adapter. The 8-bit value is mapped as follows: Bit # 7 6 5 4 3 2 1 0 Bits [7:3]: Device (range 0x00–0x1F, 0–31 decimal) Bits [2:0]: Function (range 0–7)
Port Number	Indicates which I/O port communicates with an adapter, as assigned by the system BIOS.
IRQ	Indicates the Interrupt Request Line used by an adapter, as assigned by the system BIOS.
NVM	Indicates whether an adapter has NVM (NonVolatile Memory) associated with it. An adapter's configuration is stored in its associated NVM. NVM can refer to NVRAM that is resident on a host adapter or to system NonVolatile Storage (NVS).
Boot Order	Indicates the relative boot order (0 to 3) of an adapter. The LSI Logic SCSI BIOS traverses up to four adapters in the specified order in search of bootable media. To modify this field, access the Boot Adapter List Menu.
LSI Logic Control	Indicates whether an adapter is eligible for LSI Logic software control or is reserved for control by non-LSI Logic software.

3.2.3   Adapter Properties Menu

The Adapter Properties menu allows you to view and modify adapter settings and as well as the SCSI devices connected to it. It also provides access to an adapter's device settings. To display this menu, select a device in the Adapter field on the Main Menu and press Enter. After pressing Enter, the following message flashes before the menu appears: "`Initializing the adapters, reading for non-volatile settings, and scanning for devices...`" After a few seconds the menu appears. Figure 3.2 provides an example of the Adapter Properties menu.

Figure 3.2   Adapter Properties Menu

```
LSI Logic PCI SCSI Configuration Utility Version PCI 4.16.00


Adapter Properties

          Adapter        PCI    Dev/
                         Bus    Func

          LSI53C1010     0      58


          <Device Properties>



          SCSI Parity          [Yes]

          Host SCSI ID         [7]

          SCSI Bus Scan Order  [Low to High (0.Max)]

          Removable Media      [None]
          Support

          CHS Mapping          [SCSI Plug and Play Mapping]

          Spinup Delay (Secs)  [2]

          Secondary Cluster    [No]
          Server

          Termination Control  [Auto]

          <Restore Defaults>

F1 = Help             ↑↓→←= Select Item    -/+ = [Change Item]

Esc = Abort/Exit    Home/End = Scroll      Enter= Execute <Item>
```

Table 3.3 lists the fields you can access and their descriptions.

Note: If the field displays in black text it is available for changes. If it displays in white text, it is not available.

Table 3.3   Adapter Properties Fields and Descriptions

Field	Field Type [Value]	Description
Device Properties	Executable	Select this option and press Enter to view and modify device properties.
SCSI Parity	Configuration [Yes/No]	Indicates whether SCSI parity is enabled for an adapter. When disabled, it is also necessary to disable disconnects for all devices, as parity checking for the reselection phase is not disabled. If a nonparity generating device disconnects, its operation will never complete because the reselection fails due to parity error.
Host SCSI ID	Configuration [0 to 7 / 0 to 15]	Indicates the SCSI identifier of an adapter. It is recommended that this field be set to the highest priority SCSI identifier, which is 7.
SCSI Bus Scan Order	Configuration [Low to High (0 to Max) / High to Low (Max to 0)]	Indicates the order in which to scan SCSI identifiers on an adapter. Changing this item will affect drive letter assignment(s) if more than one device is attached to an adapter.
Removable Media Support	Configuration [None / Boot Drive Only / With Media Installed]	Specifies the removable media support option for an adapter. Removable media support only applies to devices that report themselves as a hard drive. It does not apply to CD-ROM devices or Magnetic Optical devices. **None** indicates no removable media support whether the drive is selected as first (BBS), or is first in the scan order (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 regardless of the drive number assignment.

Table 3.3   Adapter Properties Fields and Descriptions (Cont.)

Field	Field Type [Value]	Description
CHS Mapping	Configuration [SCSI Plug and Play Mapping / Alternate CHS Mapping]	Defines how the Cylinder Head Sector (CHS) values are mapped onto a disk without pre-existing partition information. SCSI Plug and Play Mapping automatically determines the most efficient and compatible mapping. Alternate CHS Mapping utilizes an alternate, possibly less efficient mapping that may be required if a device is moved between adapters from different vendors. **Caution:** Neither of these options has any effect after a disk has been partitioned using the FDISK command. The FDISK utility is a tool that the user can use to delete partition entries, one or all of them. If all partition entries are deleted, it is necessary to reboot to clear memory or the old partitioning data will be reused, thus nullifying the previous operation. Use care to ensure that the correct disk is the target of an FDISK command.
Spinup Delay (Seconds)	Configuration [1 to 15]	Indicates the delay in seconds between spinups of devices attached to an adapter. Staggered spinups balance the total electrical current load on the system during boot. The default value is 2 seconds.
Secondary Cluster Server	Configuration [Yes / No]	Indicates whether an adapter has one or more devices attached that are shared with one or more other adapters and therefore, the LSI Logic SCSI BIOS should avoid SCSI bus resets as much as possible. This option allows the user to enable an adapter to join a cluster of adapters without doing any SCSI bus resets. This is a requirement for Microsoft Cluster Server. The default value is No with an alternate option of Yes.
Termination Control	Configuration [Auto / Off]	If available, the field indicates whether an adapter has automatic termination control. Auto means that the adapter automatically determines whether it should enable or disable its termination. Auto is the default state unless termination is done manually, in which case, the configuration is Off.
<Restore Defaults>	Executable	Press Enter to obtain default settings.

3.2.4 Device Properties Menu

The Device Properties Menu allows you to view and update individual device settings for an adapter. Changing a setting for the host device (for example, SCSI ID 7) changes the setting for all devices. The number of fields displayed requires the menu to scroll left/right in order to display the information. When accessing this menu online, use the Home/End keys to scroll to columns currently not displayed. The scroll indicator on the bottom of the menu shows where the cursor is relative to the first and last columns. The example for the Device Properties Menu is split (Figure 3.3 and Figure 3.4) due to the width of its multiple fields/columns.

Figure 3.3   Device Properties Menu (Left Half)

```
LSI Logic PCI SCSI Configuration Utility Version PCI 4.16.00


Device Properties

SCSI  Device Identifier    MB/  MT/   Data    Scan    Scan     Disconnect
ID                         Sec  Sec   Width   ID      LUNs>0

0     Quantum Viking 4.5   80   [40]  [16]    [Yes]   [Yes]    [On]

1     Quantum Viking 4.5   80   [40]  [16]    [Yes]   [Yes]    [On]

2     Quantum Viking 4.5   80   [40]  [16]    [Yes]   [Yes]    [On]

3     Quantum Viking 4.5   80   [40]  [16]    [Yes]   [Yes]    [On]

4     Quantum Viking 4.5   80   [40]  [16]    [Yes]   [Yes]    [On]

5     Quantum Viking 4.5   80   [40]  [16]    [Yes]   [Yes]    [On]

6     -                    80   [40]  [16]    [Yes]   [Yes]    [On]

7     LSI53C1010           80   [40]  [16]    [Yes]   [Yes]    [On]

8     -                    80   [40]  [16]    [Yes]   [Yes]    [On]

9     -                    80   [40]  [16]    [Yes]   [Yes]    [On]

10    -                    80   [40]  [16]    [Yes]   [Yes]    [On]

11    -                    80   [40]  [16]    [Yes]   [Yes]    [On]

12    -                    80   [40]  [16]    [Yes]   [Yes]    [On]

13    -                    80   [40]  [16]    [Yes]   [Yes]    [On]

14    -                    80   [40]  [16]    [Yes]   [Yes]    [On]

15    -                    80   [40]  [16]    [Yes]   [Yes]    [On]

                                <<

F1 = Help                    ↑↓→←= Select Item    -/+ = [Change Item]

Esc = Abort/Exit             Home/End = Scroll     Enter= Execute
                                                   <Item>
```

Figure 3.4   Device Properties Menu (Right Half)

```
LSI Logic PCI SCSI Configuration Utility Version PCI 4.16.00


Device Properties LSI53C1010  0            A0

SCSI  Device Identifier   SCSI    Queue  Boot    Format     Verify    Restore
ID                        Timeout Tags   Choice                       Defaults

0     Quantum Viking 4.5 < 10>   [On]   [No]    [Format]   [Verify]  <Defaults>

1     Quantum Viking 4.5 < 10>   [On]   [No]    [Format]   [Verify]  <Defaults>

2     Quantum Viking 4.5 < 10>   [On]   [No]    [Format]   [Verify]  <Defaults>

3     Quantum Viking 4.5 < 10>   [On]   [No]    [Format]   [Verify]  <Defaults>

4     Quantum Viking 4.5 < 10>   [On]   [No]    [Format]   [Verify]  <Defaults>

5     Quantum Viking 4.5 < 10>   [On]   [No]    [Format]   [Verify]  <Defaults>

6     -                  < 10>   [On]   [No]    [Format]   [Verify]  <Defaults>

7     LSI53C1010         < 10>   [On]   [No]    [Format]   [Verify]  <Defaults>

8     -                  < 10>   [On]   [No]    [Format]   [Verify]  <Defaults>

9     -                  < 10>   [On]   [No]    [Format]   [Verify]  <Defaults>

10    -                  < 10>   [On]   [No]    [Format]   [Verify]  <Defaults>

11    -                  < 10>   [On]   [No]    [Format]   [Verify]  <Defaults>

12    -                  < 10>   [On]   [No]    [Format]   [Verify]  <Defaults>

13    -                  < 10>   [On]   [No]    [Format]   [Verify]  <Defaults>

14    -                  < 10>   [On]   [No]    [Format]   [Verify]  <Defaults>

15    -                  < 10>   [On]   [No]    [Format]   [Verify]  <Defaults>

                                                                        >>

F1 = Help            ↑↓→←= Select Item      -/+ = [Change Item]

Esc = Abort/Exit     Home/End = Scroll      Enter= Execute <Item>
```

Table 3.4 lists the fields and their descriptions.

Table 3.4   Device Properties Fields and Descriptions

Field	Field Type [Value]	Description
SCSI ID	Information	Device's SCSI Identifier.
Device Identifier	Information	Indicates the ASCII device identifier string, as extracted from the device's inquiry data.
Mbytes/s	Information	Provides the maximum throughput of the device in Mbytes/s.
Megatransfers/s	Configuration [0 / 5 / 10 / 20 / 40]	Indicates the maximum synchronous data transfer rate in megatransfers per second. Megatransfers per second / Data Width = 8 bits / Data Width = 16 bits / Synch Period (ns) 0 = Asynch / 0 = Asynch / 0 = Asynch / 0 = Asynch 5 / 5 / 10 / 200 10 / 10 / 20 / 100 20 / 20 / 40 / 50 40 / 40 / 80 / 25
Data Width	Configuration [8 / 16]	Maximum data width in bits.
Scan ID	Configuration [Yes / No]	Indicates whether to scan for this SCSI identifier at boot time. Utilizing this setting allows you to ignore a device. This decreases boot time by disabling inquiry of unused SCSI identifiers. Set this option to No if there is a device that you do not want to be available to the system. Also, on a bus with only a few devices attached, the user can speed up boot time by changing this setting to No for all unused SCSI IDs.
Scan LUNs > 0	Configuration [Yes / No]	Indicates whether to scan for LUNs greater than zero for a device. LUN 0 is always queried. This option should be used if a multi-LUN device responds to unoccupied LUNs or if it is desired to reduce the visibility of a multi-LUN device to LUN 0 only. Set this option to No if you have problems with a device that responds to all LUNs whether they are occupied or not. Also, if a SCSI device with multiple LUNs exists on your system 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.

Table 3.4   Device Properties Fields and Descriptions (Cont.)

Field	Field Type [Value]	Description
Disconnect	Configuration [On / Off]	Indicates whether to allow a device to disconnect during SCSI operations. Some (usually newer) devices run faster with disconnect enabled, while some (usually older) devices run faster with disconnect disabled.
SCSI Time-out	Executable [0–9999]	Indicates the maximum allowable time for completion of a SCSI operation in seconds. Since time-outs provide a safeguard that allows the system to recover should an operation fail, it is recommended that a value greater than zero be used. A value of zero allows unlimited time for an operation to complete and could result in the system hanging (waiting forever) should an operation fail. **Note**: This field is executable and must be selected with the Enter key. You also input the new value with the number keys from the keyboard, not the number pad.
Queue Tags	Configuration [On / Off]	This field indicates whether to allow the use of queue tags for a device. Currently the BIOS does not use queue tags. This item specifies queue tag control to higher level device drivers.
Boot Choice	Configuration [Yes / No]	Indicates whether this device can be selected as the boot device. This option is only applicable to devices attached to adapter number zero in the boot list on non-BBS systems. It provides primitive BBS flexibility to non-BBS systems.
Format	Executable	Allows low-level formatting on a disk drive, if enabled. Low-level formatting will completely and irreversibly erase all data on the drive. To low level format a device, select the device from the menu and use the arrow keys to move the cursor to the Format column. Press Enter. **Note:** Formatting will default the drive to a 512-byte sector size even if the drive had previously been formatted to another sector size.
Verify	Executable	Allows verification of all sectors on a device and reassigns defective Logical Block Addresses, if enabled. To verify all sectors, select the device from the menu and use the arrow keys to move the cursor to the Verify column. Press Enter.
<Restore Defaults>	Executable	Press Enter to obtain default settings.

3.2.5   Boot Adapter List Menu

The Boot Adapter List Menu specifies the order in which adapters boot when more than one LSI Logic adapter is in a system. Up to four of the total adapters in a system can be selected as bootable. This menu may also list additional adapters in your system that are not bootable. As many as 256 adapters can be listed. To control a Boot Volume, only one of the four "active" controllers can be used.

To select this menu:

1. Press F2 while on the Main Menu to move the cursor to the Optional Menu area.

2. Move the cursor to Boot Adapter List with the arrow keys.

3. Press Enter.

Adapters can be added or deleted using this menu. Use the arrow keys to move the cursor to the lower list, the adapter select list, to add or remove an adapter. To add an adapter to the boot list, press the Insert key while on the Boot Adapter List. Use the arrow keys to select the desired adapter and press Enter to add it to the end of the Boot Adapter List. To change the configuration of the adapter, use the arrow keys to move to the configuration you want to alter.

To remove an adapter from the boot list, press the Delete key while on the desired adapter in the Boot Adapter List.

> Note: If a new device is added after this utility loads, it can only be seen in the adapter configuration section of this utility after a reboot. You must exit the utility and restart it for the new device to be seen by the Configuration Utility.

Figure 3.5 provides an example of the Boot Adapter List Menu.

Figure 3.5   Boot Adapter List Menu

```
LSI Logic PCI SCSI Configuration Utility Version PCI 4.16.00


Boot Adapter List

Insert = Add an adapter          Delete = Remove an adapter

Adapter           PCI     Dev/    Boot    Current    Next
                  Bus     Func    Order   Status     Boot

<LSI53C1010       0       98>     [2]     Off        [On]

<LSI53C896        0       88>     [1]     On         [Off]

<LSI53C896        0       58>     [0]     On         [On


Hit Insert to select an adapter from this list.

<LSI53C1010       0       98>

<LSI53C896        0       88>

<LSI53C896        0       58>


F1 = Help          ↑↓→←= Select Item         -/+ =[Change Item]

Esc = Abort/Exit   Home/End = Scroll         Enter=Execute <Item>
```

Table 3.5 lists the fields on this menu and their descriptions.

Table 3.5   Boot Adapter List Fields and Descriptions

Field	Field Type [Value]	Description
Adapter	Information	Indicates the specific LSI53CXXXX Host Adapter.
PCI Bus	Information	Indicates the PCI Bus number (range 0x00–0xFF, 0–255 decimal) assigned by the system BIOS to an adapter.
Dev/Func	Information	Indicates the PCI Device/Function assigned by the system BIOS to an adapter. An 8-bit value is mapped as follows: Bit # 7 6 5 4 3 2 1 0 Bits [7:3]: Device (range 0x00–0x1F, 0–31 decimal) Bits [2:0]: Function (range 0–7)
Boot Order	Configuration [0 to 3]	Indicates the relative boot order of the listed adapter. The LSI Logic SCSI BIOS traverses up to four adapters, in the specified order, searching for bootable media.
Current Status	Information	Indicates whether an adapter in the boot list was enabled during the most recent boot. Disabled adapters and their attached devices are ignored by the LSI Logic SCSI BIOS, although they are still visible to the configuration utility.
Next Boot	Configuration [On / Off]	Indicates whether to enable an adapter upon the next boot. The LSI Logic SCSI BIOS ignores disabled adapters and their attached devices although they are still visible to the configuration utility.

3.2.6 Global Properties Menu

The Global Properties Menu allows you to view display boot information and to set display and video modes. Figure 3.6 provides an example of the Global Properties Menu.

Figure 3.6   Global Properties Menu

```
LSI Logic PCI SCSI Configuration Utility Version PCI
4.16.00


Global Properties

                Pause If Boot Alert Displayed  [Yes]

                Boot Information Display Mode  [Verbose]

                Negotiate with Devices         [Supported]

                Video Mode                     [Color]



                <Restore Defaults>

F1 = Help          ↑↓→←= Select Item        -/+ =[Change Item]

Esc = Abort/Exit   Home/End = Scroll        Enter=Execute <Item>
```

Table 3.6 lists the fields on this menu and their descriptions.

Table 3.6   Global Properties Fields and Descriptions

Field	Field Type [Value]	Description
Pause When Boot Alert Displayed	Configuration [Yes / No]	Specifies a pause during the boot for user acknowledgement. The pause occurs after displaying an alert message. To continue after displaying a message, specify No. To wait for any key after displaying a message, specify Yes.
Boot Information Display Mode	Configuration [Terse / Verbose]	Specifies how much BIOS information displays during boot. To display minimum information, specify **Terse** mode. To display detailed information, specify **Verbose** mode.
Negotiate with Devices	Configuration [Supported / Unsupported]	Sets the default for synchronous and wide negotiation with specific devices. Supported is the default.
Video Mode	Configuration [Color / Monochrome]	Specifies the default video mode for the SCSI BIOS Configuration Utility. The monochrome setting enhances readability on a monochrome monitor.
<Restore Defaults>	Executable	Press Enter to obtain default settings.

3.2.7 Exit Menu

The Exit menu for the Configuration Utilities is used for all five of the menus listed above. However, the available functionality is different for the Main Menu and the four subordinate menus. Figure 3.7 provides an example of the Exit menu.

Figure 3.7 Exit Menu

```
LSI Logic PCI SCSI Configuration Utility Version PCI
4.16.00



     Boot property changes have been made

       Cancel exit

       Exit the Configuration Utility

       Save changes and then exit this menu

       Discard changes and exit this menu



```
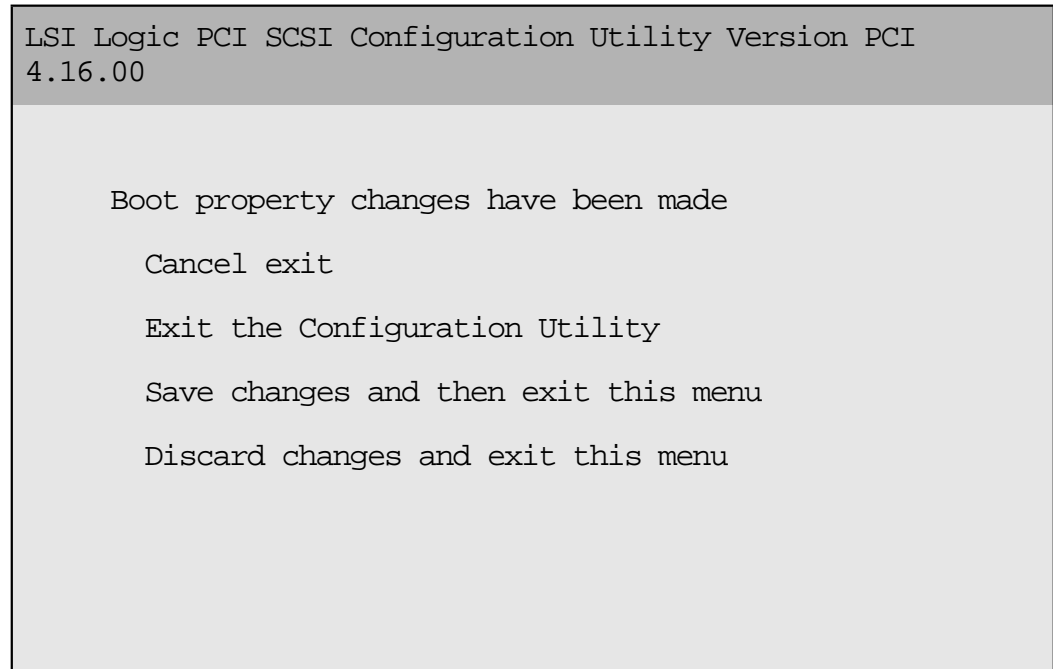
If you are exiting Adapter Properties, Device Properties, Boot Adapter List, or Global Properties, the Exit menu gives you the following options:

Cancel exit	This option returns you to the previous menu.
Save changes and exit this menu	This option implements any changes you made on the previous menu and returns you to the main menu.
Discard changes and exit this menu	This option restores the default settings and returns you to the main menu.

If you are exiting the Main Menu, the exit menu gives you the following options:

Cancel exit   This returns you to the Main Menu.

Exit the   This option exits the configuration and returns you to the
Configuration   DOS prompt.
Utility

Important: You must reboot in order for the changes you have made
              to take effect.

Configuring the LSIU160

Appendix A
Technical
Specifications

This section discusses the physical environment associated with the LSIU160. 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 LSIU160. Additionally, this board is compliant with electromagnetic standards set by the FCC.

A.1.1 Physical Characteristics

The dimensions of the LSIU160 are 6.875 x 4.0 inches. PCI connection is made through edge connector J1.

Internal SCSI connection is made through the 68-pin HD connector J4. External SCSI connection is made through the 68-pin HD connector J3. The J3 connector extends external to the cabinet through a bracket attached to the board and the face of the connector. The bracket is a standard ISA type with a cutout to accommodate connector J3.

The J6 connector is for connecting to the computer's drive activity LED. It is a 4 pin one row right angle header wired in parallel with the on-board SCSI Activity LED.

The component height on the top and bottom of the board conforms to the PCI Specification Revision 2.2.

Figure A.1   LSIU160 Mechanical Drawing
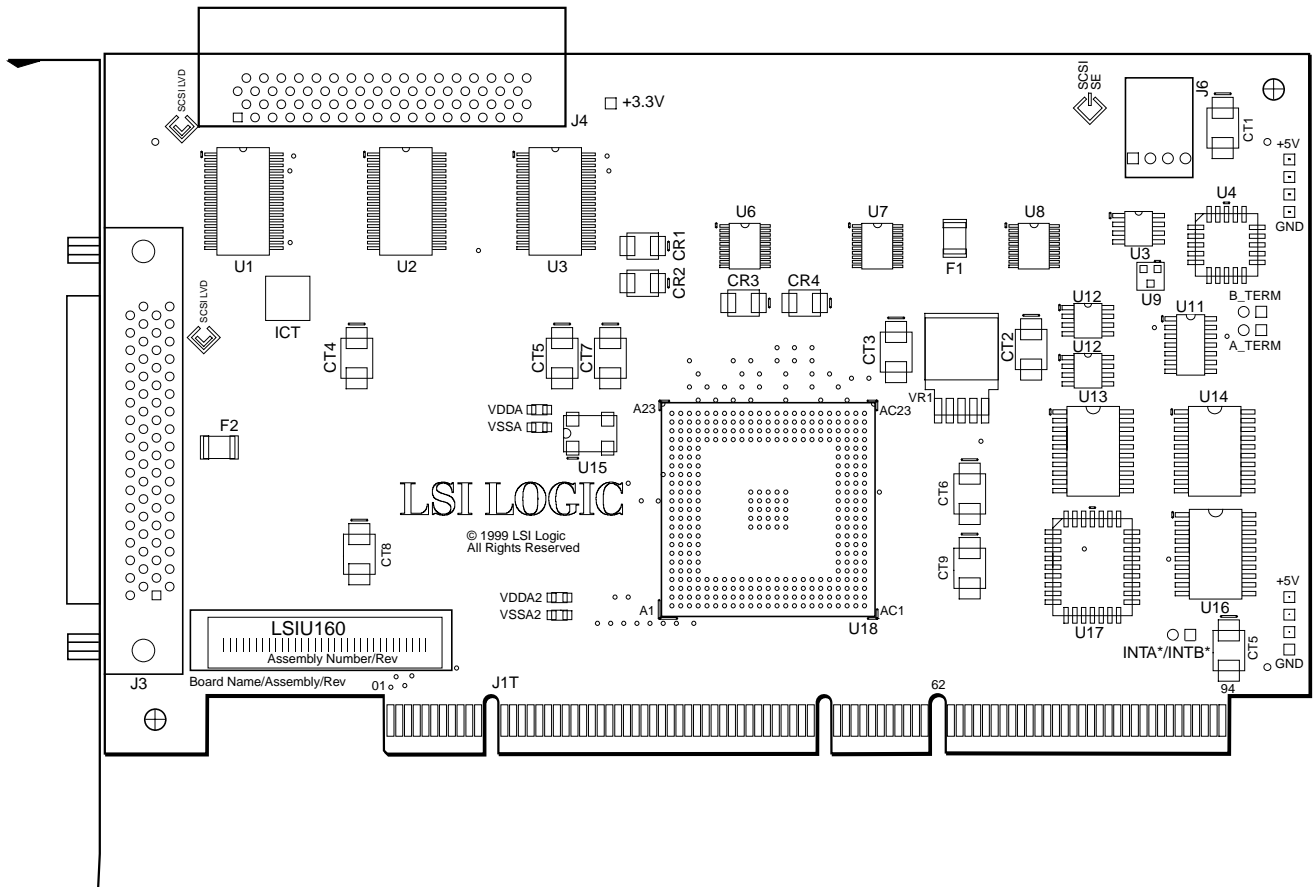
Note:

- J1: PCI 32-bit, universal board connector.
- J3: 68-pin HD right angle connector (external SCSI connector).
- J4: 68-pin HD right angle connector (internal SCSI connector).
- J6: 4-pin low density connector.

A.1.2   Electrical Characteristics

The LSIU160 maximum power requirement, including SCSI TERMPWR, under normal operation is provided in Table A.1:

Table A.1   Maximum Power Requirements

+ 5 V DC	± 5 %	1.5 A	Over the operating range 0 °C to 55 °C
+ 3 V DC	± 5%	3.0 A	Over the operating range 0 °C to 55 °C

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 (F1) opens.

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

A.1.3 Thermal, Atmospheric Characteristics

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

- Temperature range: 0 °C to 55 °C (dry bulb)

- Relative humidity range: 5% to 90% noncondensing

- Maximum dew point temperature: 32 °C

The LSIU160 is design for a storage and transit environment defined by the following parameters:

- Storage Temperature: −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 to minimize electromagnetic emissions, susceptibility, and the effects of electromagnetic discharge. The board carries the CE mark, VCCI, Canada mark, and meets the requirements of FCC Class B. The board is 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 LSIU160 is designed for use in PCI computer systems with an ISA/EISA bracket type. SDMS operates the board, but the design of the board does not prevent the use of other software. An on-board flash memory device is provided to allow BIOS code and open boot code support through PCI and a serial EEPROM.

A.2.1   The PCI Interface

The PCI interface operates as a 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 2.2 standard. Table A.2 and Table A.3 show the signal assignments. The PCI portion of the LSI53C1010 device is powered from the onboard +3.3 V regulator.

> 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 board derives power from the +5 V pins, directly and through a 3.3 V voltage regulator. The PCI +3 V/+5 V pins are used to differentiate between a 5 V or a 3.3 V PCI environment.

Table A.2   PCI Connector J1 (Front)

Signal Name	Pin	Signal Name	Pin	Signal Name	Pin	Signal Name	Pin
−12 V	1	+3.3 V	25	M66EN	49	AD59	71
TCK	2	C_BE3/	26	KEYWAY	50	AD57	72
GND	3	AD23	27	KEYWAY	51	GND	73
TDO	4	GND	28	AD08	52	AD55	74
+5 V	5	AD21	29	AD07	53	AD53	75
+5 V	6	AD19	30	+3.3 V	54	GND	76
INTB/	7	+3.3 V	31	AD05	55	AD51	77
INTD/	8	AD17	32	AD03	56	AD49	78
GND (PRSNT1/)	9	C_BE2/	33	GND	57	+3 V / +5 V	79
RESERVED	10	GND	34	AD01	58	AD47	80
GND (PRSNT2/)	11	IRDY/	35	+3 V / +5 V	59	AD45	81
KEYWAY	12	+3.3 V	36	ACK64/	60	GND	82
KEYWAY	13	DEVSEL/	37	+5 V	61	AD43	83
RESERVED	14	GND	38	+5 V	62	AD41	84
GND	15	LOCK/	39	KEYWAY	xx	GND	85
CLK	16	PERR/	40	KEYWAY	xx	AD39	86
GND	17	+3.3 V	41	RESERVED	63	AD37	87
REQ/	18	SERR/	42	GND	64	+3 V / +5 V	88
+3 V / +5 V	19	+3.3 V	43	C_BE6/	65	AD35	89
AD31	20	C_BE1/	44	C_BE4/	66	AD33	90
AD29	21	AD14	45	GND	67	GND	91
GND	22	GND	46	AD63	68	RESERVED	92
AD27	23	AD12	47	AD61	69	RESERVED	93
AD25	24	AD10	48	+3 V / +5 V	70	GND	94
1. Highlighted signals are not connected.							

Table A.3   PCI Connector J1 (Back)

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

1. Highlighted signals are not connected.

A.2.2   The SCSI Interface

The SCSI interface conforms to ANSI X 3T10.11/1142. The SCSI interface operates as 16-bit, synchronous or asynchronous, SE or LVD, and supports Ultra160 SCSI protocols. Arbitration is supported for 8-bit (at lower SCSI speeds) and 16-bit. Active SE or LVD SCSI termination is provided automatically. SCSI termination power is supplied by the board.

Connector J3 is a 68-pin HD right angle connector that protrudes through the back panel bracket and is used for external connections. Connector J4 is a 68-pin HD right angle header used for internal connections. Table A.4 and Table A.5 show the signal assignments for J4 and J3 respectively.

Table A.4   Internal SCSI Connector J4

Signal Name	Pin	Signal Name	Pin
SD12+	1	SD12–	35
SD13+	2	SD13–	36
SD14+	3	SD14–	37
SD15+	4	SD15–	38
SDP1+	5	SDP1–	39
SD00+	6	SD00–	40
SD01+	7	SD01–	41
SD02+	8	SD02–	42
SD03+	9	SD03–	43
SD04+	10	SD04–	44
SD05+	11	SD05–	45
SD06+	12	SD06–	46
SD07+	13	SD07–	47
SDP+	14	SDP–	48
GND	15	GND	49
DIFFSENS	16	CPRSNT/	50
TERMPWR	17	TERMPWR	51
TERMPWR	18	TERMPWR	52
N/C	19	N/C	53
GND	20	GND	54
SATN+	21	SATN–	55
GND	22	GND	56
SBSY+	23	SBSY–	57
SACK+	24	SACK–	58
SRST+	25	SRST–	59
SMSG+	26	SMSG–	60
SSEL+	27	SSEL–	61
SC_D+	28	SC_D–	62
SREQ+	29	SREQ–	63
SI_O+	30	SI_O–	64
SD08+	31	SD08–	65
SD09+	32	SD09–	66
SD10+	33	SD10–	67
SD11+	34	SD11–	68

Technical Specifications

Table A.5   External SCSI Connector J3

Signal Name	Pin	Signal Name	Pin
SD12+	1	SD12–	35
SD13+	2	SD13–	36
SD14+	3	SD14–	37
SD15+	4	SD15–	38
SDP1+	5	SDP1–	39
SD00+	6	SD00–	40
SD01+	7	SD01–	41
SD02+	8	SD02–	42
SD03+	9	SD03–	43
SD04+	10	SD04–	44
SD05+	11	SD05–	45
SD06+	12	SD06–	46
SD07+	13	SD07–	47
SDP+	14	SDP–	48
GND	15	GND	49
DIFFSENS	16	CPRSNT/	50
TERMPWR	17	TERMPWR	51
TERMPWR	18	TERMPWR	52
N/C	19	N/C	53
GND	20	GND	54
SATN+	21	SATN–	55
GND	22	GND	56
SBSY+	23	SBSY–	57
SACK+	24	SACK–	58
SRST+	25	SRST–	59
SMSG+	26	SMSG–	60
SSEL+	27	SSEL–	61
SC_D+	28	SC_D–	62
SREQ+	29	SREQ–	63
SI_O+	30	SI_O–	64
SD08+	31	SD08–	65
SD09+	32	SD09–	66
SD10+	33	SD10–	67
SD11+	34	SD11–	68

A.2.3 The SCSI Busy LED

The SCSI Activity LED interface on the LSIU160 is a four-wire arrangement that allows the user to connect an LED harness to the board. The buffered GPIO0_FETCH line (maximum output low voltage 0.4 V and minimum output low current 16 mA) is pulled low to complete the circuit when a harness with an LED is attached. The SCSI Busy LED connector is J6. The signal definitions for the SCSI Busy LED connector are provided in Table A.6.

Table A.6   LED Connector J6

Signal Name	Pin
LED+	1
LED–	2
NC	3
NC	4

A.3   Subsystem and Subsystem Vendor ID

The Subsystem ID and System Vendor ID for the LSIU160 are provided in Table A.7. The ID numbers are contained within the EEPROM of the LSIU160. During system initialization, the ID numbers are loaded into the Subsystem Vendor ID and Subsystem ID registers of the LSIU160 SCSI Controller (the LSI53C1010). For more information on the operation of the Subsystem Vendor ID and Subsystem ID registers, refer to the *LSI53C1010 PCI to Dual Channel Ultra3 SCSI Multifunction Controller Technical Manual*.

Table A.7   Subsystem and Subsystem Vendor ID

Subsystem	ID Number
Subsystem Vendor ID	1000
Subsystem ID	1030

Appendix B
Glossary of Terms and Abbreviations

160/m
An industry initiative extension of the Ultra160 SCSI specification that requires support of Double Transition Clocking, Domain Validation, and Cyclic Redundancy Check.

Active Termination
The electrical connection required at each end of the SCSI bus, composed of active voltage regulation and a set of termination resistors. Ultra, Ultra2, and Ultra160 SCSI require active termination.

Address
A specific location in memory, designated either numerically or by a symbolic name.

AIP
Asynchronous Information Protection provides error checking for asynchronous, nondata phases of the SCSI bus.

Asynchronous Data Transfer
One of the ways data is transferred over the SCSI bus. 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 interrupting 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.
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.
CRC	Cyclic Redundancy Check is an error detection code used in Ultra160 SCSI. Four bytes are transferred with the data to increase the reliability of data transfers. CRC is used on the Double Transition (DT) Data-In and DT Data-Out phases.
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.
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 SCSI	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).
Domain Validation	Domain Validation is a software procedure in which a host queries a device to determine its ability to communicate at the negotiated Ultra160 data rate.
DT Clocking	In Double Transition (DT) Clocking data is sampled on both the asserting and deasserting edge of the REQ/ACK signal. DT clocking may only be implemented on an LVD SCSI bus.

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-20	The SCSI Trade Association (STA) supports the use of "Ultra SCSI" over the term "Fast-20". Please see Ultra SCSI.
Fast-40	The SCSI Trade Association (STA) supports the use of "Ultra2 SCSI" over the term "Fast-40". Please see Ultra2 SCSI.
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.

B-3

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.
LVDlink	Low Voltage Differential Link allows greater Ultra2 SCSI device connectability and longer SCSI cables. LVDlink lowers the amplitude of noise reflections and allows higher transmission frequencies. Detailed information may be found in Section 1.5, "Benefits of LVDlink Technology."
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).
Mbyte	Megabyte. A measure of computer storage equal to 1024 kilobytes.
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 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. The parity 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, the information may be retransmitted or an error message may appear.

Passive 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.

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 insure proper alignment, but internal SCSI ribbon cables sometimes are 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 allow 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 SCSI specification which adds features to the original SCSI standard.
SCSI-3	The current SCSI specification which adds features to the SCSI-2 standard.
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 the highest ID, (7 or 15) giving it priority to control the bus.
SCSI SCRIPTS	A SCSI programming language that works with the SCRIPTS processor that is embedded on the LSI53C8XX or LSI53C10XX device. These SCRIPTS reside in host computer system memory.

SCRIPTS Processor The SCRIPTS processor allows users to fine tune SCSI operations with regard to unique vendor commands or new SCSI specifications. The SCRIPTS processor fetches SCRIPTS instructions from system memory to control operation of the LSI53C8XX or LSI53C10XX device.

SDMS Storage Device Management System. An LSI Logic software product that manages SCSI system I/O.

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).

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.

SureLINK The domain validation method developed and used by LSI Logic. SureLINK provides three levels of integrity checking: Basic (level 1), Enhanced (level 2), and Margined (level 3).

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.

TolerANT A technology developed and used by LSI Logic to improve data integrity, data transfer rates, and noise immunity, through the use of active negation and input signal filtering.

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. SCSI Trade Association (STA) supports using the term "Ultra SCSI" over the older 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. SCSI Trade Association (STA) supports using the term "Ultra2 SCSI" over the term "Fast-40".

Ultra160 SCSI	A standard for SCSI data transfers. It allows a transfer rate of up to 160 Mbytes/s over a 16-bit SCSI bus.
VCCI	Voluntary Control Council for Interference.
VDE	Verband Deucher Elektroniker (Association of German Electrical Engineers).
Virtual Memory	Space on a hard disk that can be used as if it were RAM.
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 SCSI Trade Association (STA) term for SCSI bus width 16-bits, SCSI bus speed maximum data rate 40 Mbytes/s.
Wide Ultra2 SCSI	The SCSI Trade Association (STA) 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.

Index

Customer Feedback

We would appreciate your feedback on this document. Please copy the following page, add your comments, and fax it to us at the number shown.

If appropriate, please also fax copies of any marked-up pages from this document.

Important: Please include your name, phone number, fax number, and company address so that we may contact you directly for clarification or additional information.

Thank you for your help in improving the quality of our documents.

Reader's Comments

Fax your comments to: LSI Logic Corporation
Technical Publications
M/S E-198
Fax: 408.433.4333

Please tell us how you rate this document: *LSIU160 PCI to Single Channel Ultra160 SCSI Host Adapter User's Guide.* Place a check mark in the appropriate blank for each category.

	Excellent	**Good**	**Average**	**Fair**	**Poor**
Completeness of information	____	____	____	____	____
Clarity of information	____	____	____	____	____
Ease of finding information	____	____	____	____	____
Technical content	____	____	____	____	____
Usefulness of examples and illustrations	____	____	____	____	____
Overall manual	____	____	____	____	____

What could we do to improve this document?

_____

_____

_____

_____

If you found errors in this document, please specify the error and page number. If appropriate, please fax a marked-up copy of the page(s).

_____

_____

_____

Please complete the information below so that we may contact you directly for clarification or additional information.

Name _____ Date _____

Telephone _____ Fax _____

Title _____

Department _____ Mail Stop _____

Company Name _____

Street _____

City, State, Zip _____

Customer Feedback

You can find a current list of our U.S. distributors, international distributors, and sales offices and design resource centers on our web site at

http://www.lsilogic.com/contacts/na_salesoffices.html

Free Manuals Download Website

http://myh66.com

http://usermanuals.us

http://www.somanuals.com

http://www.4manuals.cc

http://www.manual-lib.com

http://www.404manual.com

http://www.luxmanual.com

http://aubethermostatmanual.com

Golf course search by state

http://golfingnear.com

Email search by domain

http://emailbydomain.com

Auto manuals search

http://auto.somanuals.com

TV manuals search

http://tv.somanuals.com