

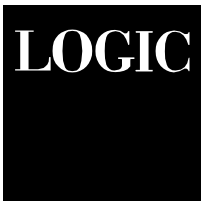
Symbios[®] SYM8953U PCI to Ultra2 SCSI Host Adapter

User's Guide

December 1999

Version 1.0

LSI LOGIC[®]



Order Number S14036



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

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Preface

This book is the primary reference and user's guide for the LSI Logic Symbios[®] SYM8953U PCI to Ultra2 SCSI Host Adapter. It contains a complete functional description for the SYM8953U 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 SYM8953U Host Adapter Board.

Organization

- [Chapter 1, Using the SYM8953U Host Adapter](#), defines the interfaces and characteristics of the SYM8953U PCI to Ultra2 SCSI Host Adapter Board.
- [Chapter 2, Installing the SYM8953U Host Adapter](#), provides both quick and detailed installation instructions.
- [Chapter 3, Configuring the SYM8953U Host Adapter](#), describes the SCSI BIOS Configuration Utility to configure adapter and device settings.
- [Appendix A, Technical Specifications](#), describes the physical and operational environments of the SYM8953U Host Adapter Board.
- [Appendix B, Glossary of Terms and Abbreviations](#), provides definitions of various terminology that is referenced throughout this user's guide.

Related Publications

Symbios[®] PCI SCSI Device Management System SDMS[™] 4.0 User's Guide, LSI Logic Corporation, Order Number S14007

Symbios[®] SYM53C895A PCI to Ultra2 SCSI Controller Technical Manual, LSI Logic Corporation, Order Number S14028

Chapter 1

Using the SYM8953U Host Adapter

This chapter describes the SYM8953U Host Adapter interface to PCI computer systems and includes these topics:

- [Section 1.1, "General Description," page 1-1](#)
 - [Section 1.2, "Features," page 1-2](#)
 - [Section 1.3, "Interface Descriptions," page 1-3](#)
-

1.1 General Description

The LSI Logic Corporation Symbios® SYM8953U PCI to Ultra2 SCSI Host Adapter board provides an Ultra2 SCSI interface to PCI computer systems. It is referred to as the SYM8953U throughout this guide. Installing this adapter in your PCI system allows connection of up to 15 SCSI devices.

The SYM8953U board is a 16-bit, Low Voltage Differential (LVD)/Single-Ended (SE) SCSI solution for your computer. This board also supports legacy Fast SCSI and Ultra SCSI devices, and the newest LVD Ultra2 SCSI devices. It is also backwards compatible with existing wide SCSI applications for the SYM8251S and SYM8751SP/E host adapters.

Symbios SCSI Device Management System (SDMS™) software operates the board. SCSI software provided by other vendors that works with the SYM53C895A chip can also be used. BIOS support for this adapter is incorporated on the board in a Flash memory device. The SYM8953U host adapter has a serial EEPROM device for storing the user's SCSI bus configuration.

The SYM53C895A chip 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 *Symbios SYM53C895A PCI to Ultra2 SCSI Controller Technical Manual*.

This user's guide, along with the *Symbios PCI SCSI 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 your SYM8953U PCI to Ultra2 SCSI Host Adapter 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 SYM8953U Host Adapter board.

1.2.1 PCI Interface

- Supports 32-bit DMA bus master with 64-bit addressing
- Bursts up to 133 Mbytes/s (@ 33 MHz) with zero wait-state bus master data
- Supports universal 3.3 V and 5 V PCI bus voltage
- Supports 32-bit 33 MHz data bursts with variable burst lengths
- Bursts 2 to 128 dwords across the PCI bus
- Prefetches up to 8 dwords of SCRIPTS instructions
- Supports PCI Write and Invalidate, Read Line, and Read Multiple commands

1.2.2 SCSI Interface

- Supports 16-bit LVD and SE signaling
- Supports SCRIPTS
 - Includes 8 Kbytes RAM for SCRIPTS instruction storage
- Automatically enables LVD or SE termination

- Contains external 68-pin High Density (HD) and internal 68-pin HD latching connectors
- Performs wide Ultra2 SCSI LVD synchronous transfers up to 80 Mbytes/s
- Supports SCSI synchronous offset up to 31
- Provides SCSI termination power (TERMPWR) source with autoresetting circuit protection device
- Supports SCSI Configured AutoMatically (SCAM) Level 1 Capability (Set “OFF” by default)
- Utilizes flash ROM for BIOS storage for up to 256 Kbytes
- Supports variable block size and scatter/gather data transfers
- Performs complex SCSI bus sequences without interrupts, including restore data pointers
- Has serial EEPROM for user configuration utility
- Has SCSI bus activity LED connector and on-board LED

1.2.3 Board Characteristics

- PCI board dimensions, 152.4 x 88.90 mm (6.00 x 3.5 inches)
- PCI Universal 32-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, Ultra2 SCSI Technology, and LVD Link™ 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 SYM8953U is contained within the Symbios SYM53C895A PCI to Ultra2 Controller with LVD Link Universal Transceivers. The SYM53C895A 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 32-bit DMA bus master capable of 64-bit addressing. The connection is made through edge connector J1, shown in [Figure 2.1](#). The signal definitions and pin numbers conform to the PCI Local Bus Specification Revision 2.2 standard. The SYM8953U host adapter 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 SYM8953U is contained within the SYM53C895A. This chip is a PCI to Ultra2 SCSI Controller with LVD Link 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 SYM8953U operates as an 8-bit or 16-bit interface. It supports 8-bit or 16-bit, synchronous and asynchronous, LVD or SE, Fast, Ultra and Ultra2 SCSI protocols in various combinations. The interface is made through connectors J2 and J3 (see [Figure 2.1](#)). Internal connector J2 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. An on-board LED (labeled Activity) indicates SCSI bus activity. LVD/SE dual mode, active termination is provided on the SYM8953U board. Termination is automatically disabled when both SCSI connectors are used. The SYM8953U 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 SYM8953U to provide the clock frequency to the SYM53C895A that is necessary to support Ultra2 SCSI transfers of up to 80 Mbytes/s.

1.3.3 Ultra2 SCSI Technology

The SYM8953U fully supports Ultra2 SCSI. Ultra2 SCSI is an extension of the SCSI Parallel Interface 2 and 3 (SPI-2 and SPI-3) family of standards. SCSI2 expands the bandwidth of the SCSI bus, allowing faster synchronous data transfers.

For the internal bus, special impedance SCSI ribbon cables are specified for operation with Ultra and Ultra2 SCSI devices. You must consider the total length of the bus cables and the number of devices on the SCSI bus when setting up your system. Make sure that your SCSI cables are rated for standard SCSI (Fast, Ultra, and Ultra2) environments.

[Chapter 2, "Installing the SYM8953U Host Adapter"](#) has a detailed explanation of SCSI bus connections.

1.3.4 LVD Link Technology

To support greater device connectivity and a longer SCSI cable, the SYM8953U features LVD Link technology, the LSI Logic implementation of Universal LVD SCSI. LVD Link transceivers provide the inherent reliability of differential SCSI, and a long-term migration path to faster SCSI transfer rates.

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

The LVD Link 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 SYM53C895A chip automatically detects signal type, based on the voltage detected. It automatically switches to the SE or LVD mode, as appropriate. 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.

1.3.4.1 Benefits of LVD Link

LVD Link, supported by the SYM53C895A, is a signaling technology that increases the reliability of SCSI data transfers over longer distances than supported by SE SCSI. The low current requirements of LVD allow direct

integration of I/O transceivers into the chip. LVD provides the reliability of HVD SCSI without the added cost of external differential transceivers. Ultra2 SCSI with LVD allows a longer SCSI cable and more devices on the bus, using the same cables defined in the SCSI-3 parallel Interface (SPI-2) standard for Ultra SCSI.

Important: To utilize Ultra2 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.

1.3.5 On-Board LED

An on-board LED (CR1) indicates the status of the SCSI bus. This SCSI Activity LED lights when the SCSI bus is transferring information. It is located near J4 (see [Figure A.1](#)).

Chapter 2

Installing the SYM8953U Host Adapter

This chapter provides instructions on how to install the SYM8953U Host Adapter and includes these topics:

- [Section 2.1, “Quick Installation Procedure,” page 2-1](#)
- [Section 2.2, “Detailed Installation Procedure,” page 2-3](#)
- [Section 2.3, “Completing the Installation,” page 2-24](#)

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 SYM8953U host adapter, 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 SYM8953U PCI to Ultra2 SCSI Host Adapter board 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 SYM8953U requires a PCI slot that allows bus master operation. See [Figure 2.2](#).

- 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 *Symbios PCI SCSI 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.

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

2.2 Detailed Installation Procedure

This section provides step-by-step instructions for installing the SYM8953U host adapter board, 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 for reference. Perform the steps listed below to install the SYM8953U.

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

Step 2. Remove the SYM8953U PCI to Ultra2 SCSI Host Adapter board 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.

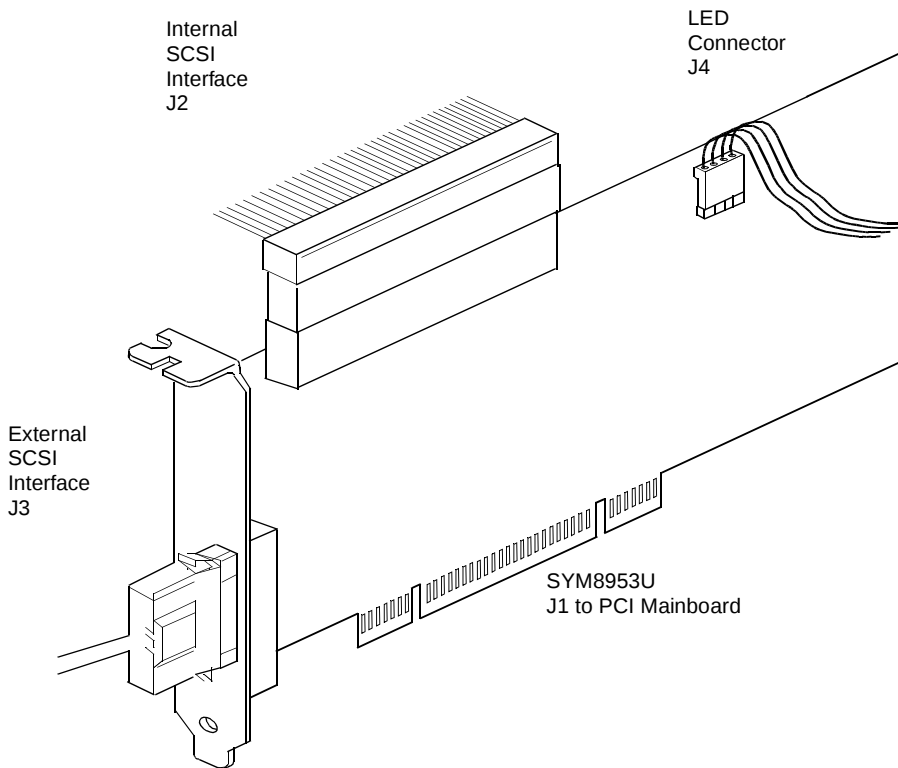
Refer to the user's manual for your computer to confirm the location of the PCI slots.

Important: The SYM8953U board requires a PCI slot that allows bus master operation.

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 SYM8953U Host Adapter

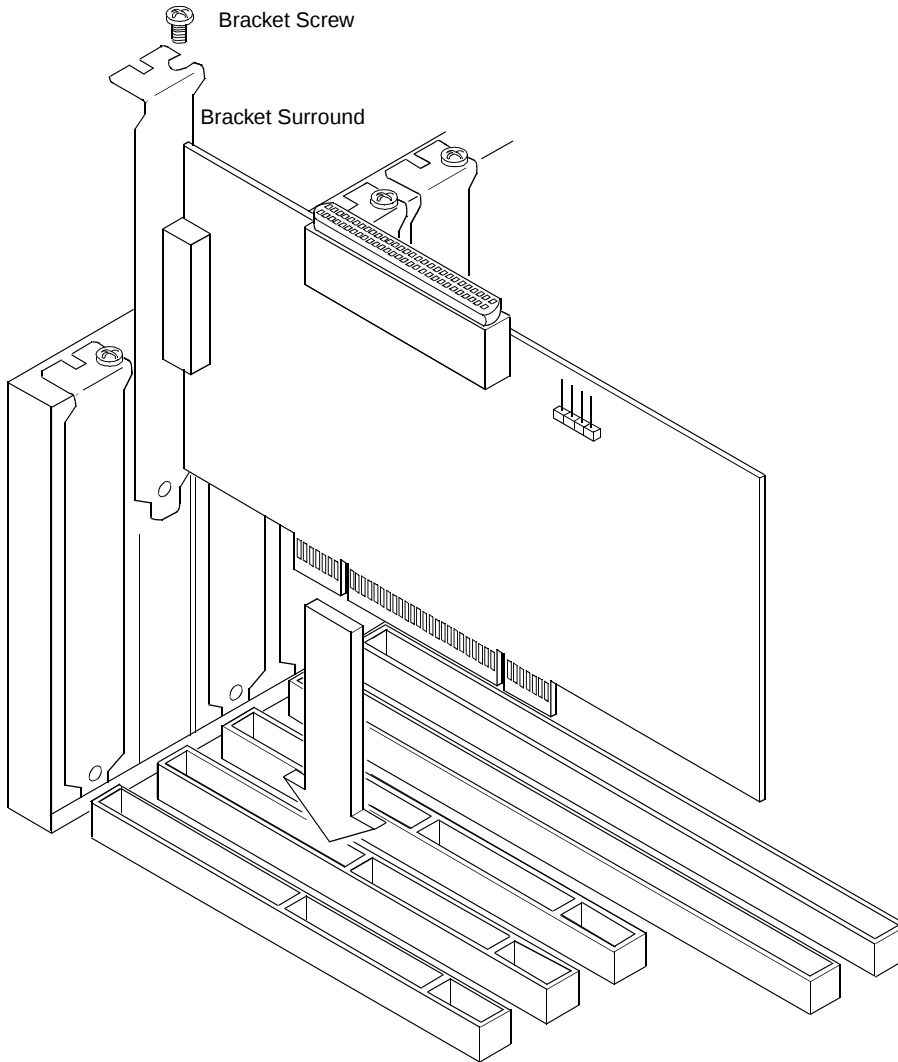


Step 7. Carefully insert edge connector J1 (see [Figure 2.1](#)) of the host adapter into the PCI slot.

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



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 SYM8953U host adapter inside your computer can be made with an unshielded 68 conductor Ultra SCSI PVC 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 SYM8953U host adapter 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 Symbios Adapter Board Kit for the SYM8953U host adapter.

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
Note: Absence of the word "Wide" means an 8-bit bus width. It is acceptable to use the word "Narrow" to avoid ambiguity.		

You can connect up to eight SCSI, Fast SCSI, and Ultra SCSI devices on a 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).

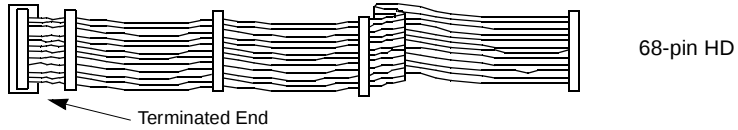
Table 2.2 SCSI Bus Lengths

	Maximum Bus Length, Meters ¹			Maximum # of Devices
	SE	Differential	LVD	
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

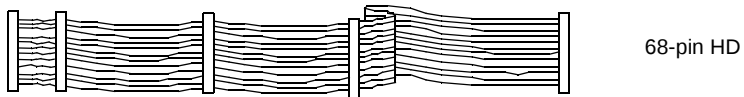
1. This parameter may be exceeded in point-to-point and engineered applications.
2. Additional spacing rules apply.
3. SE and high power differential are not defined at Ultra2 speeds.

Figure 2.3 SCSI Cables

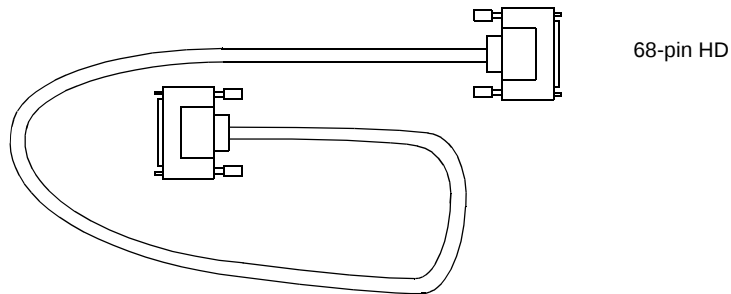
Terminated SCSI Cable for Internal Connections
(for use with nonterminated internal devices)



SCSI Cable for Internal Connections



SCSI Cable for External Connections



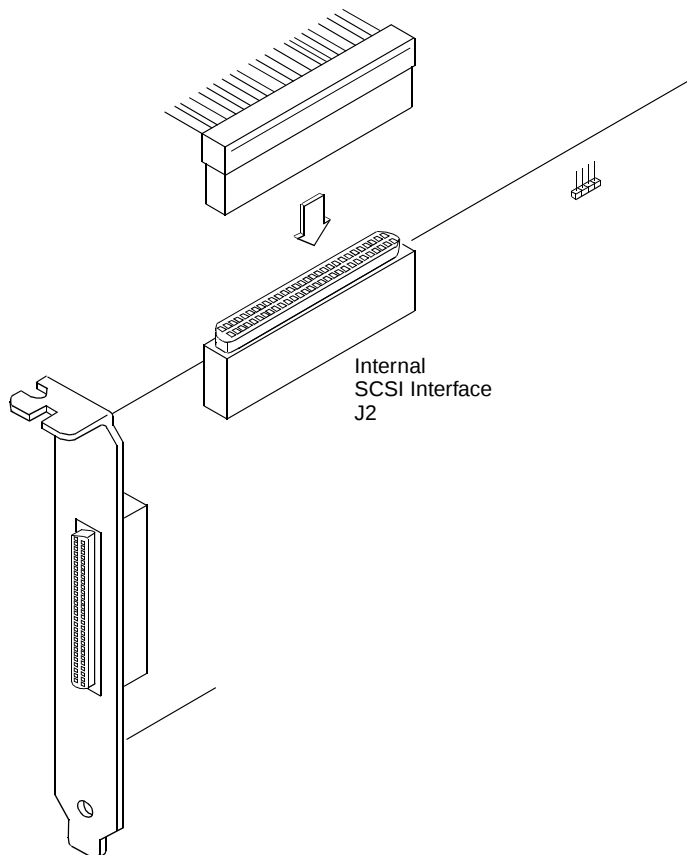
2.2.4 Making Internal SCSI Bus Connections

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 J2 (see [Figure 2.4](#)).

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

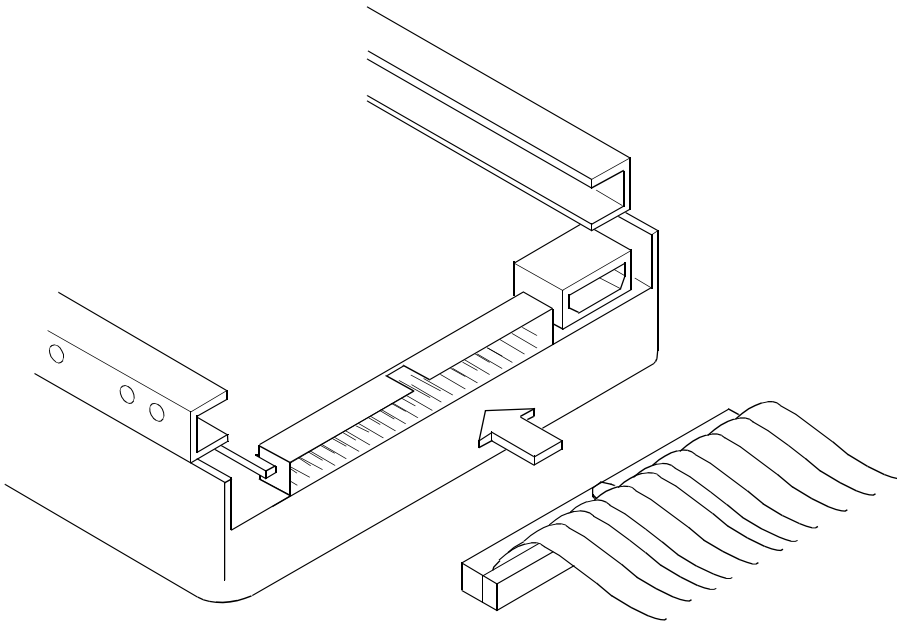
Figure 2.4 Internal SCSI Ribbon Cable to Host Adapter Connection



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. If you have only one internal device, proceed to [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

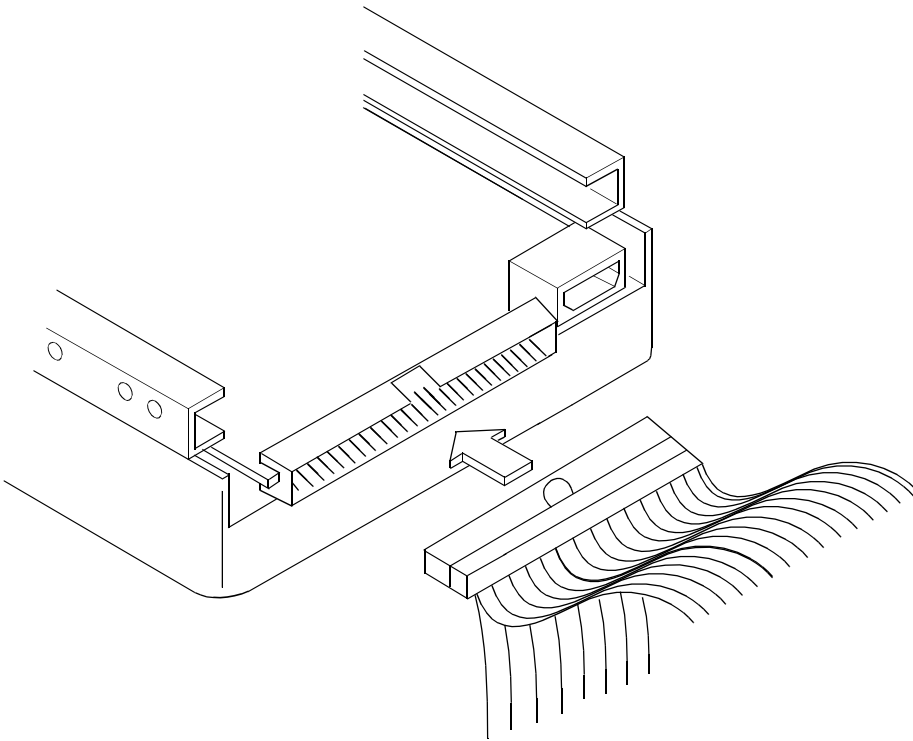
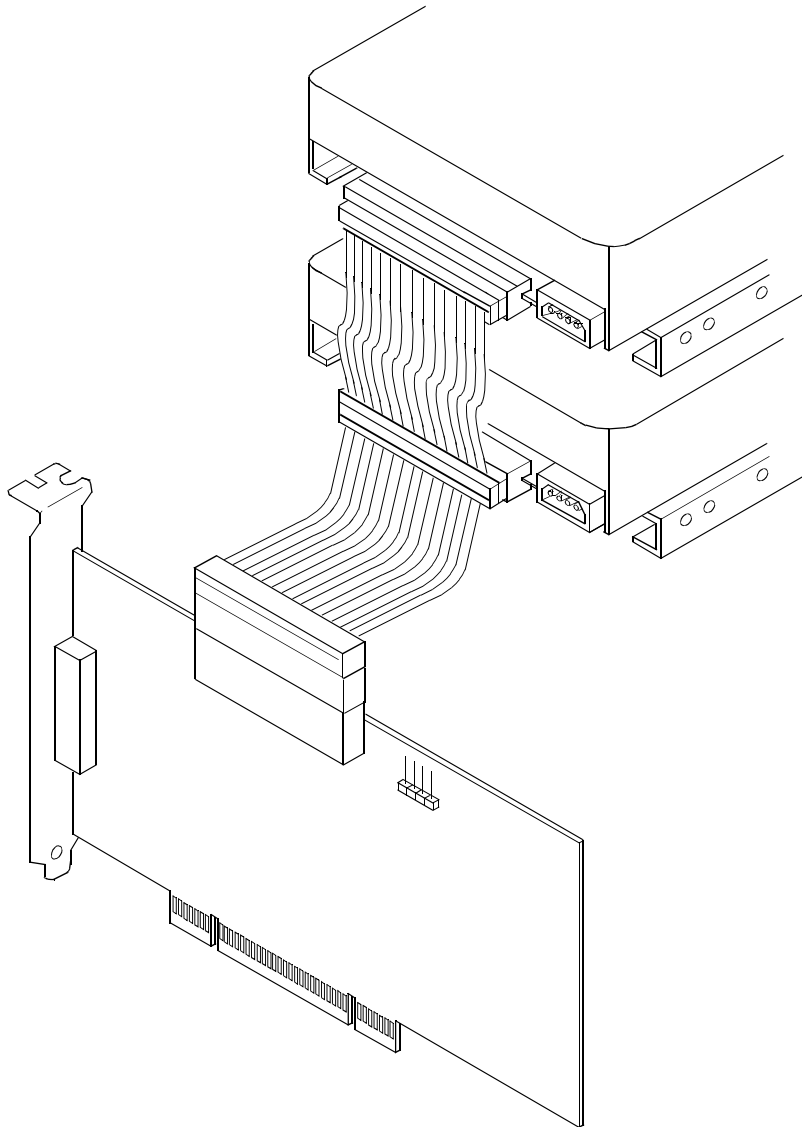


Figure 2.7 Multiple Internal SCSI Devices Chained Together



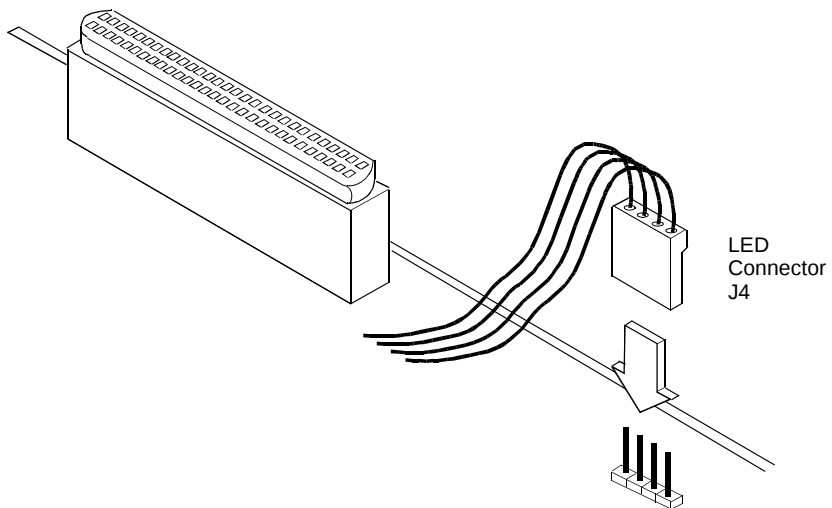
Most PC cabinets are designed with a front panel LED.

Step 4. Connect the LED cable to connector J4 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 J4 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 J4.

Figure 2.8 SCSI LED Connector



Some LED cables have only two wires. In this case, place the connector on one end or the other of J4. If the LED does not light when there is SCSI activity, put the connector on the other half of J4.

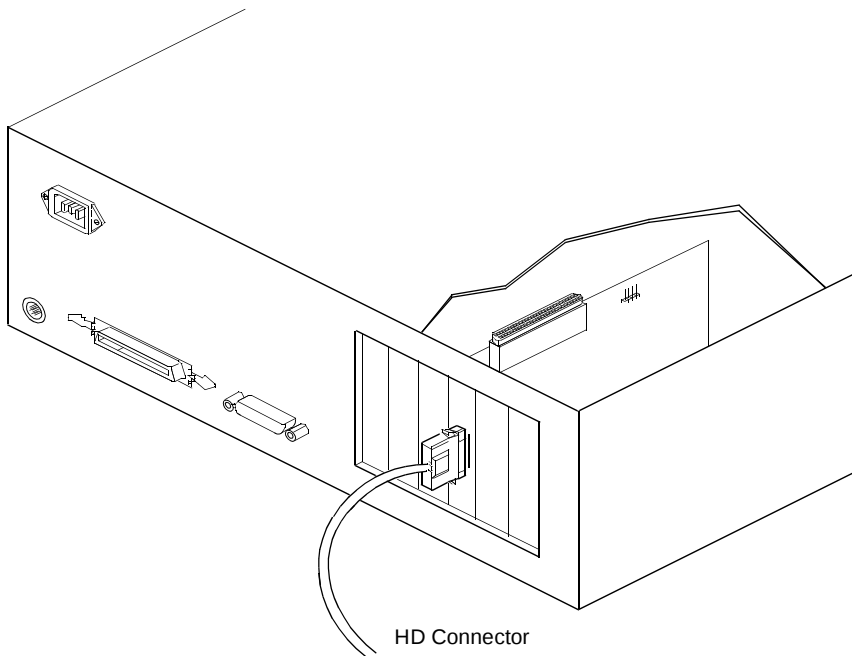
2.2.5 Making External SCSI Bus Connections

This section provides step-by-step instructions about making external SCSI bus connections. To connect external SCSI devices to the SYM8953U host adapter:

- 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](#)).

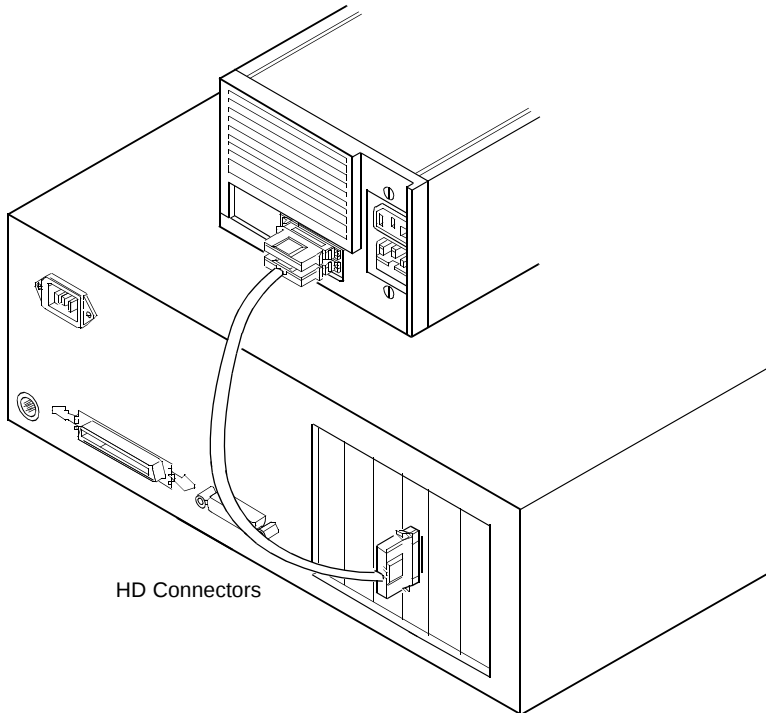
This connector is in the bracket attached to the back panel of your computer. [Figure 2.9](#) shows how this connection is made.

Figure 2.9 External Cable to Host Adapter



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

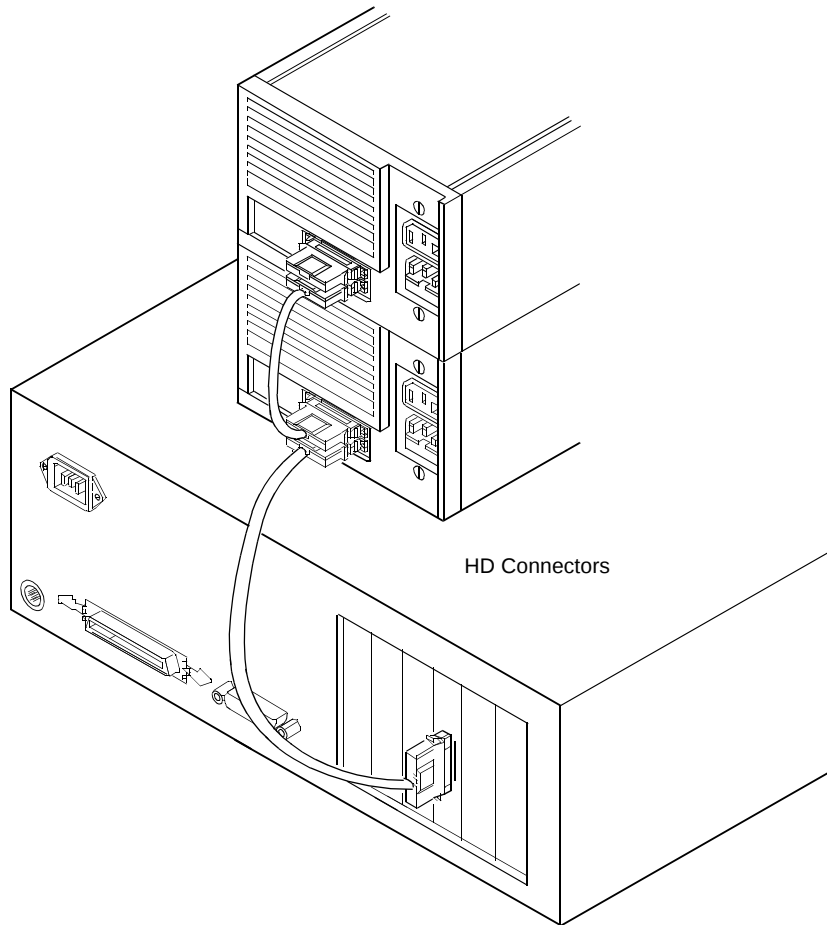


If this is the only external SCSI device on your system, proceed to [Section 2.2.6, “SCSI Bus Termination,” page 2-18](#) for termination instructions. If you have multiple SCSI devices, proceed to the next page.

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



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 SYM8953U host adapter 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 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 SYM8953U may enable termination erroneously if it is directly cabled to another SCSI device or host adapter using the same sensing method. The SYM8953U senses the presence of SCSI devices by detecting the ground signal on conductor 50 of the SCSI cable.

The SYM8953U 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"](#)

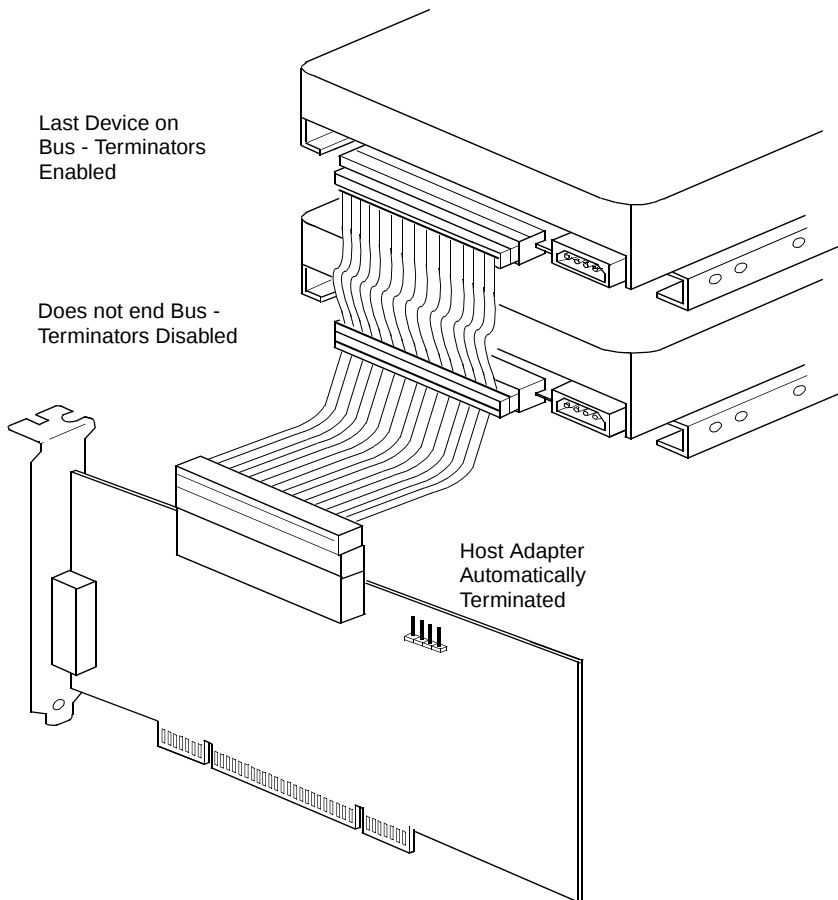
Termination on the SYM8953U host adapter for these three different bus configurations is discussed below.

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

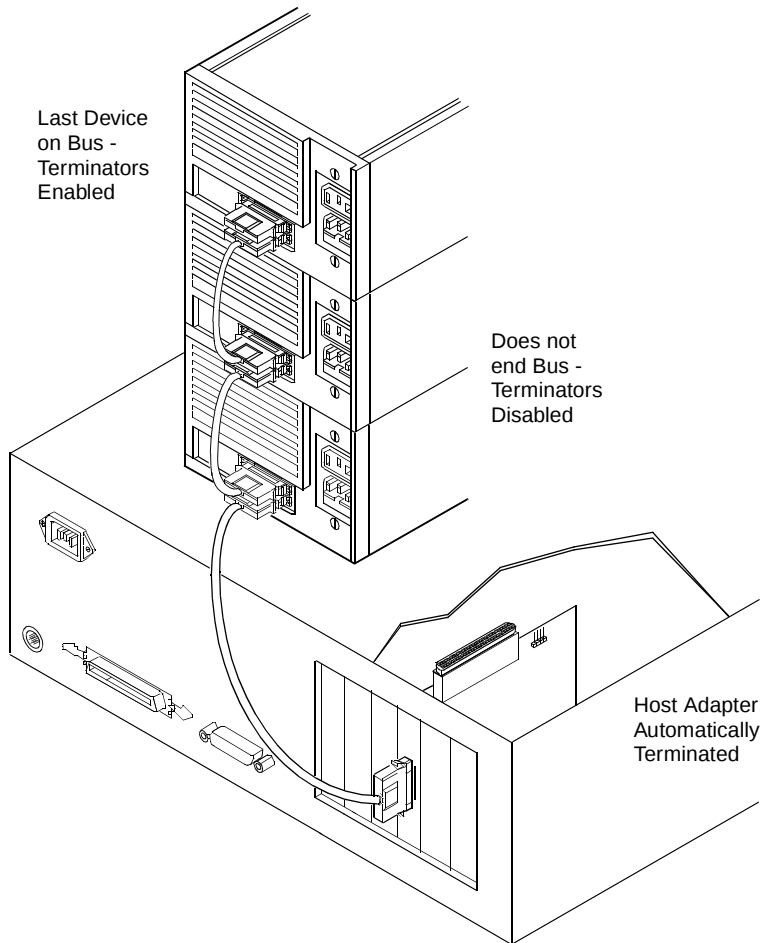


2.2.6.2 External Bus Connections

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

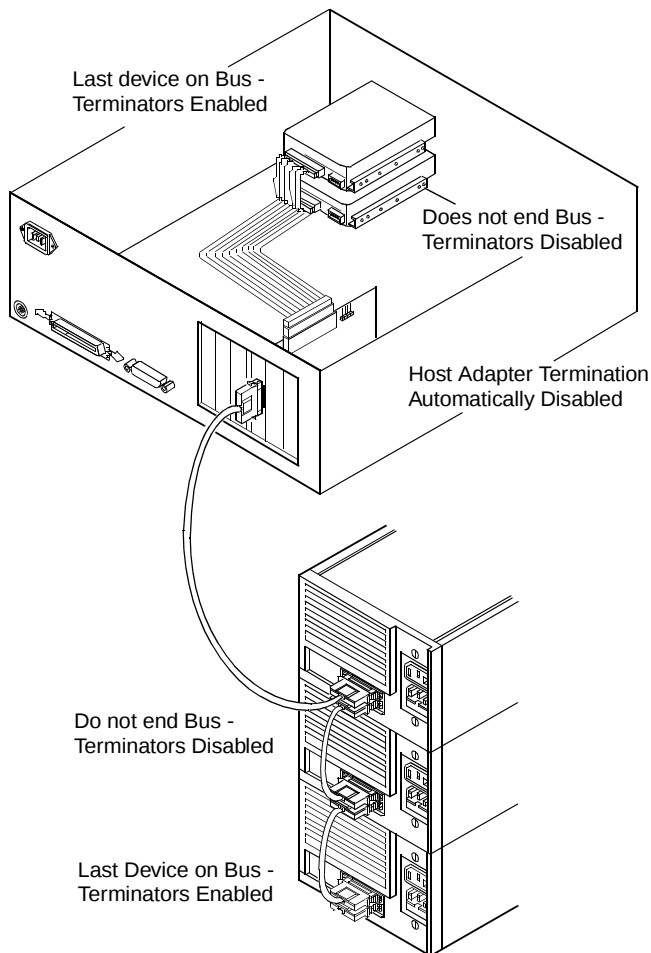


2.2.6.3 Internal and External Bus Connections

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



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 SYM8953U Host Adapter”](#) explains how to set the host adapter ID using the Symbios 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	SYM8953U Host Adapter (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 SYM8953U Host Adapter"](#).
- Step 6. Load the software and drivers suitable to your application and system.

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

Chapter 3

Configuring the SYM8953U Host Adapter

This chapter describes configuring the SYM8953U Host Adapter and includes these topics:

- [Section 3.1, “Overview of the SCSI BIOS Configuration Utility,” page 3-1](#)
- [Section 3.2, “The Symbios SCSI BIOS Configuration Utility Menus,” page 3-3](#)

3.1 Overview of the SCSI BIOS Configuration Utility

The SYM8953U Host Adaptor is loaded with Symbios SCSI BIOS and Configuration Utility Version 4.15 (or greater). This chapter 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 Symbios host adapter boards.

3.1.1 Starting the Configuration Utility

You can see the version number of your Symbios 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 Symbios Configuration Utility...

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

Please wait, invoking Symbios Configuration Utility...

After a brief pause, your computer monitor displays the Main Menu of the Symbios 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 Symbios 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 SYM8953U Host Adapter. 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 Symbios SCSI BIOS Configuration Utility Menus

This chapter describes the menu system of the Symbios 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](#)), described in detail later.

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 Symbios SCSI BIOS Configuration Utility, the Main Menu, shown in [Figure 3.1](#), appears. This menu displays a list of installed Symbios 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

Symbios PCI SCSI Configuration Utility Version PCI 4.15.00							
<Boot Adapter List>				<Global Properties>			
SYM53C8XX Host Bus Adapters							
Adapter	PCI Bus	Dev/ Func	Port Number	IRQ	NVM	Boot Order	LSI Logic Control
<SYM53C895A	0	98>	FC00	9	Yes	2	Enabled
<SYM53C896	0	88>	F800	10	Yes	3	Disabled
<SYM53C896	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

Fields	Descriptions
Adapter	Indicates the specific SYM53C8XX 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.)

Fields	Descriptions
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 Symbios 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	Indicates whether an adapter is eligible for LSI Logic Symbios software control or is reserved for control by non-Symbios 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

Symbios PCI SCSI Configuration Utility Version PCI 4.15.00		
Adapter Properties SYM53C895A 0 A0		
<Device Properties>		
SCSI Parity		[Yes]
Host SCSI ID		[7]
SCSI Bus Scan Order		[Low to High (0.Max)]
Removable Media Support		[None]
CHS Mapping		[SCSI Plug and Play Mapping]
Spinup Delay (Secs)		[2]
Secondary Cluster Server		[No]
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]	Descriptions
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 non-parity 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]	Descriptions
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 Symbios 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)

Symbios PCI SCSI Configuration Utility Version PCI 4.15.00							
Device Properties SYM53C895A 0 A0							
SCSI ID	Device Identifier	Sync Rate	Data Width	Scan ID	Scan LUNs>0	Disconnect	
0	Quantum Viking 4.5	[20]	[16]	[Yes]	[Yes]	[On]	
1	Quantum Viking 4.5	[20]	[16]	[Yes]	[Yes]	[On]	
2	Quantum Viking 4.5	[20]	[16]	[Yes]	[Yes]	[On]	
3	Quantum Viking 4.5	[20]	[16]	[Yes]	[Yes]	[On]	
4	Quantum Viking 4.5	[20]	[16]	[Yes]	[Yes]	[On]	
5	Quantum Viking 4.5	[20]	[16]	[Yes]	[Yes]	[On]	
6	-	[20]	[16]	[Yes]	[Yes]	[On]	
7	SYM53C895A	[20]	[16]	[Yes]	[Yes]	[On]	
8	-	[20]	[16]	[Yes]	[Yes]	[On]	
9	-	[20]	[16]	[Yes]	[Yes]	[On]	
10	-	[20]	[16]	[Yes]	[Yes]	[On]	
11	-	[20]	[16]	[Yes]	[Yes]	[On]	
12	-	[20]	[16]	[Yes]	[Yes]	[On]	
13	-	[20]	[16]	[Yes]	[Yes]	[On]	
14	-	[20]	[16]	[Yes]	[Yes]	[On]	
15	-	[20]	[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)

Symbios PCI SCSI Configuration Utility Version PCI 4.15.00								
Device Properties SYM53C895A 0 A0								
SCSI ID	Device Identifier	SCSI Timeout	Queue Tags	Boot Choice	Format	Verify	Restore 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	SYM53C895A	< 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.																								
Sync Rate	Configuration [0 / 5 / 10 / 20 / 40]	Indicates the maximum synchronous data transfer rate in mega transfers per second. <table><tr><th>Mega Xfers per second</th><th>Data Width = 8 bits</th><th>Data Width = 16 bits</th><th>Synch Period (ns)</th></tr><tr><td>0 = Asynch</td><td>0 = Asynch</td><td>0 = Asynch</td><td>0 = Asynch</td></tr><tr><td>5</td><td>5</td><td>10</td><td>200</td></tr><tr><td>10</td><td>10</td><td>20</td><td>100</td></tr><tr><td>20</td><td>20</td><td>40</td><td>50</td></tr><tr><td>40</td><td>40</td><td>80</td><td>25</td></tr></table>	Mega Xfers 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
Mega Xfers 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 Symbios 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

Symbios PCI SCSI Configuration Utility Version PCI 4.15.00					
Boot Adapter List					
Insert = Add an adapter			Delete = Remove an adapter		
Adapter	PCI Bus	Dev/ Func	Boot Order	Current Status	Next Boot
<SYM53C895A	0	98>	[2]	Off	[On]
<SYM53C896	0	88>	[1]	On	[Off]
<SYM53C896	0	58>	[0]	On	[On]
Hit Insert to select an adapter from this list.					
<SYM53C895A	0	98>			
<SYM53C896	0	88>			
<SYM53C896	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 SYM53C8XX 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 Symbios 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 Symbios 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 Symbios 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

```
Symbios PCI SCSI Configuration Utility Version PCI 4.15.00

Global Properties

                Pause If Boot Alert Displayed  [Yes]
                Boot Information Display Mode   [Verbose]
                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.

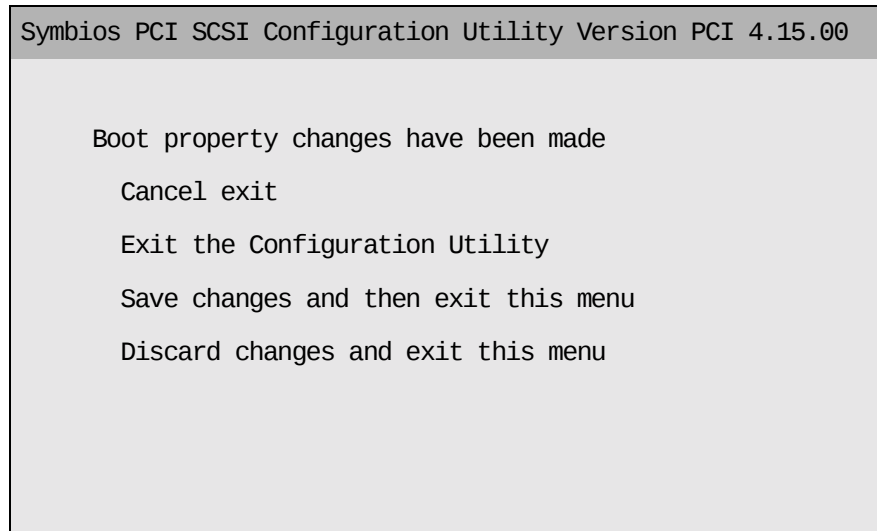
Table 3.6 Global Properties Fields and Descriptions

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.
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



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

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

Appendix A

Technical Specifications

This section discusses the physical environment associated with the SYM8953U Host Adapter. It includes a mechanical drawing of this board, which is shown in [Figure A.1](#). It also includes these topics:

- [Section A.1, “Physical Environment,” page A-1](#)
 - [Section A.2, “Operational Environment,” page A-3](#)
-

A.1 Physical Environment

This section discusses the physical, electrical, thermal, and safety characteristics of the SYM8953U Host Adapter board. Additionally, this board is compliant with electromagnetic standards set by the FCC.

A.1.1 Physical Characteristics

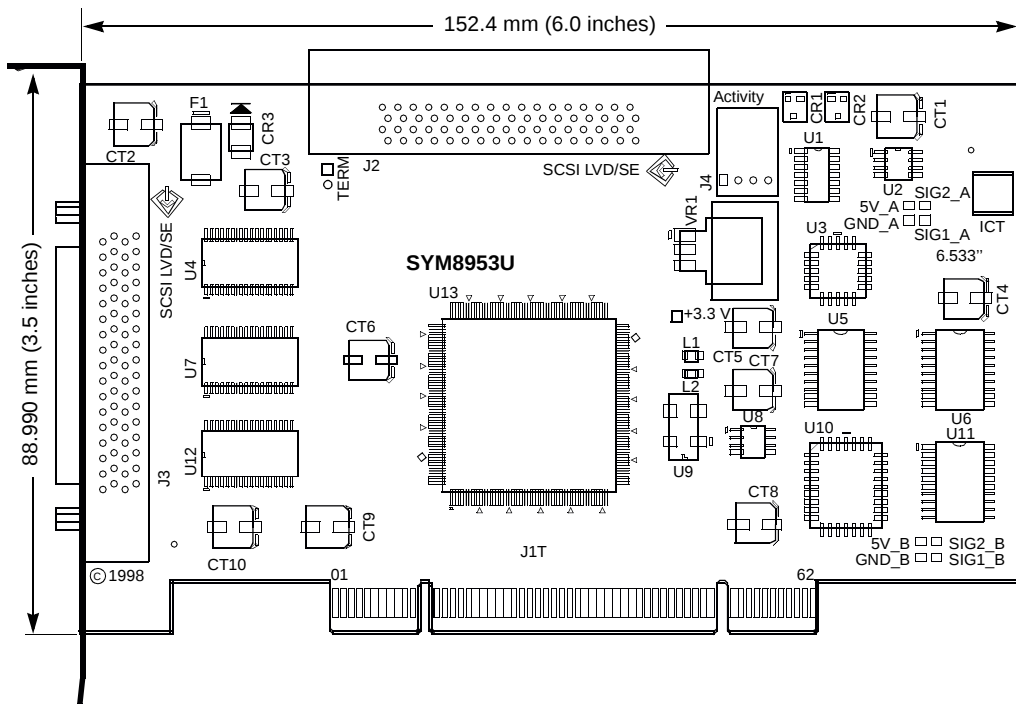
The dimensions of the SYM8953U Host Adapter board are 6.00 x 3.50 inches. PCI connection is made through edge connector J1.

Internal SCSI connection is made through the 68-pin HD connector J2. 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 J4 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 SYM8953U Mechanical Drawing



- Note:
- J1: PCI 32-bit, universal board connector.
 - J2: 68-pin HD connector.
 - J3: 68-pin HD connector.
 - J4: 4 pin low density connector.

A.1.2 Electrical Characteristics

The SYM8953U maximum power requirement, including SCSI TERMPWR (termination power), under normal operation is as follows:

Table A.1 Maximum Power Requirements

+ 5 V DC	± 5%	1.5 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 7.5 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
- Storage Temperature: – 45 °C to + 105 °C (dry bulb)

A.1.4 Electromagnetic Compliance

The board is designed and implemented to minimize electromagnetic emissions, susceptibility, and the effects of electromagnetic discharge. The board meets the requirements of FCC Class B and CISPR 22 limits and is marked with the FCC Class B Declaration of Conformity Symbol. It also carries the CE mark.

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 SYM8953U host adapter is designed for use in PCI computer systems. SDMS operates the board, but the design of the board does not prevent the use of other software.

A.2.1 The PCI Interface

The PCI interface operates as a 32-bit 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.

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 $V_{I/O}$ 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
– 12 V	1	GND	22	SERR/	42
TCK	2	AD27	23	+ 3.3 V	43
GND	3	AD25	24	C_BE1/	44
TDO	4	+ 3.3 V	25	AD14	45
+ 5 V	5	C_BE3/	26	GND	46
+ 5 V	6	AD23	27	AD12	47
INTB/	7	GND	28	AD10	48
INTD/	8	AD21	29	GND	49
GND (PRSNT1/)	9	AD19	30	KEYWAY	50
RESERVED	10	+ 3.3 V	31	KEYWAY	51
GND (PRSNT2/)	11	AD17	32	AD08	52
KEYWAY	12	C_BE2/	33	AD07	53
KEYWAY	13	GND	34	+ 3.3 V	54
RESERVED	14	IRDY/	35	AD05	55
GND	15	+ 3.3 V	36	AD03	56
CLK	16	DEVSEL/	37	GND	57
GND	17	GND	38	AD01	58
REQ/	18	LOCK/	39	VI/O	59
VI/O	19	PERR/	40	ACK64/	60
AD31	20	+ 3.3 V	41	+ 5 V	61
AD29	21			+ 5 V	62
1. Highlighted signals are not connected.					

Table A.3 PCI Connector J1 (Back)

Signal Name	Pin	Signal Name	Pin	Signal Name	Pin
TRST/	1	AD28	22	GND	42
+ 12 V	2	AD26	23	PAR	43
TMS	3	GND	24	AD15	44
TDI	4	AD24	25	+ 3.3 V	45
+ 5 V	5	IDSEL	26	AD13	46
INTA/	6	+ 3.3 V	27	AD11	47
INTC/	7	AD22	28	GND	48
+ 5 V	8	AD20	29	AD09	49
RESERVED	9	GND	30	KEYWAY	50
+ 5 V	10	AD18	31	KEYWAY	51
RESERVED	11	AD16	32	C_BE0/	52
KEYWAY	12	+ 3.3 V	33	+ 3.3 V	53
KEYWAY	13	FRAME/	34	AD06	54
RESERVED	14	GND	35	AD04	55
RST/	15	TRDY/	36	GND	56
VI/O	16	GND	37	AD02	57
GNT/	17	STOP/	38	AD00	58
GND	18	+ 3.3 V	39	VI/O	59
RESERVED	19	SDONE	40	REQ64/	60
AD30	20	SBO/	41	+ 5 V	61
+ 3.3 V	21			+ 5 V	62
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 SCSI-3 protocols and 8-bit and 16-bit arbitration. The interface is made through connectors J2 and J3.

Active SE or LVD SCSI termination is provided automatically. SCSI termination power is supplied by the board.

Connector J2 is a 68-pin HD right angle header used for internal connections.

Connector J3 is a 68-pin HD right angle connector that protrudes through the back panel bracket and is used for external connections.

[Table A.4](#) and [Table A.5](#) show the signal assignments for J2 and J3 respectively.

Table A.4 Internal SCSI Connector J2

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
SDP0+	14	SDP0–	48
GND	15	GND	49
DIFFSENS	16	J2_SENS	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
SCD+	28	SCD–	62
SREQ+	29	SREQ–	63
SIO+	30	SIO–	64
SD08+	31	SD08–	65
SD09+	32	SD09–	66
SD10+	33	SD10–	67
SD11+	34	SD11–	68

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
SDP0+	14	SDP0–	48
GND	15	GND	49
DIFFSENS	16	J3_SENS	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
SCD+	28	SCD–	62
SREQ+	29	SREQ–	63
SIO+	30	SIO–	64
SD08+	31	SD08–	65
SD09+	32	SD09–	66
SD10+	33	SD10–	67
SD11+	34	SD11–	68

Note: When operated in the SE mode, all signals with the + suffix are clamped to ground.

A.2.3 On-Board LED

On-board LEDs are used to indicate the status of the SCSI bus.

The SCSI Activity LED lights when the SCSI bus is transferring information.

A.2.4 The SCSI Busy LED

The SCSI Activity LED interface on the SYM8953U is a four-wire arrangement that allows the user to connect a 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 a LED is attached. The SCSI Busy LED connector is J4.

Table A.6 LED Connector J4

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

Appendix B

Glossary of Terms and Abbreviations

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 and Ultra2 SCSI require active termination.
Address	A specific location in memory, designated either numerically or by a symbolic name.
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 your 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.
CPU	Central Processing Unit. The “brain” of the computer that performs the actual computations. The term Microprocessor Unit (MPU) is also used.
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).
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.
IRQ	Interrupt Request Channel. A path through which a device can get the immediate attention of the computer's CPU. The PCI bus assigns an IRQ path for each SCSI host adapter.
ISA	Industry Standard Architecture. A type of computer bus used in most PCs. It allows devices to send and receive data up to 16 bits at a time.
Kbyte	Kilobyte. A measure of computer storage equal to 1024 bytes.
Local Bus	A way to connect peripherals directly to computer memory. It bypasses the slower ISA and EISA buses. PCI is a local bus standard.
Logical Unit	A subdivision, either logical or physical, of a SCSI device (actually the place for the device on the SCSI bus). Most devices have only one logical unit, but up to eight are allowed for each of the eight possible devices on a SCSI bus.
LUN	Logical Unit Number. An identifier, zero to seven, for a logical unit.
LVD Link	Low Voltage Differential link allows greater Ultra2 SCSI device connectability and longer SCSI cables. LVD Link lowers the amplitude of noise reflections and allows higher transmission frequencies. Detailed information may be found in Section 1.3.4, "LVD Link 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 (Electrically 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 current SCSI specification which adds features to the original SCSI-1 standard.
SCSI-3	The 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 SYM53C8XX device. These SCRIPTS reside in 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 SYM53C8XX device.
SDMS	SCSI Device Management System. A 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.
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.
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”.
VCCI	Voluntary Control Council for Interference.
VDE	Verband Deutscher Elektriker (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.

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