SYMBIOS

SYM8951U
PCI to Ultra2 SCSI
Host Adapter

User's Guide
Version 2.0

SCSI LVD/SE

J19982I

Federal Communications Commission (FCC)

Declaration of Conformity

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. Symbios 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 Symbios. The correction of interferences caused by such unauthorized modification, substitution, or attachment will be the responsibility of the user.

The Symbios SYM8951U is tested to comply with FCC standards for home or office use.

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</div>

Preface

About This Book

This User's Guide is intended to explain how to install and configure the Symbios SYM8951U PCI to Ultra2 SCSI host adapter in a PCI computer system. Basic information on setting up the SCSI bus is also provided.

Symbios Logic Technical Support

Your entire Symbios host adapter solution has been designed for ease of use. However, if you require additional assistance, please contact the Symbios Technical Support Hot Line at (719) 533-7230. The hours of operation are from 7:30 to 4:30 (MST), Monday through Friday.

Before calling, please have the answers to the following questions:

- Which Symbios host adapter are you installing?
- What system are you installing the adapter in?
- What SCSI devices are you connecting to the bus?
- How is your system configured?

It is also helpful if you are at your system when you call.

Reference Documents

Symbios Specifications:

971001
Board Level Logic Development Process

348-0032187
SYM8951U Project/Quality Plan

602-0080607
Design for Manufacturability Guidelines

602-0080608
Design for Testability Guidelines

National, International, and Industry Standards:

ANSI X3T10.11/1142D
SCSI SPI-2

CFR 47 Part 15
Class B Computing Device Radiation Limits

CISPR PUB 22
Limits & Methods of Measurement of Radiated
Interference characteristics of Information
Technology Equipment

EN 55022:1987
Emissions standard utilizing CISPR 22

EN 55082-1:1992
Immunity standard utilizing IEC 801-2:1991 (ESD),
IEC-801-3:1984 (EMF), IEC-801-4:1988 (EFT)

Revision 2.1
PCI Local Bus Specification Revision 2.1.

Other References:

TR-TSY-000332
Bellcore Reliability Prediction Procedure for
Electronic Equipment (Technical Reference
TR-TSY-000332, Issue 2, July 1988)

T69961I/089-25HX
SYM53C895 Users Manual

Revision Record

Page No.	Date	Remarks
n/a	01/97	Rev 1.0 First official release
2-10, 2-11	06/98	Rev 2.0 Update internal SCSI cabling
Chapter 3	06/98	Rev 2.0 Chapter 3 updated to reflect BIOS 4.11

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Introduction

Features

PCI Interface

- Full 32-bit DMA bus master
- Zero wait-state bus master data bursts
- Universal PCI bus voltage support
- Supports 32-bit 33 MHz word 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

SCSI Interface

- Supports 16-bit Low Voltage Differential (LVD) and Single Ended (SE) signaling
- Includes 4KB internal RAM for SCRIPTs instruction storage
- Automatically enables LVD and SE termination
- External 68-pin VHDCI, Internal 68-pin HD latching connectors
- Performs wide Ultra2 SCSI LVD synchronous transfers as fast as 80 MB/s
- SCSI synchronous offset up to 31
- SCSI TERMPWR source with auto-resetting circuit protection device
- SCAM Level 1
- Flash EEPROM for BIOS storage

SCSI Interface (continued)

- Serial NVRAM for user configuration utility and SCAM (SCSI Configured AutoMatically) information storage
- SCSI bus activity LED connector and on-board LED
- 816 Byte FIFO

Board Characteristics

- PCI board dimensions, 177.8 x 96.52 mm (7.00 x 3.8 inches)
- PCI Universal 32-bit card edge connector
- ISA/EISA type bracket
- VHDCI (68 pin Champ style) external connector
- HD (68 pin) internal connector
- On board LEDs indicating SCSI bus activity, Term Power, LVD mode, HVD mode, and SE mode

A mechanical drawing showing board dimensions and component layout is located in Appendix A.

Description

Your Symbios SYM8951U PCI to Ultra2 SCSI host adapter provides an Ultra2 SCSI interface to PCI computer systems. Installing this adapter in your PCI system allows connection of up to 15 SCSI devices.

Your SYM8951U board is a 16-bit, Low Voltage Differential (LVD) / Single Ended (SE) SCSI solution for your computer. This board can support both legacy Fast SCSI and Ultra SCSI devices, and the newest LVD Ultra2 SCSI devices. It is also backwards compatible with existing 16 bit applications for the SYM8251S and SYM8751SP host adapters.

Symbios SCSI Device Management System (SDMS) software is used to operate the board, but the design of the board does not prevent other SCSI software from being used with it.

Your SYM8951U host adapter has a serial Flash ROM device for storing the user SCSI bus configuration and SCAM information automatically.

This guide, along with the *Symbios SDMS User's Guide*, contain product information and installation instructions to help you gain the full benefits of your SYM8951U PCI to Ultra2 SCSI host adapter for your computer system.

The PCI Interface

PCI is a high-speed standard local bus for interfacing a number of I/O components to the processor and memory subsystems in a high end PC or server. The PCI functionality for your SYM8951U is contained within the Symbios SYM53C895 PCI-Ultra2 SCSI I/O Processor with on board LVDlink^{TM} Universal Transceivers. The

SYM53C895 connects directly to the PCI bus and generates timing protocol in compliance with the PCI specification.

The PCI interface operates as a 32-bit DMA bus master. The connection is made through edge connector J1 (see Figure 2-1). The signal definitions and pin numbers conform to the PCI Local Bus Specification Revision 2.1 standard. Your SYM8951U host adapter conforms to the PCI universal signaling environment for a 5 volt or 3.3 volt PCI bus.

The SCSI Interface

The SCSI functionality for your SYM8951U is contained within the Symbios SYM53C895 PCI-Ultra2 SCSI I/O Processor with LVDlink Universal Transceivers. The SYM53C895 connects directly to the SCSI bus and generates timing and protocol in compliance with the SCSI standard.

The SCSI interface on your SYM8951U operates as a 16 bit interface. It supports 16-bit, synchronous and asynchronous, low voltage differential or single ended, Fast, Ultra and Ultra2 SCSI protocols in the combinations shown in the following table. The interface is made through connectors J2 and J3 (see Figure 2-1). Connector J2 is a 68-pin high density right-angle latching connector. Connector J3 is a shielded 68-pin very high density (VHDCI or 8mm) right-angle connector that protrudes through the back panel bracket. An on-board LED (labeled SCSI Activity, CR4) indicates SCSI Bus activity.

Protocol	Modes
Fast +	SE + Synchronous or Asynchronous
Ultra	SE + Synchronous or Asynchronous
Ultra2	LVD + Synchronous or Asynchronous

LVD / Single-ended dual mode active termination is provided on your SYM8951U board. Termination is automatically enabled when only one of the connectors, J2 or J3, is used. Termination is automatically disabled when cables are attached to both connectors, J2 and J3.

Your SYM8951U supplies SCSI bus termination power (TERMPWR) through a blocking diode and a self resetting 1.5 A short circuit protection device. An on board LED (labeled TERMPWR Shorted, CR3) will light if the TERMPWR current limit is exceeded.

A 40 MHz oscillator is installed on the SYM8951U to provide the clock frequency to the SYM53C895 that is necessary to support Ultra2 SCSI transfers of up to 80 MB/sec.

Ultra2 SCSI Technology

Your SYM8951U 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 that 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. These special cable

requirements relate only to the SCSI internal ribbon cable.

High-quality external SCSI cables built to the SCSI specifications meet Fast, Ultra and Ultra2 requirements. If you are using only Fast SCSI internal devices, you may use any quality SCSI ribbon cable.

See Chapter 2, Installing Your SYM8951U Host Adapter for a more detailed explanation of SCSI bus connections.

LVDlink Technology

To support greater device conductibility and a longer SCSI cable, the SYM8951U (SYM53C895 chip) features LVDlink technology, the Symbios 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 transceiver reduces the power needed to drive the SCSI bus, so that the I/O drivers can be integrated directly in the chip. LVDlink technology lowers the amplitude of noise reflections and allows higher transmission frequencies.

The Symbios LVDlink transceivers operate in LVD and single-ended modes. They also allow the chip to detect a high voltage differential signal when the chip is connected to external high voltage differential transceivers. The SYM53C895 chip automatically detects which type of signal is connected, based on the voltage detected, and automatically switches as needed to the single-ended, or LVD mode. All bus devices MUST be LVD or SE. Any HVD devices connected to the bus will cause the bus to shut down.

If a high voltage device is detected, the board will shut down and the on board LED (labeled HVD, CR4) will light.

Benefits of LVDlink

The SYM53C895 supports low voltage differential for SCSI (LVD), a signaling technology that increases the reliability of SCSI data transfers over longer distances than supported by single-ended SCSI. The low current output of LVD allows the I/O transceivers to be integrated directly onto the chip. LVD provides the reliability of high voltage differential 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 Fast-40 (Ultra2 SCSI).

On Board LEDs

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.

The TERMPWR Shorted LED lights when the board has shut down due to the termination power current limit being exceeded.

The LVD Mode LED lights when the board is terminated and operating correctly in the LVD mode. If the LED is off, the board is not terminated for the LVD mode.

The HVD Mode LED lights when the bus detects a HVD device connected to it and the board has shut down.

The SE Mode LED lights when the board is terminated and operating in the SE mode. If the LED is off the board is not terminated for the SE mode.

Chapter 2

Installing Your SYM8951U Host Adapter

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Installing Your SYM8951U Host Adapter

Quick Installation Procedure

This section is provided for the experienced computer user with prior host adapter installation and SCSI bus setup experience. If you prefer a more detailed guidance for installing your SYM8951U host adapter, please follow the instructions in the next section under the heading: *Detailed Installation Procedure*.

For safe and proper installation, check the *User's Manual* supplied with your computer and perform the following steps.

1   Switch off and unplug the system.

2   Remove the cabinet cover on your computer to access the PCI slots. Refer to the *User's Manual* for your computer.

Caution   GROUND YOURSELF WITH A STATIC GROUND STRAP ON THE METAL SURFACE OF THE COMPUTER CHASSIS OR ON A SUITABLE GROUND BEFORE PROCEEDING TO INSTALL THE SYM8951U BOARD. 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.

3   Locate the sockets for installing a PCI plug-in board. Refer to the *User's Manual* for your computer to confirm the location of the PCI sockets. Your SYM8951U requires a PCI socket which allows bus master operation.

4   Remove the blank bracket panel on the back of the computer aligned with the PCI socket you intend to use. Save the bracket screw.

5   Remove your SYM8951U PCI to SCSI host adapter board from the anti-static electric packaging bag and check that it is not damaged.

6   Carefully insert the edge connector, J1, (please see Figure 2-1 and Figure 2-2) of the host adapter into the PCI socket. Make sure the edge connector is properly aligned before pressing the board into place.

Note: You may notice that the components on a PCI host adapter face the opposite way from non-PCI adapter boards you have in your system. This is correct, and the board is keyed to go in with the bracket and the J3 connector mounted for exterior access.

7   The bracket around connector J3 (see Figure 2-1) should fit where the blank bracket panel was removed. You must now secure the bracket with the bracket screw before making the internal and external SCSI bus connections.

8   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). Make certain to match pin one on both connectors.

9   Connect your computer's LED cable to connector J4 if desired (see Figure 2-8). This is designed to drive an off-board system LED and indicates activity on the SCSI bus. The off-board LED will operates at the same time as the on-board SCSI Activity LED.

10 Replace the cabinet top as described in the *User's Manual* for your computer.

11 Make all external SCSI bus connections.

Remember: The SCSI bus requires proper termination, and no duplicate SCSI IDs on non-SCAM devices.

12 Finally, refer to the *Symbios SDMS User's Guide* (or the guide for the software you will use) to load the driver software for your particular operating system.

Detailed Installation Procedure

This section provides step-by-step instructions for installing your SYM8951U host adapter board, and connecting it to your SCSI peripherals. If you are experienced in these tasks, you may prefer to use the preceding section titled *Quick Installation Procedure*. If you are not confident you can perform the tasks as described here, we suggest getting assistance.

Before You Start

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

● Open your PC cabinet and select an open PCI slot

● Insert your host adapter board

● Connect your internal and external SCSI peripherals

● Terminate the SCSI bus

● Set the peripheral SCSI IDs

● Make any configuration changes

● Close your PC cabinet

● Install your software

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

Inserting Your Host Adapter

For safe and proper installation, check the *User's Manual* supplied with your computer and perform the following steps.

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

2   Remove the cabinet cover on your computer to access the PCI slots. Refer to the *User's Manual* for your computer to find out how this is done.

Caution   GROUND YOURSELF WITH A STATIC GROUND STRAP ON THE METAL SURFACE OF THE COMPUTER CHASSIS OR ON A SUITABLE GROUND BEFORE PROCEDING TO INSTALL THE SYM8951U BOARD. 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.

3   Locate the sockets for PCI plug-in board installation. Refer to the *User's Manual* for your computer to confirm the location of the PCI sockets. Your SYM8951U requires a PCI socket which allows bus master operation. If unsure, try one and or the other of the two PCI connectors.

4   Remove the blank bracket panel on the back of the computer aligned with the PCI socket you intend to use. Save the bracket screw.

5   Remove your SYM8951U PCI to Ultra2 SCSI host adapter board from the anti-static packing bag and check that it is not damaged. Remember to ground yourself first, a static discharge could damage your board.

Figure 2-1
 Hardware Connections for Your
SYM8951U Host Adapter
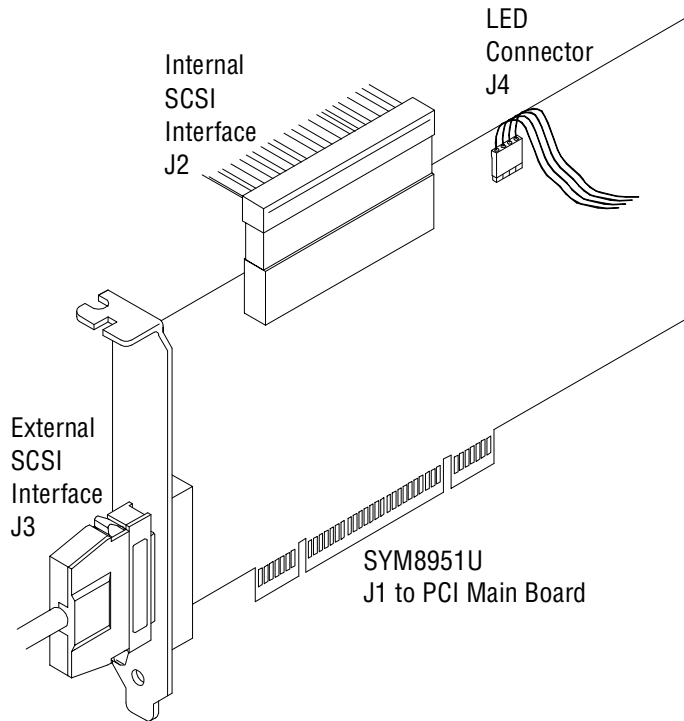
6   Carefully insert edge connector J1 (please see Figure 2-1) of the host adapter into the PCI socket. Make sure the edge connector is properly engaged before pressing the board into place as shown in Figure 2-2.

You may notice that the components on the PCI host adapter face the opposite way from those on other non-PCI adapter boards you have in your system.

This is correct, and the board is keyed to go in only one way.

Figure 2-2
Inserting Your Host Adapter
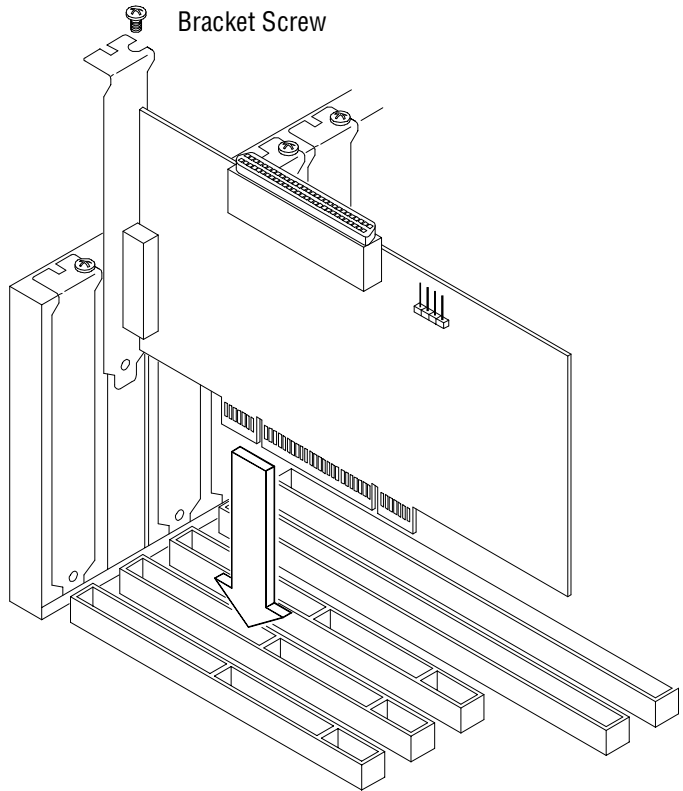
Bracket Screw

7   The bracket around connector J3 (see Figure 2-1) should fit where you removed the blank panel. Secure it with the bracket screw (see Figure 2-2) before making the internal and external SCSI bus connections.

Connecting Your SCSI Peripherals

SCSI bus connections to your SYM8951U host adapter inside your computer can be made with an unshielded 68 conductor Ultra SCSI PVC ribbon cable (see Figure 2-3). Regular PVC ribbon cable will not allow Ultra SCSI speeds without data errors. One side of this cable is marked with a colored stripe to indicate pin 1. Sometimes the connectors on this cable are keyed to insure proper pin 1 connection.

All external SCSI bus connections to your SYM8951U host adapter are made with high quality shielded 68 conductor cables (see Figure 2-3). The connectors on this cable are always keyed to insure proper pin-1 connection.

Table 2-1
SCSI Bus Widths and Speeds

STA Terms	SCSI Bus Width, Bits	SCSI Bus Speed Maximum Data Rate, MegaBytes/Sec
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 8 SCSI, Fast SCSI, and Ultra SCSI devices on a single-ended Ultra SCSI bus only if they are evenly spaced on a 1.5 meter Ultra2 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 single-ended 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 if they are evenly spaced on a 12 meters Ultra SCSI cable (0.19 m minimum between devices).

Table 2-2
SCSI Bus Lengths

	Maximum Bus Length, Meters (See Note 1)			
	Single-ended	Differential	LVD	Maximum Devices
SCSI-1	6	25	12.5	8
Fast SCSI	3	25	12.5	8
Fast Wide SCSI	3	25	12.5	16
Ultra SCSI	1.5	25	12.5	8
Ultra SCSI	3	-	-	4
Wide Ultra SCSI	-	25	12.5	16
Wide Ultra SCSI	1.5	-	-	8
Wide Ultra SCSI	3	-	-	4
Ultra2 SCSI	Note 2	Note 2	12.5	8
Wide Ultra2 SCSI	Note 2	Note 2	12.5	16

Notes:
1. This parameter may be exceeded in point to point and engineered applications.
2. Single-ended and high-power differential are not defined at Ultra2 speeds.

Figure 2-3
SCSI Cables

Terminated SCSI Cable for Internal Connections
(for use with non-terminated internal devices)
68-pin high density

Terminated End

SCSI Cable for Internal Connections
68-pin high density

SCSI Cable for External Connections
68-pin VHDCI
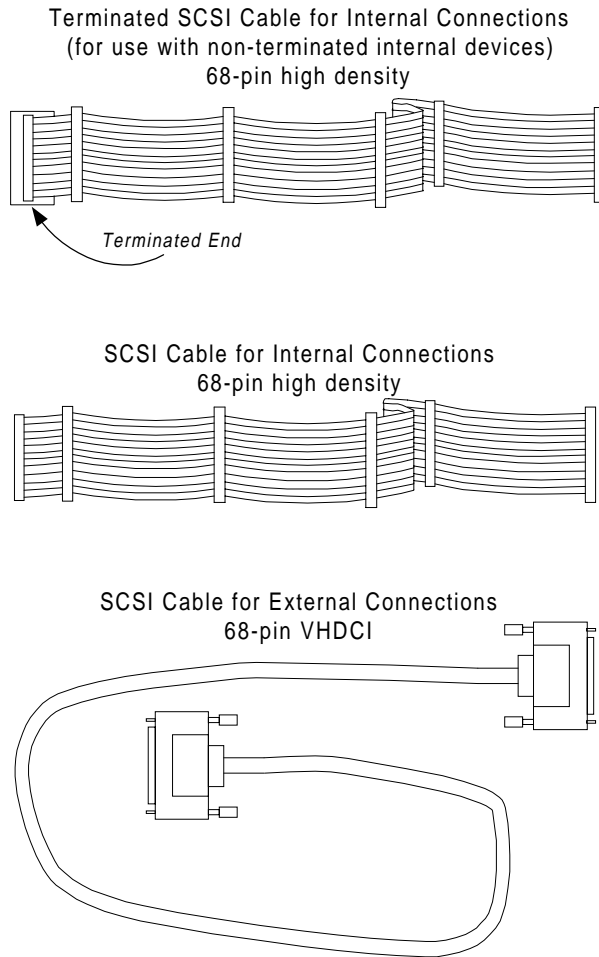
Making Internal SCSI Bus Connections

1   If you are connecting an internal SCSI device, plug
    the 68-pin connector on one end of the internal SCSI
    ribbon cable into connector J2 (see Figure 2-4).

Figure 2-4
Internal SCSI Ribbon Cable to
Host Adapter Connection

Internal
SCSI Interface
J2
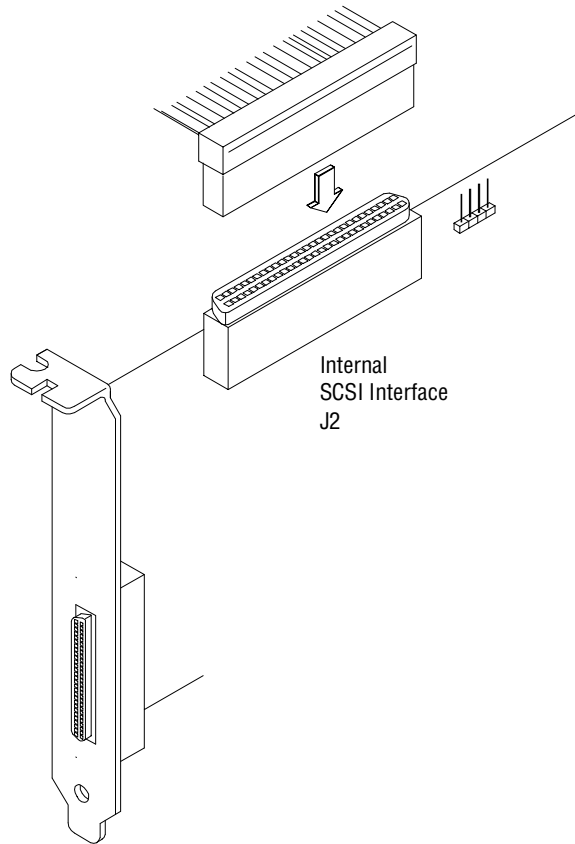
2   Plug the 68-pin connector on the other end of the
    internal SCSI ribbon cable into the SCSI connector
    on your internal SCSI device. An example of this
    connection is shown in Figure 2-5. You must match
    pin 1 on all connections. **Note:** For non-terminated
    internal SCSI devices, a terminated cable may be
    required.

Figure 2-5
Internal SCSI Ribbon Cable to
Internal SCSI Device Connection
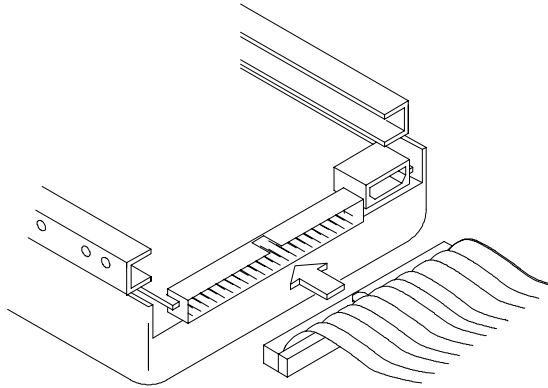
3   Additional internal SCSI devices may be plugged in
    by using an internal SCSI ribbon cable with the
    required number of 68-pin connectors attached along
    its length as shown in Figure 2-6.

    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
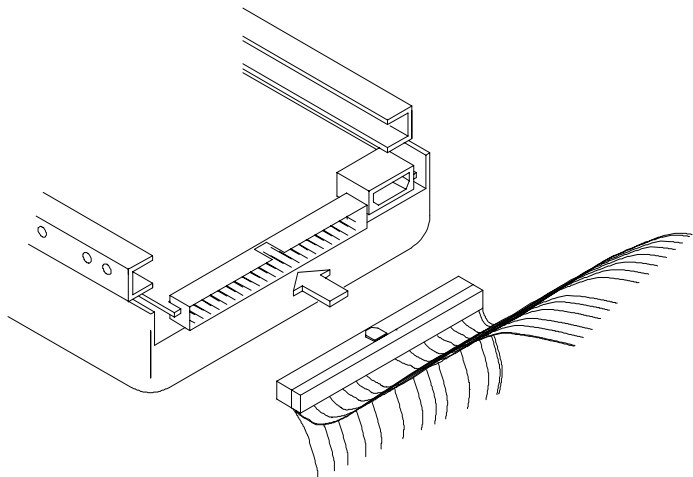
Figure 2-7
Multiple Internal SCSI Devices
Chained Together
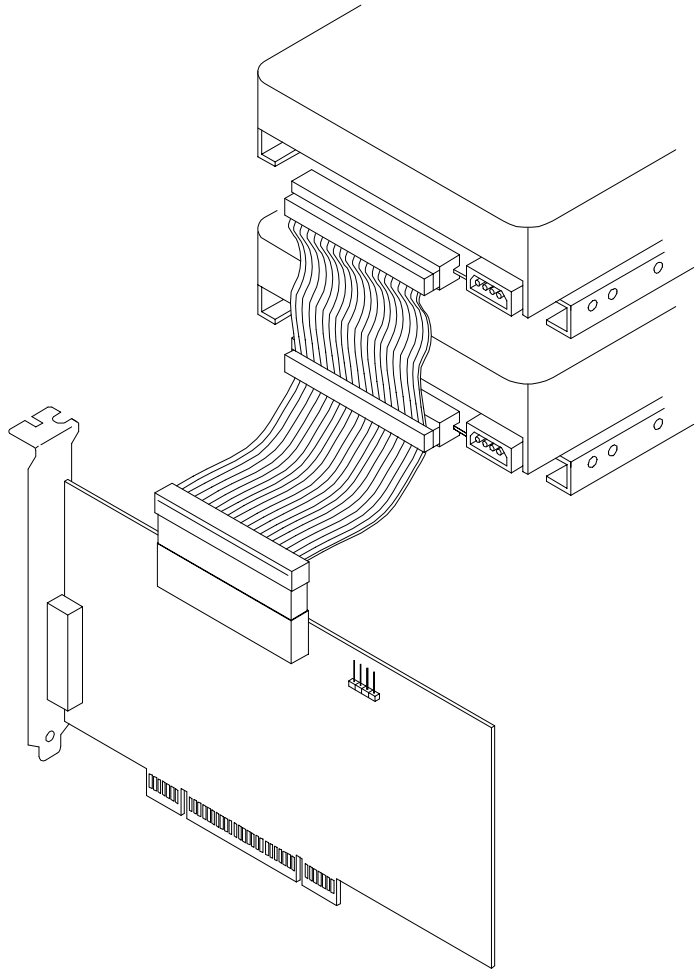
4   Most PC cabinets are designed with a front panel
     LED (sometimes already connected to an existing
     IDE drive). You may connect the LED cable to
     connector J4 on your host adapter, as shown in Figure
     2-8. This causes the front panel LED to light when

there is activity on the SCSI bus. There is also an
LED on your SYM8951U host adapter board which
indicates activity on the SCSI bus.

Connector J4 is not keyed. The orientation of the
LED cable does not matter as long as all four pins are
connected.

Figure 2-8
SCSI LED Connector

LED
Connector
J4
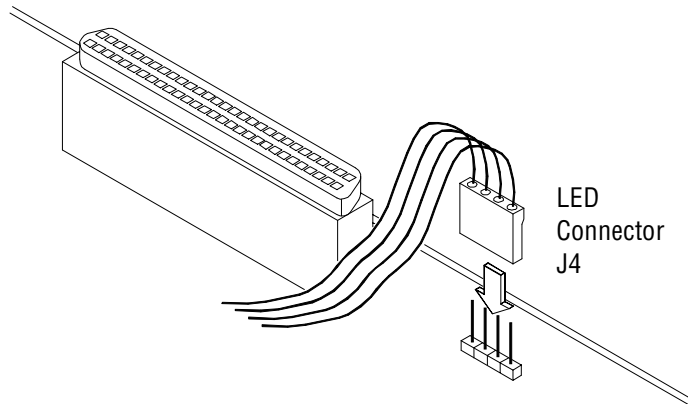
Some LED cables have only two wires. In this case,
place the connector on one end or the other of J4. If
the LED does not light during SCSI bus activity from
this host adapter, you may have to rotate the LED
cable 180° on J4.

Making External SCSI Bus Connections

1   If you need to connect external SCSI devices to your
    SYM8951U host adapter, plug the 68-pin VHDCI
    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 now bracketed to the back panel of your computer. Figure 2-9 shows how this connection is made.

Figure 2-9
External Cable to Host adapter
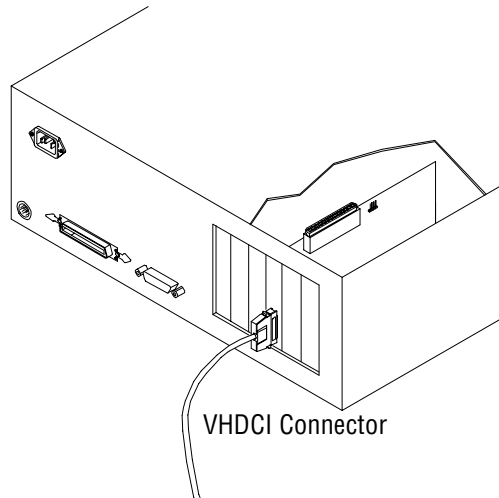
VHDCI Connector

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

VHDCI Connectors
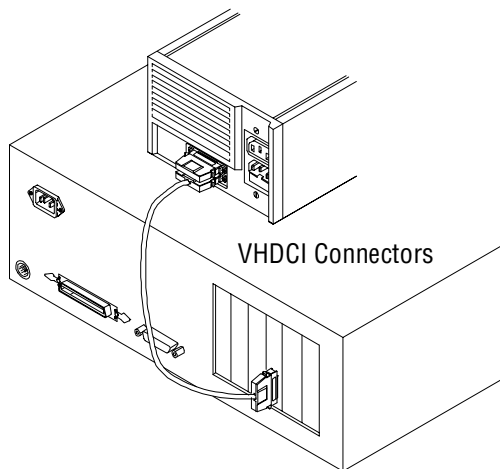
3   If you wish to connect more than one external SCSI
device to your host adapter, you must chain them
together with shielded external SCSI cables. An
example of these chained connections is shown in
Figure 2-11 and Figure 2-13.

Figure 2-11
 Multiple External SCSI Devices
Chained Together

VHDCI Connectors
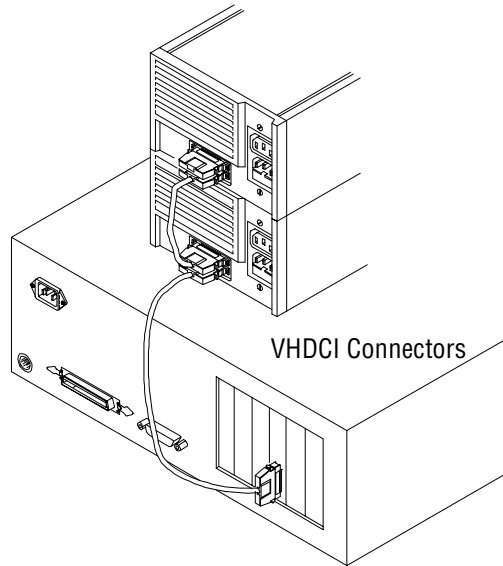
SCSI Bus Termination

The devices making up the SCSI bus are connected serially (chained together) with SCSI cables. The first and last physical SCSI devices connected on the ends of the SCSI bus must have their terminators active. All other SCSI devices on the bus must have their terminators removed or disabled. Remember that your SYM8951U Host Adapter is also on the SCSI bus — its termination is automatically enabled when it is connected to the end of the bus.

Your 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 setting of each device and how to change it.

CAUTION   The auto-enable/disable sensing feature on your SYM8951U may enable termination erroneously if it is directly cabled to another SCSI device or host adapter using the same sensing method. Your SYM8951U senses the presence of SCSI devices by detecting the ground signal on conductor 50 of the SCSI cable.

ANY SCAM AND SCSI DEVICES CONNECTED TO YOUR SCSI BUS WILL AUTOMATICALLY SET THEIR OWN TERMINATION AND IDENTIFICATION CODES.

The following information covers SCSI bus terminations for three different bus configurations. It depends on the use of the J2 and J3 connectors; if you have only internal SCSI devices on connector J2, or if you have only external SCSI devices connected to connector J3, or if you have connections to both J2 and J3.

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.

IF THE LAST DEVICE PROVIDES SCAM (SCSI CONFIGURED AUTOMATICALLY), THEN IT WILL SET ITS OWN TERMINATION AS NEEDED.

Figure 2-12
 Internal SCSI Device Termination

Last Device on
Bus - Terminators
Enabled

Does not end Bus -
Terminators Disabled

Host Adapter
Automatically
Terminated

External Bus Connections

If you have only external SCSI devices connected 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 your host adapter is
automatically enabled in this case.

ANY SCAM AND SCSI DEVICES CONNECTED TO
YOUR SCSI BUS WILL AUTOMATICALLY SET
THEIR OWN TERMINATION AND
IDENTIFICATION CODES.

Figure 2-13 shows an example of how termination is
determined for this SCSI bus configuration.

Figure 2-13
 External SCSI Device Termination
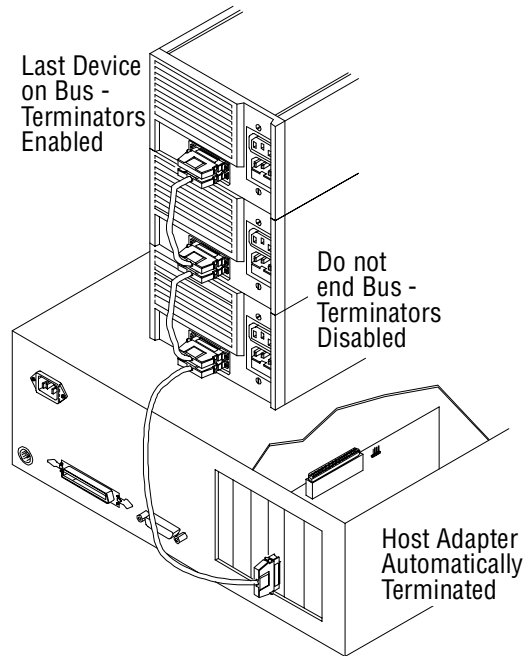
Internal and External Bus Connections

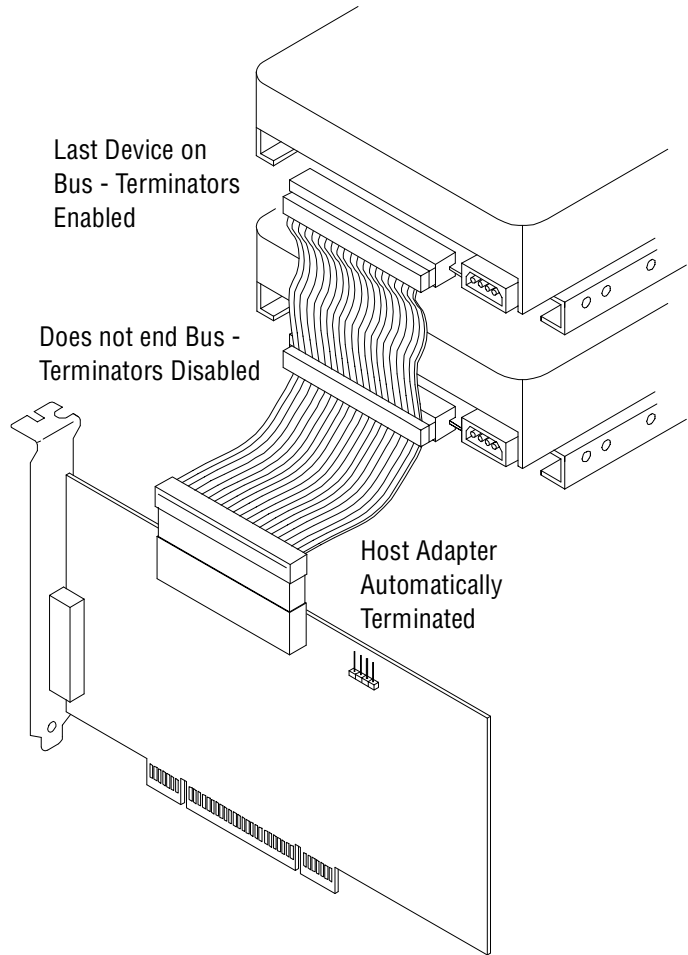If you have internal and external SCSI devices connected
to your host adapter, you must terminate the last internal
and last external device on the SCSI bus. You must
disable the termination on all other devices. Termination
on your host adapter is automatically disabled in this case.
There must be no 8 bit devices on the bus. If 8 bit devices
are required, please call Symbios Technical Support.

Figure 2-14 shows an example of how termination is determined for this SCSI bus configuration.

ANY SCAM AND SCSI DEVICES CONNECTED TO YOUR SCSI BUS WILL AUTOMATICALLY SET THEIR OWN TERMINATION AND IDENTIFICATION CODES.

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 - Terminator Enabled
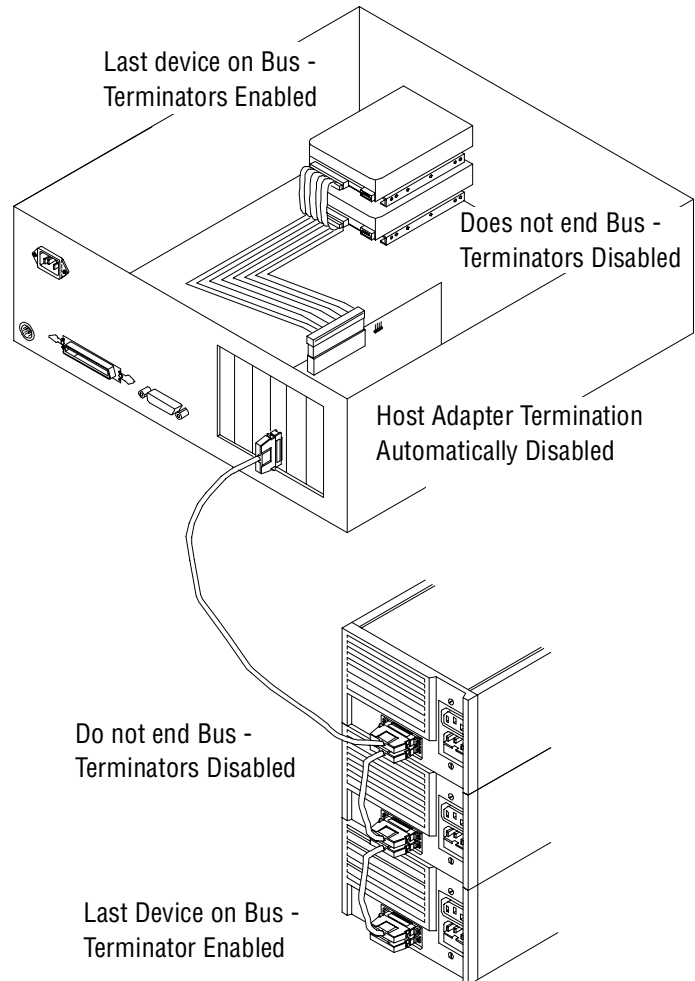
Setting SCSI IDs

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 SCSI ID 0, or the lowest SCSI ID on the bus. For system performance optimization this may be set to an ID other than 0 (zero). Chapter 3, *Configuring Your Host Adapter*, explains how to set your host adapter ID using the Symbios SCSI BIOS Configuration Utility.

Your 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. You must have no duplication of SCSI IDs on a SCSI bus.

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

    Any SCSI devices with SCAM automatically detect and select their own SCSI ID. Refer to your device User's Guide if you run into difficulties.

2   Make any necessary changes to the SCSI IDs and record the IDs for future reference. The following table 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	SYM8951U Host Adapter (default)
6	
5	
4	
3	
2	
1	
0	

Completing Your Installation

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

✔   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

1   Replace the cabinet cover on your computer.

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

3   Boot your computer.

4   To change the configuration of your host adapter, see Chapter 3, *Configuring Your Host Adapter.*

5   Finally, refer to the *Symbios SDMS User's Guide* (or the guide for the software you plan to use) to load the driver software for your particular operating system.

Chapter 3

Configuring Your Host Adapter

Table of Contents
Configuring Your Host Adapter

When to Configure Your SYM8951U Host Adapter

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

The following tables list the configuration settings you can change. The global settings effect your host adapter and all SCSI devices which are connected to it. The device settings effect only individual SCSI devices.

Table 3-1
Global Default Settings

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

★ Applies to BIOS version 4.09 and later.

Table 3-2
Device Default Settings

Settings for Individual SCSI Devices	Default Settings
Synchronous Transfer Rate (MB/sec)	80
Data Width	16
Disconnect	On
Read Write I/O Timeout (secs)	10
Scan for Devices at Boot Time	Yes
Scan for SCSI LUNs	Yes
Queue Tags	On

Starting the SCSI BIOS Configuration Utility

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

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

```
Press Ctrl-C to start 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.

As NVRAM (non-volatile random access memory) is available on this Symbios SYM53C895 SCSI device, 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, pressing Ctrl-A (or Ctrl-E on version 4.04 or later) after memory initialization during reboot allows you to re-enable and reconfigure.

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

Configuration Utility Main Menu

When you start the Symbios SCSI BIOS Configuration Utility, the Main Menu appears. This menu displays a list of up to four Symbios PCI to SCSI host adapters in your system and information about each of them. To select an adapter, use only the arrow keys and enter key. Then, you can view and/or change the current settings for that adapter and the SCSI devices attached to it.

You can select an adapter only if Current Status is "On". Changes are possible since NVRAM is present on this host adapter.

The Main Menu looks like this:

```
Main Menu

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

SYM53C895   FC00     9        On         On        Yes
SYM53C896   F800     9        On         Off       Yes
SYM53C896   F801     9        On         Off       Yes

Change Adapter Status
Adapter Boot Order
Additional Adapter Configuration
Display Mode = Verbose
Mono/Color
Language
Help
Quit
```

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

Change Adapter Status

The change adapter status allows you to activate or deactivate a host adapter and all SCSI devices attached to it. When this option is used to make a change, the change takes place after a reboot that is automatic upon exit from the utility. The Change Status on Next Boot menu looks like this:

```
Main Menu

Change Status on Next Boot:

              Port     Irq--------Status--------NVRAM
              Num
                       Level   Current  Next-Boot  Found
SYM53C895     FC00      9        On        On        Yes
SYM53C896     F800      9        On        Off       Yes
SYM53C896     F801      9        On        Off       Yes
```

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

Adapter Boot Order

The adapter boot order allows you to set the order in which host adapters will boot when you have more than one Symbios host adapter in your system. When this option is selected, the Boot Order menu appears:

```
Main Menu

BootSeq         Bus DevFunc BootSeq          Bus DevFunc

  0    SYM53C895 00    A0       1    SYM53C896 00    98

  2    SYM53C896 00    90
```

To change an adapter's boot order, select it and press Enter. You are then prompted to enter the new boot sequence number. To remove an adapter's boot order,

press Enter again rather than entering a new sequence number. While the maximum capacity is 32 adapters, only 0 through 3 can be assigned a boot order. If an invalid number is entered, an error message appears. When the adapters are ordered as desired, press the Escape (Esc) key to exit from this menu.

Additional Adapter Configuration

The additional adapter configuration allows you to configure an adapter that is not assigned a boot order. When this option is selected, the Adapter Configuration menu appears:

```
Main Menu

BootSeq         Bus DevFunc BootSeq         Bus DevFunc

  1    SYM53C895 00    A0      0    SYM53C896 00    98

       SYM53C896
```

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

Display Mode

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

Mono/Color

Mono/color allows you to choose between a monochrome or color display for the SCSI BIOS Configuration utility.

You might need to choose the mono setting to get a more readable screen on a monochrome monitor.

Language

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

Help

The Help option allows you to bring up a help screen with information about the Main Menu.

Quit

The Quit option allows you to exit from the SCSI BIOS Configuration utility when on the Main Menu.

Esc

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

Utilities Menu

When you select a host adapter on the Main menu, the Utilities menu appears:

```
SYM53C896

            Utilities

                   Adapter Setup

                   Device Selections

                   Help

                   Exit this menu

```

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

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

Adapter Setup Menu

When you select Adapter Setup, the Adapter Setup menu appears:

```
SYM53C895

 Adapter Setup

   SCAM Support           Off

   Parity                 Enabled

   Host SCSI ID           7

   Scan Order             Low to High <0..Max>

   Removable Media Support None

   CHS Mapping            SCSI Plug & Play Mapping

   Spinup Delay           2

   Help

   Restore Default Setup

   Exit this menu
```

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

SCAM Support   The Symbios BIOS version 4.0 and above supports the SCSI Plug and Play protocol called SCAM (SCSI Configured AutoMatically). SCAM support by default is off in versions 4.09.00 and later for the SYM53C895 device. You may choose to turn this on.

Note that if this BIOS is flashed onto a board with existing settings, then these settings will not be changed to reflect the new BIOS defaults. Go into the Configuration Utility to change settings.

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

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

Host SCSI ID   In general, it is suggested that you do not change your host adapter ID from the default value of 7, as this gives it the highest priority on the SCSI bus.

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

See the *Symbios SDMS User's Guide,* Chapter 2 "SCSI BIOS" for additional information regarding BBS.

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

Removable Media Support   This option defines the removable media support for a specific drive. When

this option is selected, a window appears with three choices:

- None
- Boot Drive Only
- With Media Installed

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

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

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

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

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

To support interchange with non-compatible systems, there is another option that can be selected by choosing CHS Mapping and then cursoring to "Alternate CHS Mapping".

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

To remove partitioning, two options are available:

- Reformat the disk using the Format Device option. See the section "Device Selections Menu" below.

● Use the FDISK /MBR command at the C:\ prompt, where MBR represents master boot record.

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

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

Spinup Delay (secs)

This option allows you to stagger spinups for a longer period of time to balance the total current load. The default value is 2 seconds, with choices between 1 and 10 seconds.

This is a power management device designed to accommodate disk devices that may have heavy current load during power up. If multiple drives are being powered up simultaneously and drawing heavy current loads, then this option staggers the spinups to limit startup current.

Device Selections Menu

When you select the Device Selections option, the corresponding menu appears:

```
SYM53C895

Device Selections 0-7

          Sync Data  Disc Time      Scan      Queue   Initial

          Rate Width      Out  Bus    LUNS    Tags    Boot

0-Dev0 N/A   80    16    On   10  Yes    Yes     On      No

1-Dev1 N/A   80    16    On   10  Yes    Yes     On      No

2-Dev2 N/A   80    16    On   10  Yes    Yes     On      No

3-Dev3 N/A   80    16    On   10  Yes    Yes     On      No

4-Dev4 N/A   80    16    On   10  Yes    Yes     On      No

5-Dev5 N/A   80    16    On   10  Yes    Yes     On      No

6-Dev6 N/A   80    16    On   10  Yes    Yes     On      No

SYM53C895

Device Selections 8-15

Help

Exit this menu
```

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

```
SYM53C895

    Inside device

            Sync Rate

            Width

            Disconnect

            Read/Write I/O Timeout

            Scan for Device at Boot Time

            Scan for SCSI LUNs

            Queue Tags

            Initial Boot

            Format

            Verify

            Help

            Restore Default Setup

            Exit this menu
```

Sync Rate (mega Bytes/sec)   The value set with this option defines the maximum data transfer rate the host adapter attempts to negotiate. The host adapter and a SCSI device must agree to a rate they can both handle.

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

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

while some run faster with disconnects disabled (mostly older devices).

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

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

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

Scan for SCSI Logical Units (LUNs)   You can set this option to "No" if you have problems with a device that responds to all LUNs whether they are occupied or not. For example, if there is a SCSI device with multiple LUNs but you do not want all of those LUNs to be available to the system, then set this option to "No." This will limit the scan to LUN0 only.

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

Initial Boot   This option allows any device attached to the first adapter to become the boot device. It provides the users of non-BBS personal computers some of the flexibility of a BBS machine.

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

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

"Verify all sectors on the device

Press ESC to abort

Else press any key to continue"

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

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

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

To Exit the SCSI BIOS Configuration Utility

Since some changes only take effect after your system reboots, it is important that you exit this configuration utility properly. Return to the Main menu and exit via the Quit option. If you reboot the system without properly exiting the utility, some changes may not take effect.
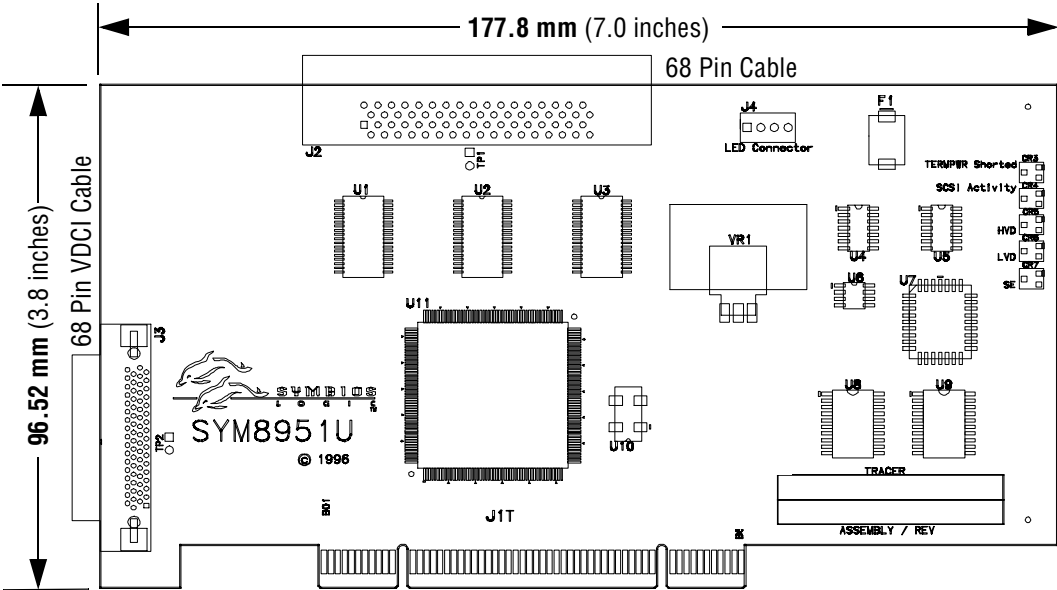
Appendix A

Technical Specifications

Table of Contents
Technical Specifications

Mechanical Drawing

Figure A-1
Board Dimensions

Reference Designator	Description	Reference Designator	Description
U1, U2, U3	Terminators	U7	Flash ROM
U4, U5	Decode Logic	U10	Oscillator
U6, U8, U9	NVRAM	U11	53C895

Physical Environment

Physical Characteristics

The dimensions of the SYM8951U host adapter board are 7.00" x 3.80". PCI connection is made through edge connector J1. Internal SCSI connection is made through the 68-pin high density connector J2. External SCSI connection is made through the 68-pin Very High Density Connector Interconnect (VHDCI) 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 2.1 PCI specification.

Electrical Characteristics

The SYM8951U maximum power requirements, including SCSI TERMPWR, under normal operation is:

● +5V DC ±5% 1.5A over the operating range 5-55°C

Under abnormal conditions such as a short on SCSI TERMPWR, +5V current may be higher. At temperatures of at least 25°C a current of 4A 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 7.5W maximum configuration.

Thermal, Atmospheric Characteristics

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

- Temperature range: 5-55°C (dry bulb)
- Relative humidity range: 5-90% non-condensing
- Maximum dew point temperature: 32°C
- Storage Temperature: -45°C to +85°C (dry bulb)

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.

Safety Characteristics

The bare board meets or exceeds the requirements of UL flammability rating 94V0. 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 42.4V limit.

Operational Environment

The SYM8951U is designed for use in PCI computer systems with an ISA/EISA bracket type. The Symbios SDMS (SCSI Device Management Software) operates the board, but the design of the board does not prevent the use of other SCSI software with it.

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 2.1 standard. The following tables show the signal assignments.

Note: The +3.3V pins are tied together and decoupled with high frequency bypass capacitors to ground. No current from these 3.3V pins is used on the board. The board derives power from the +5V pins, directly and through a 3.3V voltage regulator. The PCI $V_{I/O}$ pins are used to differentiate between a 5V or a 3.3V PCI environment.

Table 1-1
PCI Connector J1 (Front)

Signal Name	Pin	Signal Name	Pin	Signal Name	Pin
-12V	1	GND	22	SERR/	42
TCK	2	AD27	23	+3.3V	43
GND	3	AD25	24	C_BE1/	44
TDO	4	+3.3V	25	AD14	45
+5V	5	C_BE3/	26	GND	46
+5V	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	+3.3V	31	KEYWAY	51
GND (PRSNT2/)	11	AD17	32	AD08	52
GND	12	C_BE2/	33	AD07	53
GND	13	GND	34	+3.3V	54
RESERVED	14	IRDY/	35	AD05	55
GND	15	+3.3V	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	+3.3V	41	+5V	61
AD29	21			+5V	62

Note: Highlighted signals are not connected.

Table 1-2
PCI Connector J1 (Back)

Signal Name	Pin	Signal Name	Pin	Signal Name	Pin
TRST/	1	AD28	22	GND	42
+12V	2	AD26	23	PAR	43
TMS	3	GND	24	AD15	44
TDI	4	AD24	25	+3.3V	45
+5V	5	IDSEL	26	AD13	46
INTA/	6	+3.3V	27	AD11	47
INTC/	7	AD22	28	GND	48
+5V	8	AD20	29	AD09	49
RESERVED	9	GND	30	KEYWAY	50
VI/O	10	AD18	31	KEYWAY	51
RESERVED	11	AD16	32	C_BE0/	52
GND	12	+3.3V	33	+3.3V	53
GND	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	+3.3V	39	VI/O	59
RESERVED	19	SDONE	40	REQ64/	60
AD30	20	SBO/	41	+5V	61
+3.3V	21			+5V	62

Note: Highlighted signals are not connected.

The SCSI Interface

The SCSI interface operates as 16-bit, synchronous or asynchronous, single-ended or low voltage differential, and supports SCSI-3 protocols and 8 / 16-bit arbitration. The interface is made through connectors J2 and J3. Connector J2 is a 68-pin high density right angle header used for internal connections. Connector J3 is a 68-pin Very High Density Connection Interconnect (VHDCI) right angle receptacle that protrudes through the back panel bracket. Active dual single-ended / low voltage differential SCSI termination is provided automatically. SCSI termination power is also supplied by the board. The following tables show the signal assignments for J2 and J3.

Table 1-3
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 1-4
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

On Board LEDs

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.

The TERMPWR Shorted LED lights when the board has shut down due to the termination power current limit being exceeded.

The LVD Mode LED lights when the board is terminated correctly in the LVD mode. If the LED is off, the board is not terminated for the LVD mode.

The HVD Mode LED lights when the bus detects a HVD device connected to it and the board has shut down.

The SE Mode LED lights when single ended devices are connected to the SCSI Bus.

The SCSI Busy LED

The SCSI Activity LED interface on the SYM8951U 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 0.4V and minimum output low current 16mA) is pulled low to complete the circuit when a harness with an LED is attached. The connector on the SYM8951U is J4.

Table 1-5
LED Connector J4

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

Glossary

A

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.

B

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 via 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.

C

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 Micro Processor Unit (MPU) is also used.

D

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.)

E

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.

F

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/sec over an 8-bit SCSI bus and up to 20 MBytes/sec 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.

H

HAB   Host Adapter Board. A circuit board that provides a bus connection to a computer system.

Hard Disk   A disk made of metal and permanently sealed into a drive cartridge. A hard disk can store very large amounts of information.

HBA   Host Bus Adapter. An integrated circuit that supplies a bus connector to a computer system.

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.

I

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 PC's. It allows devices to send and receive data up to 16-bits at a time.

K

KByte   Kilobyte. A measure of computer storage equal to 1024 bytes.

L

Local Bus   A way to connect peripherals directly to computer memory. It bypasses the slower ISA and EISA busses. 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 Chapter 1 of this manual.

M

Mainboard   A large circuit board that holds RAM, ROM, the microprocessor, custom integrated circuits, and other components that make a computer work. It also has expansion slots for host adapters and other expansion boards.

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

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

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

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

N

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

O

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.

P

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 busses.

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 via 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.

Q

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

R

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   Symbios 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.

S

SCAM   SCSI Configured AutoMatically. A method to automatically allocate SCSI IDs via 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 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.

SDMS SCSI Device Management System. A Symbios 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.

U

Ultra SCSI A standard for SCSI data transfers. It allows a transfer rate of up to 20 MB/sec over a 8-bit SCSI bus and up to 40 MB/sec over a 16-bit SCSI bus. STA (SCSI Trade Association) supports using the term "Ultra2 SCSI" over the term "Fast-20".

Ultra2 SCSI A standard for SCSI data transfers. It allows a transfer rate of up to 80 MB/sec over a 16-bit SCSI bus. STA (SCSI Trade Association) supports using the term "Ulstr2 SCSI" over the term "Fast-40".

V

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.

W

Wide SCSI   A SCSI-2 feature allowing 16 or 32-bit transfers on the SCSI bus. This dramatically increases the transfer rate over the standard 8-bit SCSI bus.

Word   A two byte (or 16-bit) unit of information.

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