

Symbios™ SYM22801 Dual Channel PCI to Ultra SCSI Host Adapter

User's Guide

Version 2.0



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Preface

This book is the primary reference and User's Guide for the LSI Logic Symbios™ SYM22801 Dual Channel PCI to Ultra SCSI Host Adapter. It contains a complete functional description for the SYM22801 and includes complete physical and electrical specifications for the SYM22801.

Audience

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

- Engineers and managers who are evaluating the processor for possible use in a system
 - Engineers who are designing the processor into a system
-

Organization

This document has the following chapters and appendixes:

- [Chapter 1, Using the SYM22801 Host Adapter](#), defines the interfaces and characteristics of the SYM22801 Dual Channel PCI to Ultra SCSI Host Adapter Board.
- [Chapter 2, Installing the SYM22801 Host Adapter](#), provides both quick and detailed installation instructions.
- [Chapter 3, Configuring the 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 SYM22801 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

PCI SCSI Device Management System SDMS 4.0 User's Guide,
Document No. DB15-000099-01

Chapter 1

Using the SYM22801 Host Adapter

This chapter describes how the SYM22801 Host Adapter interfaces 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

LSI Logic's Symbios™ SYM22801 Dual Channel PCI to Ultra SCSI host adapter provides a SCSI-3, Ultra SCSI interface to PCI computer systems. Installing this adapter in your PCI system allows connection of SCSI devices over a SCSI bus.

The dual channel SYM22801 board provides 16-bit, Single-Ended (SE), SCSI solutions for your computer, using only one PCI slot. This board supports legacy Fast SCSI devices, and the newest Ultra SCSI devices. It is also backwards compatible with the existing SYM8751SP host adapter but with a different external connector.

Symbios SCSI Device Management System (SDMS™) software operates the board, but the design of the board does not prevent other software from being written and used with it. BIOS support for this host adapter is incorporated on the board in an 8 X 64K Flash BIOS.

This guide and the *PCI SCSI Device Management System SDMS 4.0 User's Guide* contain product information and installation instructions to help you gain the full benefits of the SYM22801 Dual Channel PCI to Ultra SCSI host adapter for your computer system.

1.2 Features

This section provides a high level overview of the PCI Interface, the SCSI Interface, and Board Characteristics for the SYM22801 Host Adapter board.

1.2.1 PCI Interface

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

1.2.2 SCSI Interface

- Two independent SCSI channels
- 16-bit single-ended
- Automatically enabled active termination
- Three connectors per channel:
 - 68-pin VHDCI external
 - 68-pin right-angle high density internal with jack blocks
 - 50-pin vertical low density internal
- Fast and Ultra SCSI data transfer capability
- SCSI TERMPWR source with autoresetting circuit breaker and TERMPWR shorted LED
- SCAM (SCSI Configured AutoMatically) off in BIOS version 4.09 and later
- Flash EEPROM for BIOS storage
- Serial NVRAM (Non Volatile Random Access Memory) on each channel for user configuration utility and SCAM information storage
- SCSI activity LED connector for each channel

1.2.3 Board Characteristics

- PCI board dimensions,
190 x 96.52 mm (7.50 x 3.80 inches)
- Universal 32-bit card edge connector

1.3 Interface Descriptions

This section provides a more detailed explanation about the PCI Interface, The SCSI Interface, and Ultra SCSI.

1.3.1 The PCI Interface

PCI is a high-speed standard local bus for interfacing a number of I/O components to the processor and memory subsystems in a high end PC. The PCI functionality for the SYM22801 is contained within the Symbios SYM53C876 PCI to Ultra SCSI I/O Processor chip. The SYM53C876 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 the edge connector J1 (see Figure 2.1). The signal definitions and pin numbers conform to the PCI Local Bus Specification Revision 2.1 standard. The SYM22801 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 SYM22801 is contained within the Symbios SYM53C876 PCI-Ultra SCSI I/O Processor chip. The SYM53C876 connects directly to the two SCSI buses and generates timing and protocol in compliance with the SCSI standard.

The SCSI interfaces on the SYM22801 operates as 16-bit, synchronous or asynchronous, single-ended bus, and support Ultra SCSI protocols and 16-bit arbitration. Each interface is made through two (and only two) of the connectors J2, J3, and J4 (for Channel A), or J6, J7, and J8 (for Channel B). Connectors J2 and J6 are 68-pin high density right-angle receptacles. Connectors J3 and J7 are shielded 68-pin VHDCI 0.8 mm right-angle receptacles that protrude through the back panel bracket. Connectors J4 and J8 are 50-pin low density vertical shrouded pin headers. See Figure 2.1 for the location of these connectors.

Single-ended SCSI active termination is provided on the SYM22801 board. Termination is automatically enabled when only one of the connectors J2, J3, and J4 (or J6, J7, and J8) is used, or when an 8-bit device is connected to the 16-bit J3 or J7 connectors. In the latter case,

only the upper 8 data bits are automatically terminated. The SYM22801 supplies SCSI bus TERMPWR (termination power) through a blocking diode and a self-resetting 1.5 A short circuit protection device. The onboard LED lights when TERMPWR is shorted. Separate switches for each channel allow user override of termination.

A 40 MHz oscillator is installed on the SYM22801 to provide the clock frequency to the SYM53C876 that is necessary to support Wide Ultra SCSI transfers of up to 40 Mbytes/s.

1.3.3 Ultra SCSI

The SYM22801 has full support for Ultra SCSI as well as supporting Fast SCSI simultaneously. Ultra SCSI is an extension of the SCSI-3 family of standards that expands the bandwidth of the SCSI bus, allowing faster synchronous data transfers. Special SCSI cables are specified for operation with Ultra SCSI devices, and you must consider the total number of devices and the length of the SCSI bus when setting up your system. See Chapter 2, *Installing the SYM22801 Host Adapter* for a detailed explanation of SCSI bus connections.

Chapter 2

Installing the SYM22801 Host Adapter

This chapter provides instructions on how to install the SYM22801 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, “SCSI Bus Termination,” page 2-18
- Section 2.4, “Setting Interrupts,” page 2-27
- Section 2.5, “Completing Your Installation,” page 2-28

2.1 Quick Installation Procedure

This section provides quick setup instructions for the experienced computer user with prior host adapter installation and SCSI bus setup experience. If you prefer more detailed guidance in installing the SYM22801 host adapter, please follow the instructions in Section 2.2, “Detailed Installation Procedure.”

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

- Step 1. *Ground yourself* before removing this host adapter board. Remove the SYM22801 Dual Channel to PCI Ultra 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.
- Step 2. Switch off and unplug the system.
- Step 3. Remove the cabinet cover on your computer to access the PCI slots. Refer to the user’s manual for your computer.

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

- Step 4. Locate the slots for PCI plug-in board installation. Refer to the user's manual for your computer to confirm the location of the PCI slots. The SYM22801 requires a PCI slot that allows bus master operation.
- Step 5. Remove the blank panel on the back of the computer aligned with the PCI slot you intend to use. Save the bracket screw.
- Step 6. Carefully insert the edge connector J1 of the host adapter into the PCI slot. Make sure the edge connector is properly engaged before pressing the board into place. See the example shown in Figure 2.1.

Note: You may notice that the components on a 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.

- Step 7. The bracket around the connectors J3 and J7 (see Figure 2.1) should fit where the blank panel was removed. Secure the bracket with the bracket screw before making the internal and external SCSI bus connections.
- Step 8. If you are connecting any internal SCSI devices, plug a 68-pin connector on the end of the internal SCSI ribbon cable into connector J2 or J6 for Wide SCSI, or a 50-pin connector into connector J4 or J8 for normal SCSI (see Figure 2.1). Make certain to match pin-1 on both connectors.

Note: It is possible to use both internal connectors on a channel if no external devices are attached to that channel. You may use only two of the three connectors on each channel at once.

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

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

Step 11. Make all external SCSI bus connections.

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

Step 12. Finally, refer to the *PCI SCSI Device Management System SDMS 4.0 User's Guide* (or the guide for the software that you will use) to load the driver software for your particular operating system.

2.2 Detailed Installation Procedure

This section provides step-by-step instructions for installing the SYM22801 host adapter and connecting it to your SCSI peripherals. If you are experienced in these tasks, you may prefer to use the preceding Section 2.1, "Quick Installation Procedure." If you are not confident that you can perform the tasks as described here, LSI Logic suggests getting assistance.

2.2.1 Before You Start

Before you start, look through the task list below to get an overall idea of the steps to perform.

- Open your PC cabinet and select an open PCI slot
- Insert the host adapter
- Connect your SCSI peripherals
 - Internal
 - External
- 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 SYM22801 host adapter that you install can access up to 15 peripheral devices per channel.

2.2.2 Inserting the Host Adapter

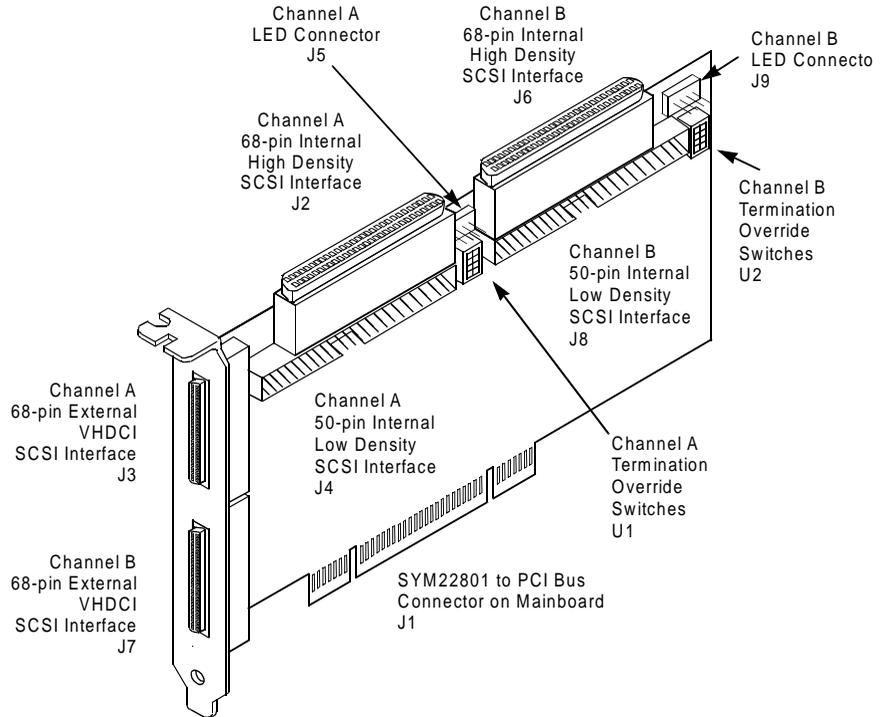
For safe and proper installation, check the user's manual supplied with your computer to perform the following steps.

- Step 1. *Ground yourself* before removing this host adapter board. Remove the SYM22801 Dual Channel PCI to Ultra 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.
- Step 2. Switch off and unplug power cords for all components in your system.
- Step 3. Remove the cabinet cover on your computer to access the PCI slots.

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

- Step 4. Locate the slots for PCI plug-in board installation. Refer to the user's manual for your computer to confirm the location of the PCI slots. The SYM22801 requires a PCI slot which allows bus master operation.
- Step 5. Remove the blank 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 SYM22801 Host Adapter

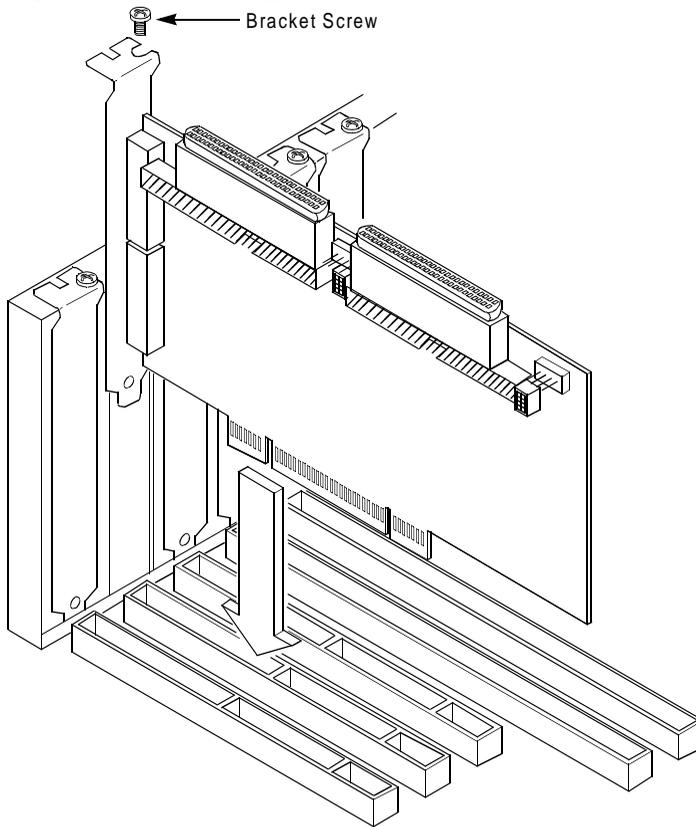


Step 6. Carefully insert the edge connector J1 (see Figure 2.1) of the host adapter into the PCI slot. Make sure the edge connector is properly engaged before pressing the board into place as shown in Figure 2.2.

Step 7. To plan on hooking up another host adapter on the same bus as this host adapter, or an 8-bit device on 68-pin connector, see the Channel Switches section discussed later in this chapter.

Notice that the components on a 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 the Host Adapter



Step 8. The bracket around the connectors J3 and J7 (see Figure 2.1) should fit where you removed the blank panel. Secure it with the bracket screw (see Figure 2.2) before making the internal and external SCSI bus connections.

2.2.3 Connecting the SCSI Peripherals

SCSI bus connections to the SYM22801 host adapter inside the computer are made with an unshielded, 68 or 50-conductor ribbon cable (see Figure 2.3). One side of this cable is marked with a color to indicate the pin-1 side. Sometimes the connectors on this cable are keyed to ensure proper pin-1 connection.

All external SCSI bus connections to the SYM22801 host adapter are made with shielded, 68-conductor cables (see Figure 2.3). The connectors on this cable are always keyed to ensure proper pin-1 connection.

Figure 2.3 SCSI Cables

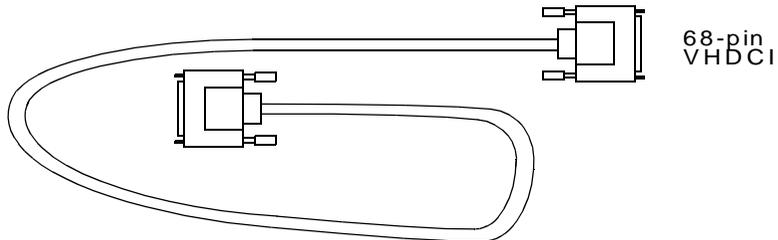
SCSI Cables for Internal Connections



and/or



SCSI Cable for External Connections



Important: You can connect up to sixteen SCSI and Fast SCSI devices, including the host adapter board, on a single-ended SCSI bus only if they are at least .3m apart on a 6 meter cable. For Ultra SCSI, you can connect up to eight devices, including the host adapter board, on a single-ended Ultra SCSI bus only if they are evenly spaced on a 1.5 meter Ultra SCSI cable (0.19m between devices). You can connect up to four devices if they are evenly spaced on a 3 meter Ultra SCSI cable (0.75m between devices). Your single-ended SCSI bus should not exceed

3 meters (total internal and external cable lengths), even with fewer than four devices. The SYM22801 autotermination scheme is designed to operate properly when plugging the end connector of the SCSI cables into the SYM22801 SCSI connectors.

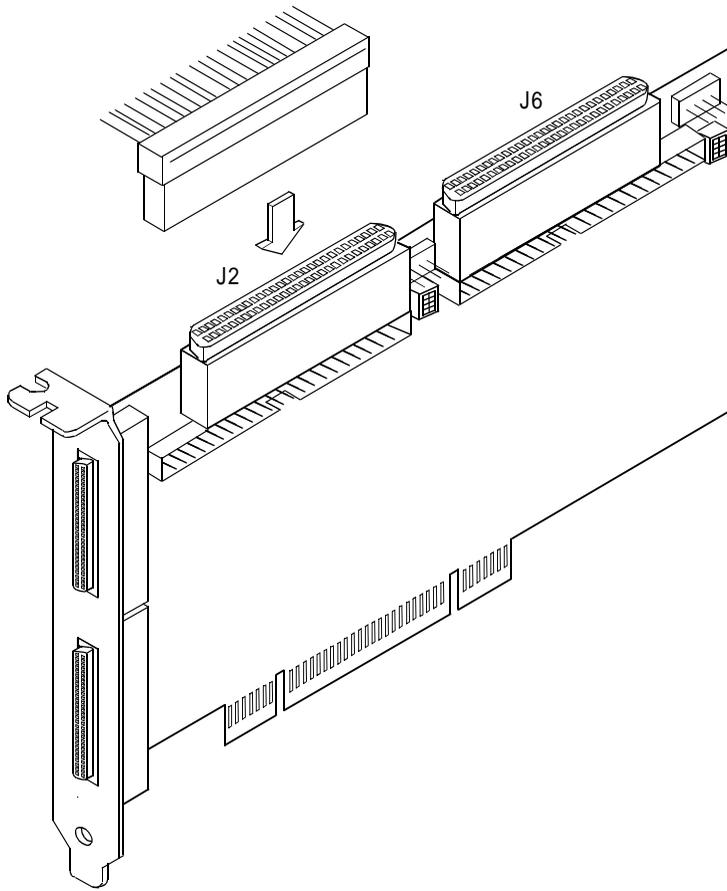
If you connect the SYM22801 in the middle of the bus, you will incur improper termination since the switches are not assigned on that bus correctly. Refer to the Channel Switches section for more information.

2.2.4 Making Internal SCSI Bus Connections

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

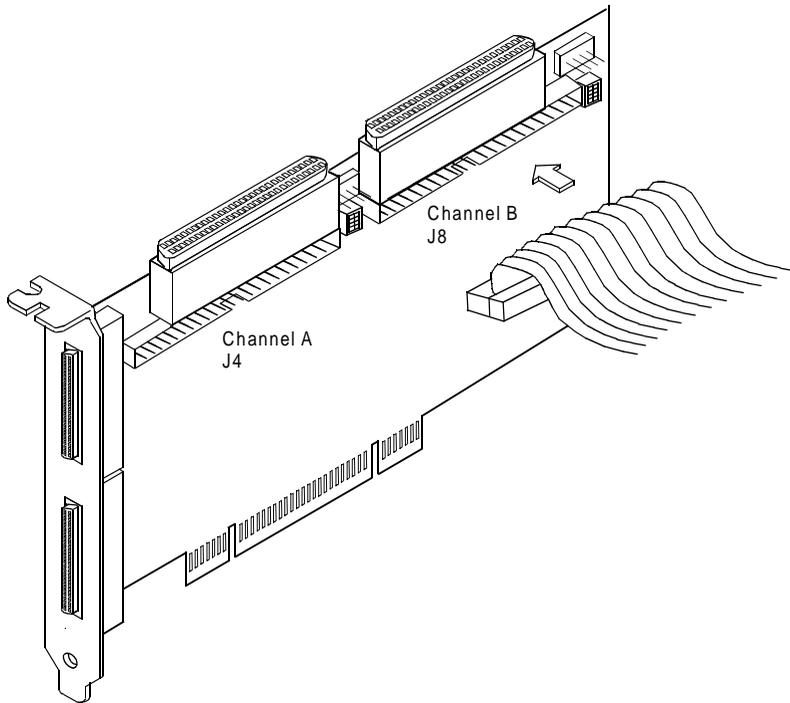
- Step 1. If you are connecting an internal Wide SCSI device, plug the 68-pin connector on one end of a wide internal SCSI ribbon cable into the connector J2, or J6 (see Figure 2.4). Make certain to match pin-1 on both connectors.

Figure 2.4 Internal Wide SCSI Ribbon Cable to Host Adapter Connection



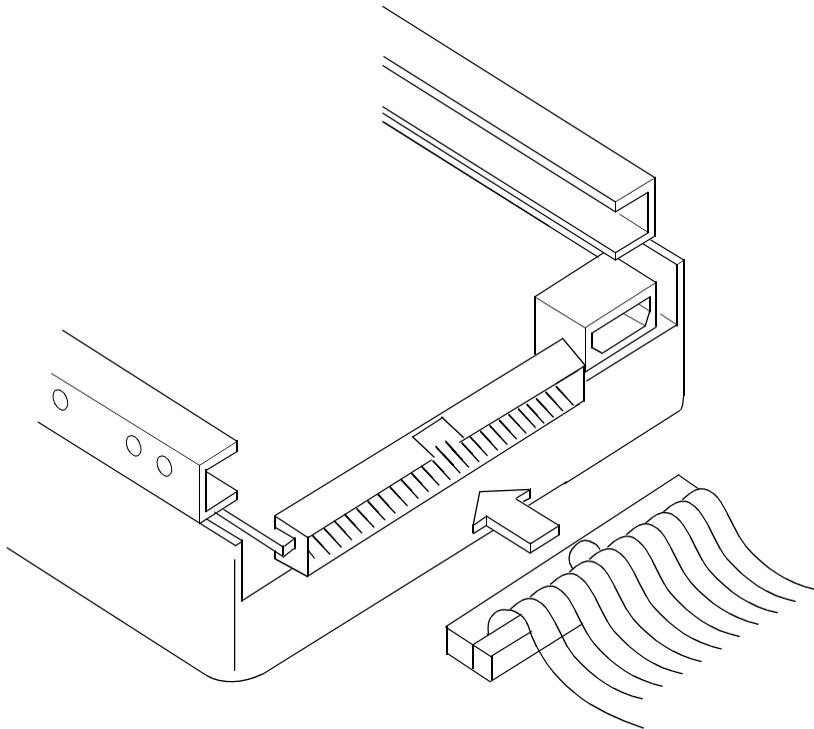
Step 2. To connect an 8-bit internal SCSI device, plug the 50-pin connector on one end of an 8-conductor internal SCSI ribbon cable into the connector J4 or J8 (see Figure 2.5). Make certain to match pin-1 on both connectors.

Figure 2.5 Internal SCSI Ribbon Cable to Host Adapter Connection



Step 3. Plug the 68 or 50-pin connector on the other end of the internal SCSI ribbon cable into the SCSI connector on the internal SCSI device. An example of this connection is shown in Figure 2.6. You must match pin-1 on all connections.

Figure 2.6 Internal SCSI Ribbon Cable to Internal SCSI Device Connection



Step 4. Additional internal SCSI devices are plugged in by using an internal SCSI ribbon cable with the required number of connectors attached along its length as shown in Figure 2.7.

An example of this type of chained connection is shown in Figure 2.8. Make sure to match pin-1 on all connections.

Figure 2.7 Connecting Additional Internal SCSI Devices

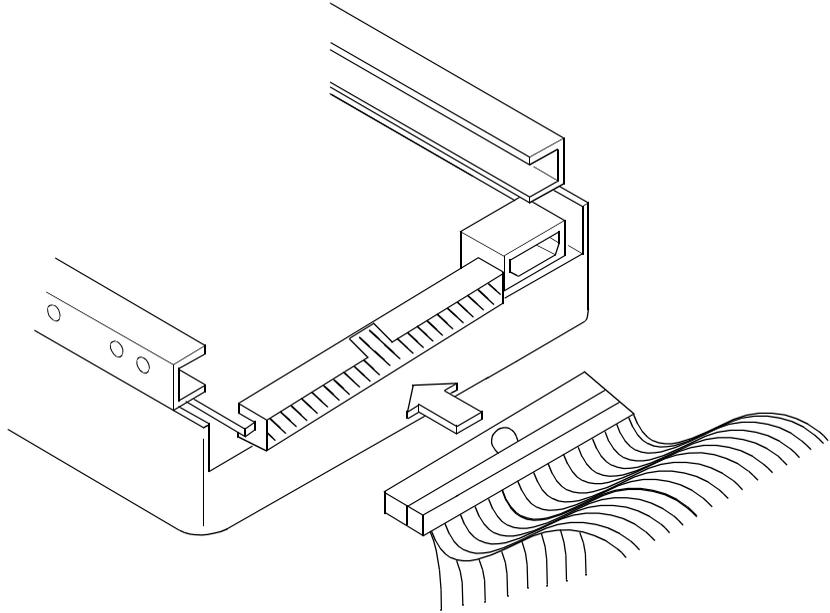
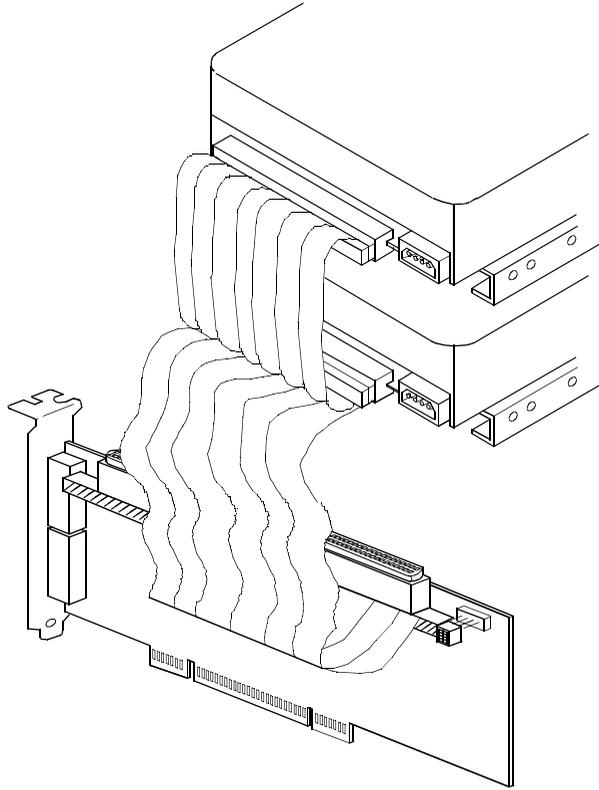
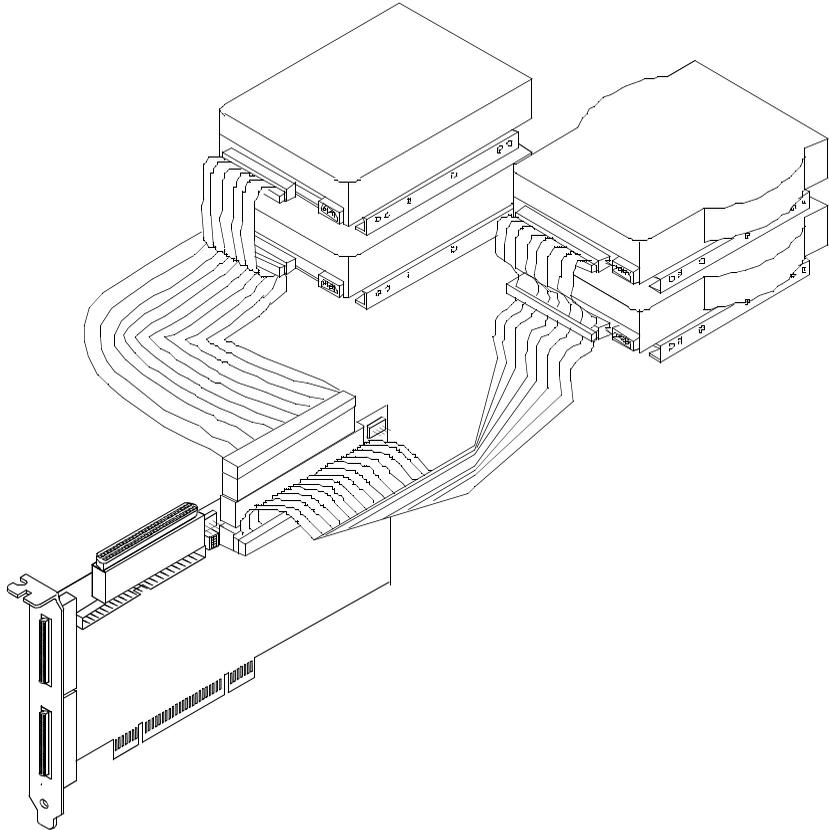


Figure 2.8 Multiple Internal SCSI Devices Chained Together



Step 5. It is also possible to use both internal connectors on a channel if you do not attach any external devices to that channel. An example of this configuration is shown in Figure 2.9.

Figure 2.9 Using Both Internal Connectors on a Channel

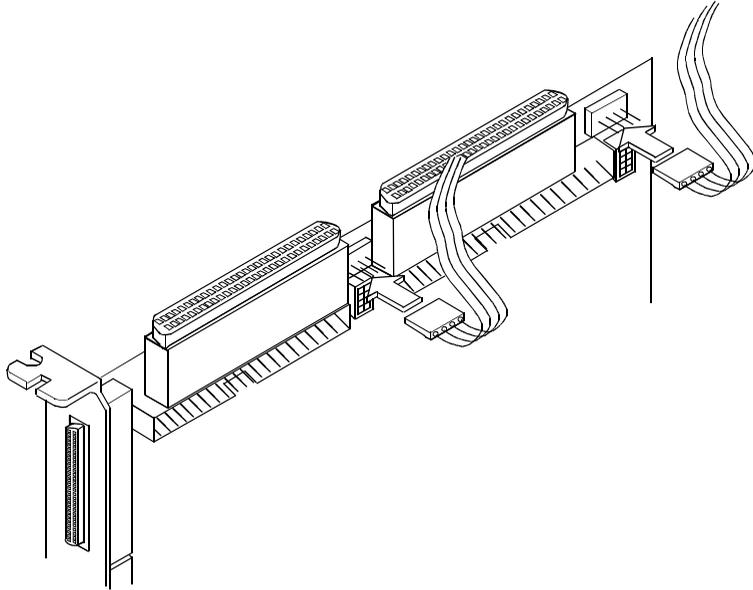


Note: When two connectors are already used on a channel, the third connector cannot be used.

Step 6. Most PC cabinets are designed with a front panel LED (sometimes already connected to an existing IDE drive). You may connect this LED cable to the host adapter, as shown in Figure 2.10. This causes the front panel LED to indicate activity on the SCSI bus.

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

Figure 2.10 SCSI LED Connectors



Some LED cables have only two wires. In this case, place the connector on one end or the other of J5 or J9. If the LED does not light during SCSI bus activity from this host adapter, you may have to rotate the LED cable 180° on J5 or J9. See Table A.5 for pin descriptions.

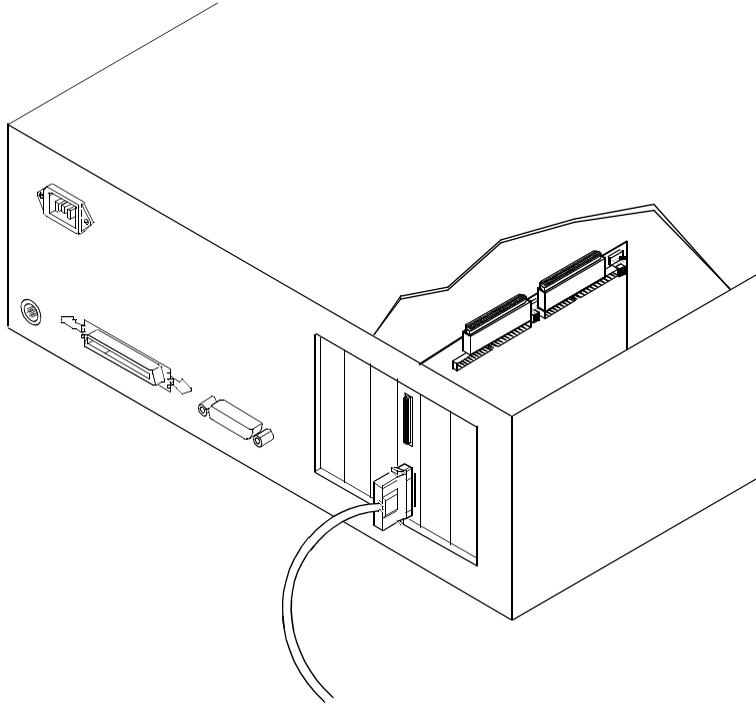
2.2.5 Making External SCSI Bus Connections

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

- Step 1. To connect external SCSI devices to the SYM22801 host adapter, plug the 68-pin connector on one end of a shielded external SCSI VHDCI cable (see Figure 2.3) into the host adapter connector J3 or J7 (see Figure 2.1).

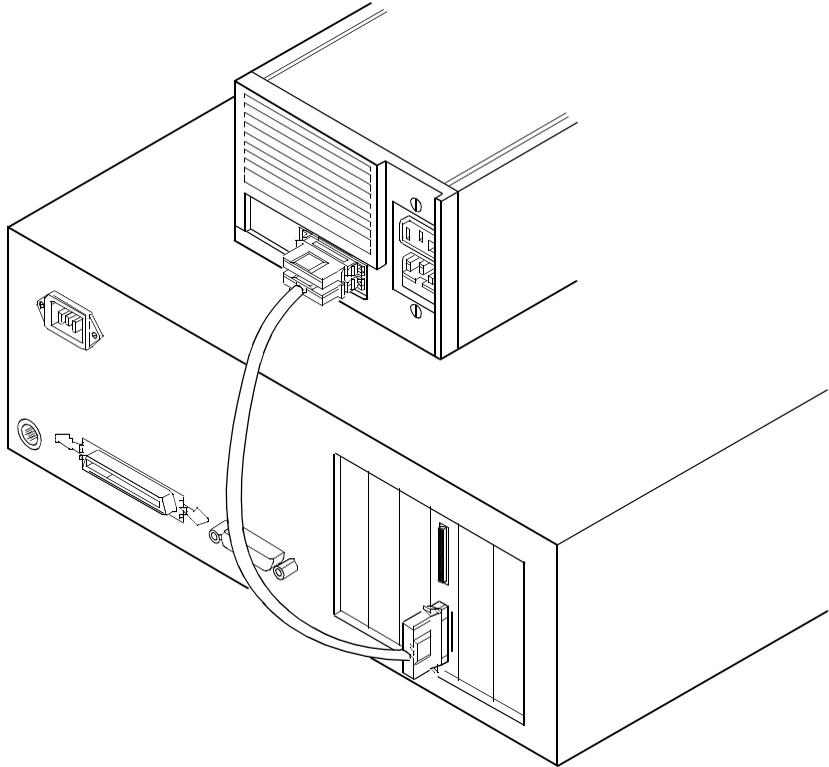
This connector is now bracketed to the back panel of your computer. Figure 2.11 shows how this connection is made.

Figure 2.11 External Cable to Host Adapter



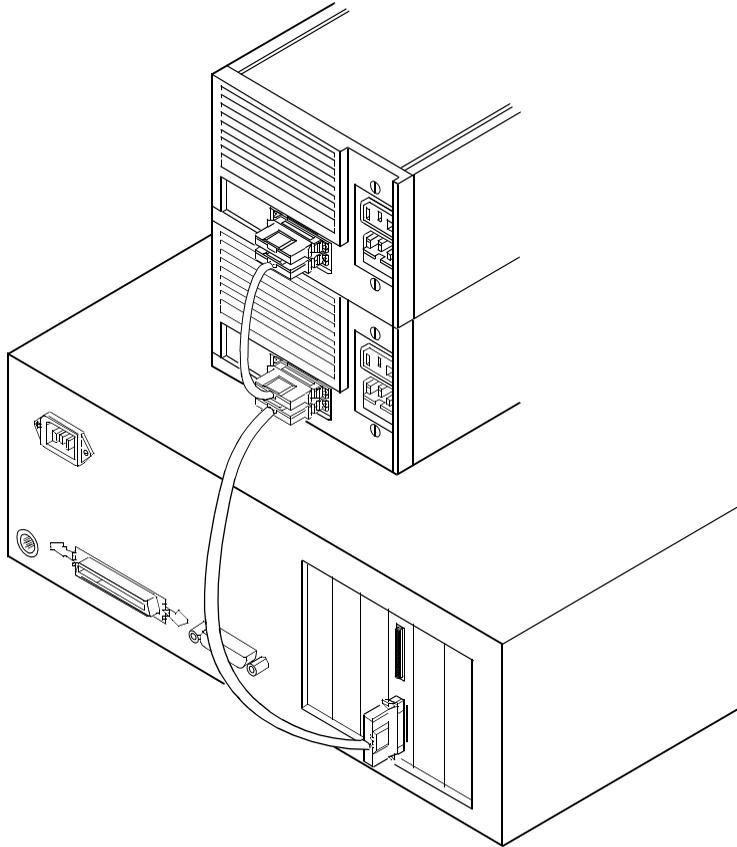
Step 2. Plug the 68-pin connector on the other end of the shielded external SCSI cable into the SCSI connector on your external SCSI device. An example of this connection is shown in Figure 2.12.

Figure 2.12 External Cable to External SCSI Device



Step 3. To connect more than one external SCSI device to the host adapter, you must chain them together with shielded external SCSI cables. An example of these chained connections is shown in Figure 2.13.

Figure 2.13 Multiple External SCSI Devices Chained Together



2.3 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 a set of resistors called terminators. All other SCSI devices on the bus must have their terminators removed or disabled.

Remember: The SYM22801 host adapter is also on the SCSI bus; its termination is automatically enabled when it is connected to the end of the bus.

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 setting of each device and how to change it.

Caution: The auto-enable/disable sensing feature on the SYM22801 may enable termination erroneously if it is directly cabled to another SCSI device or host adapter using the same sensing method. This is dealt with by properly setting the termination override switches U1 or U2 (see Figure 2.1) as explained in this section under making an internal connection with another SYM22801.

The SYM22801 senses SCSI devices by detecting the ground signal on pin-22 of a 50-conductor internal SCSI ribbon cable, or pin-50 of an internal or external 68-conductor SCSI cable. If you use an adapter to connect 8-bit devices externally with a 50-conductor SCSI cable, the ground signal is detected on pin-34.

The SYM22801 automatically covers SCSI bus termination for five different bus configurations, depending on the use of the connectors on the SYM22801 host adapter (see Figure 2.1). The five bus configurations are:

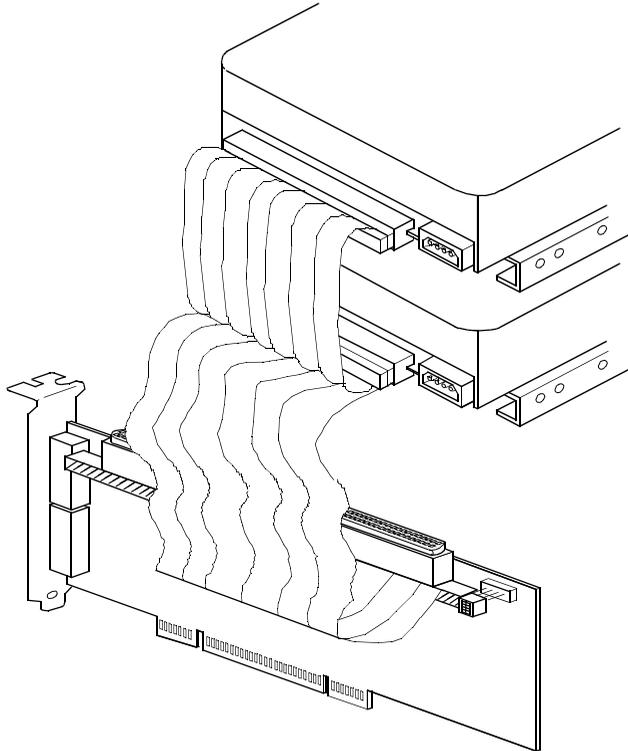
- Only for internal SCSI connections,
- Only for external SCSI connections,
- For both internal and external SCSI connections,
- For connections to both internal connectors, and
- For an internal connection to another SYM22801, or any connection to a device using the same sensing method for automatic termination as your SYM22801.

2.3.1 Internal SCSI Connections

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

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

Figure 2.14 Internal SCSI Device Termination

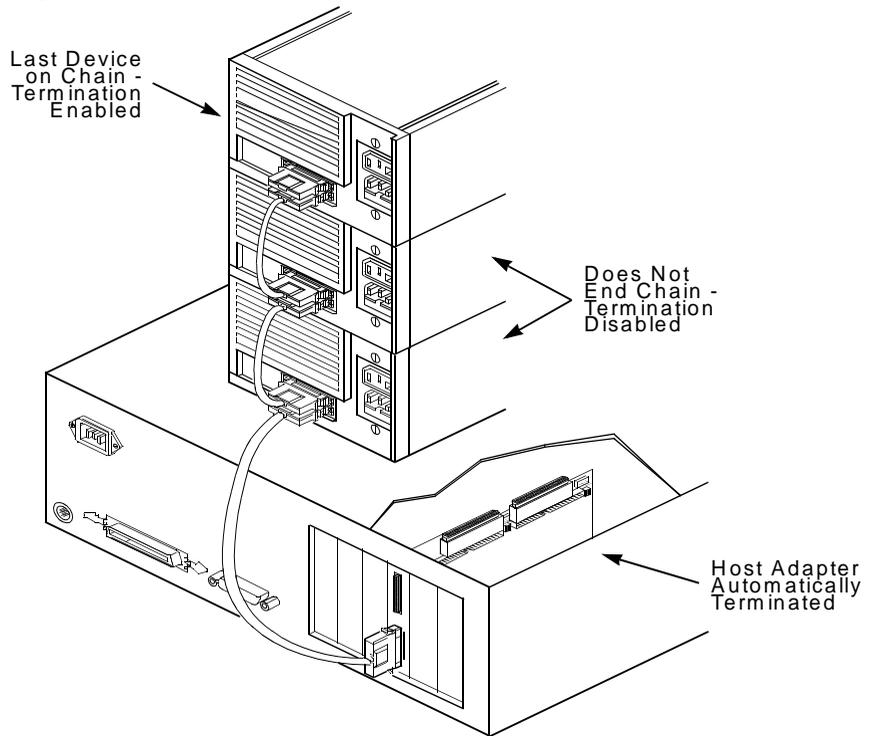


2.3.2 External SCSI Connections

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

Figure 2.15 shows an example of how termination is determined for this SCSI bus configuration.

Figure 2.15 External SCSI Device Termination

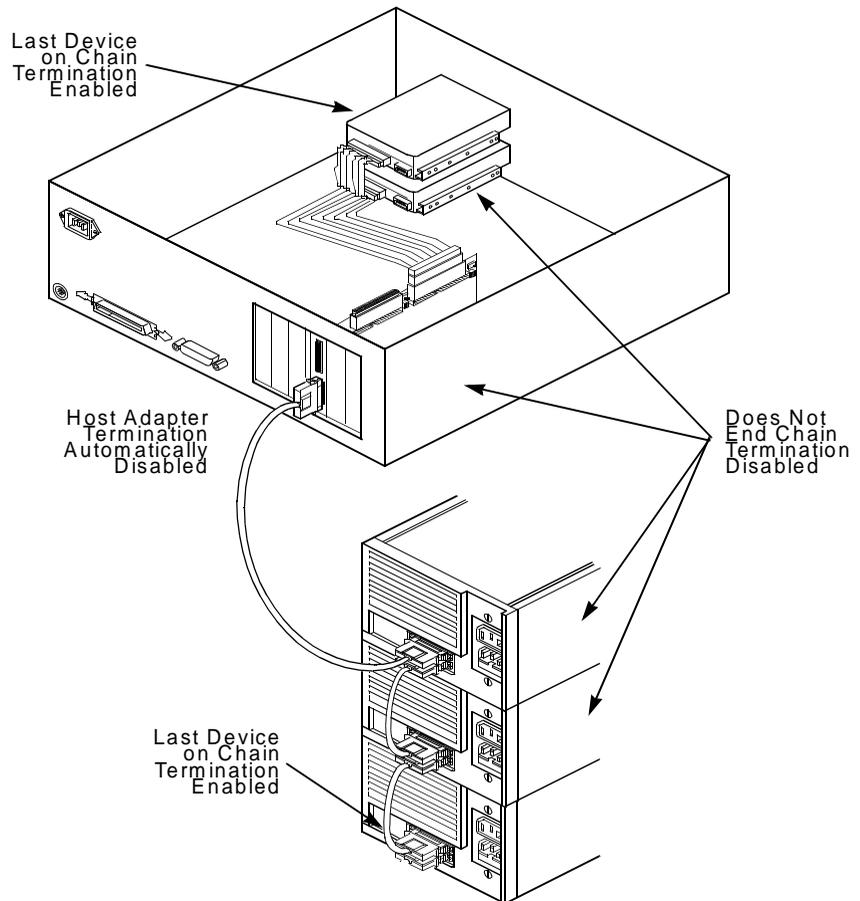


2.3.3 Internal and External SCSI Connections

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

Figure 2.16 shows an example of how termination is determined for this SCSI bus configuration.

Figure 2.16 Internal and External SCSI Device Termination



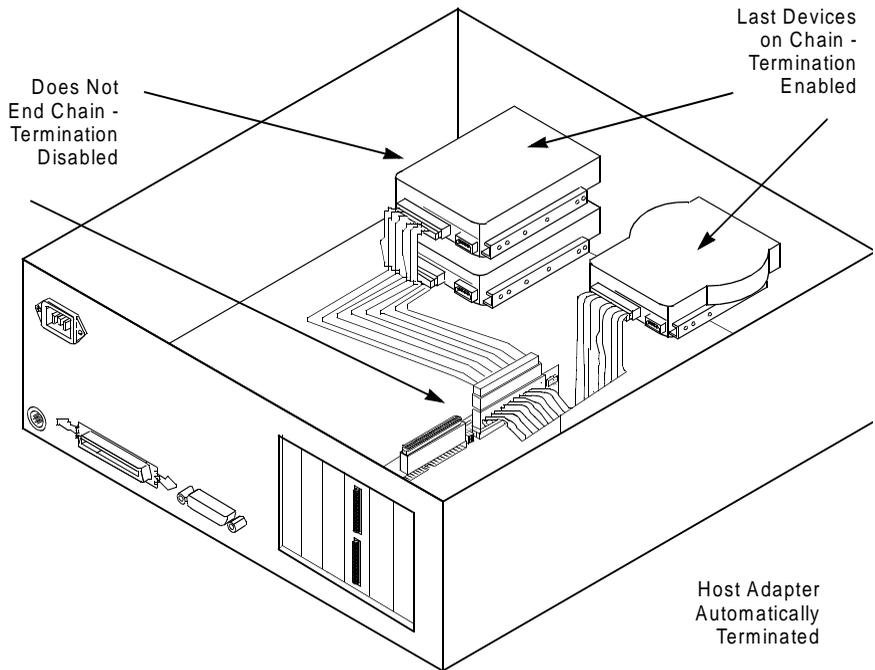
2.3.4 Internal SCSI Connections for Both Internal Connectors

If you have internal SCSI device connections to both internal connectors of a channel, you must terminate the internal devices on each end of the SCSI bus. You must disable the termination on all other devices. Termination on the host adapter is automatically disabled in this case.

Caution: Remember, you must not use the external connector for a channel if you use both internal connectors for that channel.

Figure 2.17 shows an example of how termination is determined for this SCSI bus configuration. If you connect the SYM22801 in the middle of the bus, you will incur improper termination since the switches are not assigned on that bus correctly.

Figure 2.17 Internal and Internal SCSI Device Termination



If you have an internal connection to another SYM22801 host adapter, or any connection to a device that uses the same sensing method for automatic termination as your SYM22801, you must properly set the termination override switches U1 or U2 (see Figure 2.1).

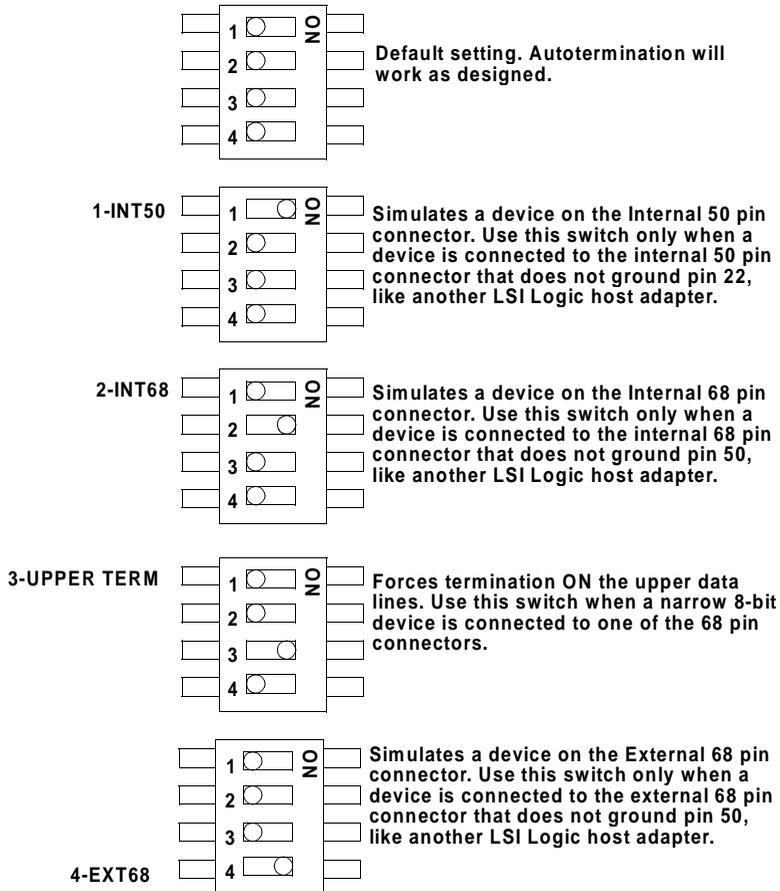
2.3.4.1 Channel Switches

When connecting another SYM22801, you must turn on the switch for the connector used on one or both of the boards. Please refer to Figure 2.18, and the next two paragraphs, to determine the correct switch setting.

Four switches for each channel provide cable detection simulation and forced upper line termination. Switch one simulates a device on the internal 50-pin connector, switch two simulates a device on the internal 68-pin connector, switch three forces the upper SCSI line terminator to stay on, and switch four simulates a device on the external 68-pin connector.

When SYM22801 is in the middle of a bus using only one connector, then switch Int68 and Ext68 (switches 2 and 4) for that bus are on. This forces the terminators for that bus to be disabled.

Figure 2.18 Termination Override Switch Settings for U1 and U2



2.3.5 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. Chapter 3, Configuring the Host Adapter, explains how to set the host adapter ID using the Symbios SCSI 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. You must have no duplication of SCSI IDs on a SCSI bus.

- Step 1. Determine the SCSI ID of each device on the SCSI bus. Note any duplications and if 8-bit SCSI devices are to be used, the host adapter ID must not be set above 7.
- Step 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 2.1 SCSI ID Record

SCSI ID	SCSI Device
15	
14	
13	
12	
11	
10	
9	
8	
7	SYM22801 Host Adapter (default)
6	
5	
4	
3	
2	
1	
0	

2.4 Setting Interrupts

You should not normally have to change the default interrupt routing for the SYM22801, since performance is usually increased by having two separate interrupts. However, if your system does not support two separate interrupts, jumper TP9 (see Figure A.1) is provided to change the interrupt routing. The following table explains the jumper settings:

Table 2.2 Setting Interrupts

Jumper Setting	Condition
Jumper Out (default)	INTB/ is routed to INTB/ on the PCI bus
Jumper In	INTB/ is rerouted at power up to INTA/ on the PCI bus

2.5 Completing Your Installation

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

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

- Step 1. Replace the cabinet cover on your computer.
- Step 2. Plug in all power cords, and switch on power to all devices and your computer.
- Step 3. Wait for your computer to boot up.
- Step 4. To change the configuration of your host adapter, see Chapter 3, Configuring the Host Adapter.
- Step 5. Finally, refer to the *PCI SCSI Device Management System SDMS 4.0 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 the Host Adapter

This chapter discusses how to change configuration settings and includes these topics:

- Section 3.1, “When to Configure the SYM22801 Host Adapter,” page 3-1
- Section 3.2, “Starting the SCSI BIOS Configuration Utility,” page 3-2
- Section 3.3, “Exiting the SCSI BIOS Configuration Utility,” page 3-13

3.1 When to Configure the SYM22801 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 affect your host adapter and all SCSI devices which are connected to it. The device settings affect only individual SCSI devices.

Table 3.1 Global Default Settings

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

1. Applies to BIOS version 4.09 and later.

Table 3.2 Device Default Settings

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

3.2 Starting the SCSI BIOS Configuration Utility

If you have SCSI BIOS version 4.xx, 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.

The version number of the SCSI BIOS appears 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.

NVRAM (Non Volatile Random Access Memory) is available on the SYM22801 host adapter. Changes can be made and stored to NVRAM using this menu driven utility.

Important: This SCSI BIOS Configuration 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. The device manufacturer provides the device drivers.

3.2.1 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. The SYM22801 host adapter appears on the menu as two SYM53C875 entries; one for each channel. To select an adapter, use only the arrow keys and enter key. Then, you can view and/or change the current settings for that adapter and the SCSI devices attached to it.

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

Here is an example of the Main Menu:

```
Main Menu

          Port   Irq-----Status-----NVRAM
          Num   Level  Current   Next-Boot  Found
SYM53C875  FC00   9      On       On         Yes
SYM53C875  F800   9      On       Off        Yes
SYM53C895  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 will reboot after the Quit option is selected, which allows the user to exit from the Configuration Utility.

3.2.1.1 Change Adapter Status

The change adapter status allows the user to activate or deactivate a host adapter and all SCSI devices attached to it. When this option is used to make a change, the change takes place after a reboot upon exit from the utility. Here is an example of the Change Status on Next Boot Menu:

```

Main Menu

Change Status on Next Boot:

          Port   Irq-----Status-----NVRAM
          Num   Level  Current  Next-Boot  Found
SYM53C875  FC00   9      On        On         Yes
SYM53C875  F800   9      On        Off        Yes
SYM53C895  F801   9      On        Off        Yes
  
```

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

3.2.1.2 Adapter Boot Order

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

```

Main Menu

BootSeq      Bus  DevFunc  BootSeq      Bus  DevFunc
0  SYM53C875  00  A0        1      SYM53C875  00  98
2  SYM53C895  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 four adapters can be assigned a boot order starting with boot sequence number zero (0). If an invalid number is entered, an error message appears. When the adapters are ordered as desired, press the Escape (Esc) key to exit from this menu.

3.2.1.3 Additional Adapter Configuration

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

Main Menu							
BootSeq	Bus	DevFunc	BootSeq	Bus	DevFunc	BootSeq	DevFunc
1	SYM53C875	00	A0	0	SYM53C875	00	98
	SYM53C895						

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

3.2.1.4 Display Mode

The Display Mode option 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.

3.2.1.5 Mono/Color

The Mono/Color option allows a choice between a monochrome or color display for the SCSI BIOS Configuration Utility. You might need to choose the mono/color setting to get a more readable screen on a monochrome monitor.

3.2.1.6 Language

If enabled, the Language option allows you to select from five languages for the configuration utility: English, German, French, Italian, and Spanish.

3.2.1.7 Help

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

3.2.1.8 Quit

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

3.2.1.9 Esc

The Esc option allows exiting from all the screens except the Main Menu.

3.2.2 Utilities Menu

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

```
SYM53C875
          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.

3.2.2.1 Adapter Setup Menu

When you select Adapter Setup, the corresponding menu appears. Here is an example of the Adapter Setup Menu:

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

SCAM Support – The Symbios BIOS version 4.xx and above supports the SCSI Plug and Play protocol called SCAM (SCSI Configured AutoMatically). SCAM support by default is off in adapter BIOS versions 4.09 and later for the SYM53C876 device. The user may choose to turn this on only if the system drivers do not require SCAM off. 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 these 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.

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

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

Note: In general, it is suggested that the user not change the host adapter ID from the default value of 7, as this gives it the highest priority on the SCSI bus. Please also note that if you have 8-bit SCSI devices (narrow), they cannot see host IDs greater than 7.

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

See the *PCI SCSI Device Management System SDMS 4.0 User’s Guide*, Chapter 2, “SCSI BIOS” for additional information regarding BBS.

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

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

- None
- Boot Drive Only
- With Media Installed

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

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

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

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

CHS Mapping – This option defines the cylinder head sector (CHS) values that will be mapped onto a disk without pre-existing partition 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”.

Note: Neither of these options will have any effect 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 “Device Selections Menu” section below for further details regarding this option.
- 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 that you target the correct disk when using either the Format utility or the FDISK /MBR command.

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 (seconds) – This option allows the user to stagger spin ups 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 spin ups to limit start-up current.

3.2.3 Device Selections Menu

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

```
Device Selections 0-7
          Sync Data  Disc  Time      Scan      Queue  Initial
          Rate Width      Out  Bus  LUNS  Tags  Boot
0-Dev0 N/A  40   16   On   10   Yes  Yes  On   No
1-Dev1 N/A  40   16   On   10   Yes  Yes  On   No
2-Dev2 N/A  40   16   On   10   Yes  Yes  On   No
3-Dev3 N/A  40   16   On   10   Yes  Yes  On   No
4-Dev4 N/A  40   16   On   10   Yes  Yes  On   No
5-Dev5 N/A  40   16   On   10   Yes  Yes  On   No
6-Dev6 N/A  40   16   On   10   Yes  Yes  On   No
SYM53C875  40   16   On   10   Yes  Yes  On   No
Device Selections 8-15
Help
Exit this menu
```

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

```
SYM53C875

    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
```

Please review the descriptions of each option below before changing any values.

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

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

Disconnect – SCSI devices have the ability to disconnect from the initiator during an I/O transfer. This disconnect option frees the SCSI Bus to allow other I/O processes. 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 (seconds) – This option sets the amount of time the host adapter waits for a read, write, or seek command to complete before trying the I/O transfer again. Since this provides a safeguard allowing the system to recover if an I/O operation fails, it is recommended that you always set the time-out to a value greater than zero.

Note: A zero value allows unlimited time for an operation to complete and could result in the system being hung-up.

Scan for Device at Boot Time – 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, you can speed up boot time by changing this setting to “No” for all unused SCSI IDs.

Scan for SCSI Logical Units (LUNs) – Set this option to “No” if problems arise with a device that responds to all LUNs whether they are occupied or not. For example, if a SCSI device with multiple LUNs is present 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 only.

Queue Tags – If the device driver has the capability, this option allows the user to enable or disable the issuing of queue tags during I/O requests.

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 with some of the flexibility of a BBS machine.

Format Device – If enabled, this option allows the user to low-level format a magnetic disk drive. Low-level formatting will completely and irreversibly erase all data on the drive. Formatting will default the drive to a 512-byte sector size even if the drive had previously been formatted to another sector size.

Verify – This option allows the user 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 Device Selections Menu.

Restore Default Setup – This option resets all device selections back to their default 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 the user to leave the Device Selections Menu and return to the previous screen.

3.3 Exiting the SCSI BIOS Configuration Utility

Since some changes only take effect after the system reboots, it is important that the user exit from this SCSI BIOS Configuration Utility properly. Return to the Main Menu and exit via the Quit option. Rebooting the system without properly exiting from this utility may cause some changes to not take effect.

Appendix A

Technical Specifications

This section discusses the physical environment associated with the SYM22801 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 1-1
 - Section A.2, “Electrical Characteristics,” page 1-2
 - Section A.3, “Operational Environment,” page 1-3
-

A.1 Physical Environment

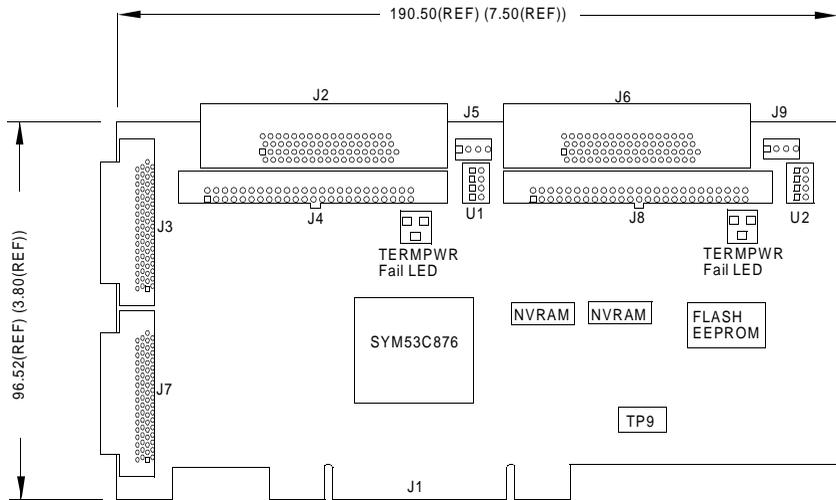
This section discusses the physical, electrical, thermal, and safety characteristics of the SYM22801 Host Adapter board. Additionally, this board is compliant with electromagnetic standards set by the FCC.

A.1.1 Physical Characteristics

The dimensions of the SYM22801 host adapter board are 7.50” x 3.80”. PCI connection is made through the edge connector J1. Internal 16-bit SCSI connection is made through the 68-pin high density connectors J2 or J6. Internal 8-bit SCSI connection is made through the 50-pin low density connectors J4 or J8. External SCSI connection is made through the 68-pin VHDCI connectors J3 or J7. The J3 and J7 connectors extend through the ISA/EISA bracket, which is attached to the face of the connector outside the cabinet where the SYM22801 is installed.

The bracket is a standard ISA type with a cutout to accommodate the connectors. The J5 and J9 connectors are for connecting the computer’s Busy LED. It is a 4-pin one row right angle header wired in parallel with the on-board LED. The component height on the top and bottom of the board follows the PCI specification.

Figure A.1 SYM22801 Mechanical Drawing



A.2 Electrical Characteristics

The SYM22801 maximum power requirements, including SCSI TERMPWR, under normal operation are as follows:

+ 5 V DC	±5%	1.5 A	Over the operating range 0–55 °C
+ 12 V	±0.6 V	50 mA	Over the operating range 0–55 °C
+ 3.3 V	±0.3 V	130 mA	Over the operating range 0–55 °C when operating in a 3.3 V PCI slot

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

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

A.2.1 Thermal, Atmospheric Characteristics

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

- Temperature range: 0–55 °C (dry bulb)
- Relative humidity range: 0–90% (noncondensing)
- Maximum dew point temperature: 32 °C

A.2.2 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 and CISPR Class B limits and is marked with the FCC Self Certification logo. It also carries the CE mark.

A.2.3 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.3 Operational Environment

The SYM22801 is designed for use in PCI computer systems with an ISA/EISA bracket type. The Symbios SDMS™ (SCSI Device Management System) software operates the board, but the design of the board does not prevent the use of other software.

A.3.1 The PCI Interface

The PCI interface operates as a 32-bit DMA bus master. The connection is made through the 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 + 3.3 V pins are tied together and decoupled with high frequency bypass capacitors to ground. No current from these 3.3 V pins is used on the board. The PCI portion of the SYM53C876 chip is powered from the 3 V/5 V pins.

Table A.1 PCI Connector J1 (Front)¹

Signal Name	Pin	Signal Name	Pin	Signal Name	Pin
-12 V	1	GND	22	+3.3 V	43
TCK	2	AD27	23	C_BE1/	44
GND	3	AD25	24	AD14	45
TDO	4	+3.3 V	25	GND	46
+5 V	5	C_BE3/	26	AD12	47
+5 V	6	AD23	27	AD10	48
INTB/	7	GND	28	GND	49
INTD/	8	AD21	29	KEYWAY	50
GND (PRSNT1/)	9	AD19	30	KEYWAY	51
RESERVED	10	+3.3 V	31	AD08	52
GND (PRSNT2/)	11	AD17	32	AD07	53
KEYWAY	12	C_BE2/	33	+3.3 V	54
KEYWAY	13	GND	34	AD05	55
RESERVED	14	IRDY/	35	AD03	56
GND	15	+3.3 V	36	GND	57
CLK	16	DEVSEL/	37	AD01	58
GND	17	GND	38	3 V/5 V	59
REQ/	18	LOCK/	39	ACK64/	60
3 V/5 V	19	PERR/	40	+5 V	61
AD31	20	+3.3 V	41	+5 V	62
AD29	21	SERR/	42		

1. Shaded signals are not connected.

Table A.2 PCI Connector J1 (Back)¹

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

1. Shaded signals are not connected.

A.3.2 The SCSI Interface

The SCSI interface operates as 8-bit or 16-bit, synchronous or asynchronous, single-ended bus, and supports SCSI-2 protocols and 16-bit arbitration. The interface is made through connectors J2, J3 and J4 for channel A. Channel B connectors are J6, J7, and J8. Connectors J2 and J6 are 68-pin high density right angle receptacles for internal connections. Connectors J3 and J7 are 68-pin VHDCI right angle receptacles that protrude through the back panel bracket. Connectors J4 and J8 are 50-pin low density vertical shrouded headers used for internal SCSI connections.

Note: Up to two (and only two) connections are allowed on each channel. Connecting to all three connectors on a channel will result in an unreliable configuration.

Active single-ended SCSI termination is provided automatically. SCSI termination power is also supplied by the board. The following tables show the signal assignments for J2/J6, J3/J7, and J4/J8.

Table A.3 SCSI Connectors J2/J6 and J3/J7

Signal Name	Pin	Signal Name	Pin	Signal Name	Pin
GND	1	GND	24	SD7/	47
GND	2	GND	25	SDP/	48
GND	3	GND	26	GND	49
GND	4	GND	27	CPRSNT_A-B/ ¹	50
GND	5	GND	28	TERMPWR	51
GND	6	GND	29	TERMPWR	52
GND	7	GND	30	N/C	53
GND	8	GND	31	GND	54
GND	9	GND	32	SATN/	55
GND	10	GND	33	GND	56
GND	11	GND (J2/J6) GND/16CBLSNS (J3/J7)	34	SBSY/	57
GND	12	SD12/	35	SACK/	58
GND	13	SD13/	36	SRST/	59
GND	14	SD14/	37	SMSG/	60
GND	15	SD15/	38	SSEL/	61
GND	16	SDP1/	39	SC_D/	62
TERMPWR	17	SD0/	40	SREQ/	63
TERMPWR	18	SD1/	41	SI_O/	64
N/C	19	SD2/	42	SD8/	65
GND	20	SD3/	43	SD9/	66
GND	21	SD4/	44	SD10/	67
GND	22	SD5/	45	SD11/	68
GND	23	SD6/	46		

1. CPRSNT_A/ (J2/J6) and CPRSNT_B/ (J3/J7) are used to sense the connection of a standard SCSI device by sensing SCSI standard GND on this pin.

Table A.4 SCSI Connectors J4/J8

Signal Name	Pin	Signal Name	Pin
GND	1	SD0/	2
GND	3	SD1/	4
GND	5	SD2/	6
GND	7	SD3/	8
GND	9	SD4/	10
GND	11	SD5/	12
GND	13	SD6/	14
GND	15	SD7/	16
GND	17	SDP/	18
GND	19	GND	20
GND	21	CPRSNT_C/ ¹	22
N/C	23	N/C	24
N/C	25	TERMPWR	26
N/C	27	N/C	28
GND	29	GND	30
GND	31	SATN/	32
GND	33	GND	34
GND	35	SBSY/	36
GND	37	SACK/	38
GND	39	SRST/	40
GND	41	SMSG/	42
GND	43	SSEL/	44
GND	45	SC_D/	46
GND	47	SREQ/	48
GND	49	SI_O/	50

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

A.3.3 The LED Interface

The LED interface on the SYM22801 is a four-wire arrangement that allows the user to connect an LED harness to the board. The GPIO0_FETCH line (maximum output low voltage 0.4 V and minimum output low current 16 mA) is pulled low to complete the circuit when a harness with an LED is attached. The connectors on the SYM22801 are J5 and J9.

Table A.5 LED Connectors J5/J9

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

Appendix B

Glossary of Terms and Abbreviations

Address	A specific location in memory, designated either numerically or by a symbolic name.
Asynchronous Data Transfer	A method of transmission which does not require a common clock, but separates fields of data by stop and start bits. It is slower than synchronous data transfer.
BIOS	Basic Input/Output System. Software that provides basic read/write capability. Usually kept as firmware (ROM based). The system BIOS on the mainboard of a computer is used to boot and control the system. The SCSI BIOS on 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 bothering the computer's microprocessor. This is the fastest way for multitasking operating systems to transfer data.
Byte	A unit of information consisting of eight bits.
Chain	A topology in which every processor is connected to two others, except for two end processors that are connected to only one other.
CISPR	A special international committee on radio interference (Committee, International and Special, for Protection in Radio).

Configuration	Refers to the way a computer is set up; the combined hardware components (computer, monitor, keyboard, and peripheral devices) that make up a computer system; or the software settings that allow the hardware components to communicate with each other.
CPU	Central Processing Unit. The “brain” of the computer that performs the actual computations. The term Micro Processor Unit (MPU) is also used.
DMA	Direct Memory Access. A method of moving data from a storage device directly to RAM, without using the CPU’s resources.
DMA Bus Master	A feature that allows a peripheral to control the flow of data to and from system memory by blocks, as opposed to PIO (Programmed I/O) where the processor is in control and the flow is by byte.
Device Driver	A program that allows a microprocessor (through the operating system) to direct the operation of a peripheral device.
Differential	A hardware configuration for connecting SCSI devices. It uses a pair of lines for each signal transfer (as opposed to single-ended SCSI which references each SCSI signal to a common ground).
Dword	A double word is a group of 4 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	Electrically-Erasable Programmable Read Only Memory. A memory chip typically used to store configuration information. See NVRAM.
EISA	Extended Industry Standard Architecture. An extension of the 16-bit ISA bus standard. It allows devices to perform 32-bit data transfers.
External SCSI Device	A SCSI device installed outside the computer cabinet. These devices are connected in a continuous chain using specific types of shielded cables.
Fast SCSI	A standard for SCSI data transfers. It allows a transfer rate of up to 10 Mbytes/s over an 8-bit SCSI bus and up to 20 Mbytes/s over a 16-bit SCSI bus.
FCC	Federal Communications Commission.
File	A named collection of information stored on a disk.

Firmware	Software that is permanently stored in ROM. Therefore, it can be accessed during boot time.
Hard Disk	A disk made of metal and permanently sealed into a drive cartridge. A hard disk can store very large amounts of information.
Host	The computer system in which a SCSI host adapter is installed. It uses the SCSI host adapter to transfer information to and from devices attached to the SCSI bus.
Host Adapter	A circuit board or integrated circuit that provides a SCSI bus connection to the computer system.
Internal SCSI Device	A SCSI device installed inside the computer cabinet. These devices are connected in a continuous chain using an unshielded ribbon cable.
IRQ	Interrupt Request Channel. A path through which a device can get the immediate attention of the computer's CPU. The PCI bus assigns an IRQ path for each SCSI host adapter.
ISA	Industry Standard Architecture. A type of computer bus used in most PC's. 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 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.
Mbyte	Megabyte. A measure of computer storage equal to 1024 kilobytes.
Mainboard	A large circuit board that holds RAM, ROM, the microprocessor, custom integrated circuits, and other components that make a computer work. It also has expansion slots for host adapters and other expansion boards.
Main Memory	The part of a computer's memory which is directly accessible by the CPU (usually synonymous with RAM).

Motherboard	See Mainboard. In some countries, the term Motherboard is not appropriate.
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.
NVRAM	Non Volatile Random Access Memory. Actually an EEPROM (Electrically-Erasable Programmable Read Only Memory chip) used to store configuration information. See EEPROM.
Operating System	A program that organizes the internal activities of the computer and its peripheral devices. An operating system performs basic tasks such as moving data to and from devices, and managing information in memory. It also provides the user interface.
Parity Checking	A way to verify the accuracy of data transmitted over the SCSI bus. One bit in the transfer is used to make the sum of all the 1 bits either odd or even (for odd or even parity). If the sum is not correct, an error message appears.
PCI	Peripheral Component Interconnect. A local bus specification that allows connection of peripherals directly to computer memory. It bypasses the slower ISA and EISA 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 are sometimes not.
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.

Queue Tags	A way to keep track of multiple commands that allows for increased throughput on the SCSI bus.
RAM	Random Access Memory. The computer's primary working memory in which program instructions and data are stored and are accessible to the CPU. Information can be written to and read from RAM. The contents of RAM are lost when the computer is turned off.
RISC Core	LSI Logic SCSI chips contain a RISC (Reduced Instruction Set Computer) processor, programmed through microcode scripts.
ROM	Read Only Memory. Memory from which information can be read but not changed. The contents of ROM are not erased when the computer is turned off.
SCAM	SCSI Configured AutoMatically. A method to automatically allocate SCSI IDs via software when SCAM compliant SCSI devices are attached.
Scatter/Gather	A device driver feature that lets the host adapter modify a transfer data pointer so that a single host adapter transfer can access many segments of memory. This minimizes interrupts and transfer overhead.
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 the original SCSI-1 standard.
SCSI-3	The next SCSI specification, which adds features to the SCSI-2 standard. Although this version is still in development, parts of the SCSI-3 standard are already in use.
SCSI Bus	A host adapter and one or more SCSI peripherals connected by cables in a linear chain configuration. The host adapter may exist anywhere on the chain, allowing connection of both internal and external SCSI devices. A system may have more than one SCSI bus by using multiple host adapters.
SCSI Device	Any device that conforms to the SCSI standard and is attached to the SCSI bus by a SCSI cable. This includes SCSI host adapters and SCSI peripherals.

SCSI ID	A way to uniquely identify each SCSI device on the SCSI bus. Each SCSI bus has eight available SCSI IDs numbered 0 through 7 (or 0 through 15 for Wide SCSI). The host adapter usually gets ID 7 giving it priority to control the bus.
SDMS	SCSI Device Management System. A LSI Logic software product that manages SCSI system I/O.
STA	SCSI Trade Association. A group of companies that cooperate to promote SCSI parallel interface technology as a viable mainstream I/O interconnect for commercial computing.
Single-Ended SCSI	A hardware specification for connecting SCSI devices. It references each SCSI signal to a common ground. This is the most common method (as opposed to differential SCSI which uses a separate ground for each signal).
Synchronous Data Transfer	One of the ways data is transferred over the SCSI bus. Transfers are clocked with fixed-frequency pulses. This is faster than asynchronous data transfer. Synchronous data transfers are negotiated between the SCSI host adapter and each SCSI device.
System BIOS	Controls the low level POST (Power On Self Test), and basic operation of the CPU and computer system.
Termination	The electrical connection required at each end of the SCSI bus, composed of a set of resistors. It improves the integrity of bus signals.
Ultra SCSI	A standard for SCSI data transfers. It allows a transfer rate of up to 20 Mbytes/s over an 8-bit SCSI bus and up to 40 Mbytes/s over a 16-bit SCSI bus. STA (SCSI Trade Association) supports using the term "Ultra SCSI" over the term "Fast-20".
VCCI	Voluntary Control Council for Interference.
Virtual Memory	Space on a hard disk that can be used as if it were RAM.
VHDCI	Very High Density Cable Interconnect. A trapezoidal shielded connector that has a 0.8 mm pitch.
Wide SCSI	A SCSI-2 feature allowing 16 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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