SYM8751D
PCI to Ultra SCSI
Host Adapter

User's Guide
Version 1.0

J10971I

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1 This device may not cause harmful interference, and

2 This device must accept any interference received, including interference that may cause undesired operation.

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- Consult the dealer or an experienced radio/TV technician for help.

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Revision Record

Page No.	Date	Remarks
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Chapter 1

Introduction

Features

PCI Interface

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

SCSI Interface

- 16-bit differential
- External plug-in termination supplied with board
- Dual connector: 68-pin high density external, 68-pin high density internal
- Fast and Ultra SCSI data transfer capability
- SCSI TERMPWR source with auto-resetting circuit breaker
- Serial NVRAM (Non-Volatile RAM) for user configuration utility and SCAM (SCSI Configured AutoMatically) information storage
- Flash BIOS
- SCSI activity LED connector

Board Characteristics

- PCI board dimensions, **127 x 82.55 mm** (5.00 x 3.25 inches)
- Universal 32-bit card edge connector

Description

Your Symbios Logic SYM8751D 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.

Your SYM8751D board is a 16-bit, differential, Ultra SCSI solution. This board is completely backwards compatible with the existing SYM8251D host adapter.

The Symbios Logic SCSI Device Management System (SDMS) software is used to operate 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 32K Flash BIOS.

This guide, along with the *Symbios Logic SDMS User's Guide*, contain product information and installation instructions to help you gain the full benefits of your SYM8751D PCI to Ultra 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. The PCI functionality for your SYM8751D is contained within the Symbios Logic SYM53C875J PCI-SCSI I/O Processor chip. The SYM53C875J 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. Your SYM8751D 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 SYM8751D is contained within the Symbios Logic SYM53C875 PCI-Ultra SCSI I/O Processor chip. The SYM53C875 connects directly to the SCSI bus and generates timing and protocol in compliance with the SCSI standard.

The SCSI interface on your SYM8751D operates as 16-bit, synchronous or asynchronous, differential, and supports Ultra SCSI protocols and 16-bit arbitration. The interface is made through connectors J2 and J3 (see Figure 2-1). Connector J2 is a 68-pin high density right-angle receptacle. Connector J3 is a shielded 68-pin high density right-angle receptacle that protrudes through the back panel bracket.

Differential SCSI termination is provided for your SYM8751D board as a pluggable terminator. This terminator plugs into either the internal or external 68-pin high density connector (J2 or J3). Your SYM8751D supplies SCSI bus TERMPWR through a blocking diode and a self re-setting 1.5 A short circuit protection device.

A 80 MHz oscillator is installed on the SYM8751D to provide the clock frequency to the SYM53C875 that is necessary to support Wide Ultra SCSI transfers of up to 40 MB/sec.

Ultra SCSI

Your SYM8751D has full support for Ultra SCSI. Ultra SCSI (also known as Fast-20 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 your SCSI bus when setting up your system. See the section on connecting your SCSI peripherals in Chapter 2 for a more detailed explanation of SCSI bus connections.

Chapter 2

Installing Your SYM8751D 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 more detailed guidance in installing your SYM8751D 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* that was 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 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.

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 SYM8751D requires a PCI slot which allows bus master operation.

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

5 Remove your SYM8751D PCI to Ultra SCSI host adapter board from the packing and check that it is not damaged.

6 Carefully insert the 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.

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.

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

8 If you are connecting any internal SCSI devices, remove the differential terminator and plug a 68-pin connector on the end of the internal SCSI ribbon cable into the connector J2 (see Figure 2-1). Make certain to match pin one on both connectors.

Note: Save the differential terminator. If your host adapter is ever positioned at the end of the SCSI bus, it requires termination on either the unused connector (J2 or J3).

9 Connect the LED cable if desired. This is designed to drive the front panel LED found on most PC cabinets to indicate activity on the SCSI bus.

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.

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

Detailed Installation Procedure

This section provides step-by-step instructions for installing your SYM8751D 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 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 your host adapter
- Connect your SCSI peripherals
  - Internal
  - External
- Terminate the SCSI bus
- Set the 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 that you install can act as host for up to seven peripheral devices, not including the adapter itself.

Inserting Your Host Adapter

1 Switch off and unplug 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.

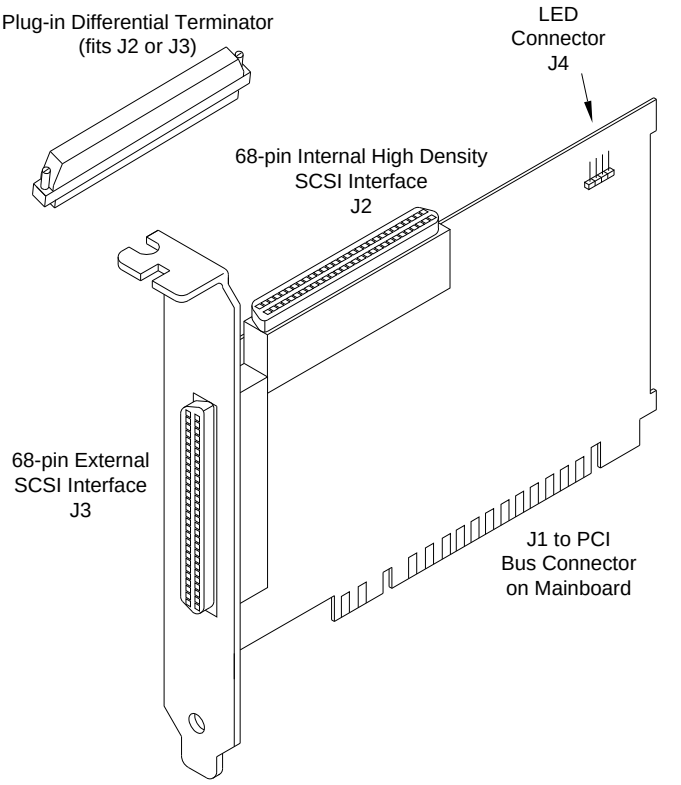
Caution GROUND YOURSELF by touching a metal surface before removing the cabinet top. Static charges on your body can damage electronic components. Handle plug-in boards by the edge; do not touch board components or gold connector contacts. The use of a static ground strap is recommended.

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 SYM8751D requires a PCI slot which allows bus master operation.

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

5 Remove your SYM8751D PCI to Ultra SCSI host adapter board from the packing and check that it is not damaged. Remember to ground yourself first, a static discharge could damage your board.

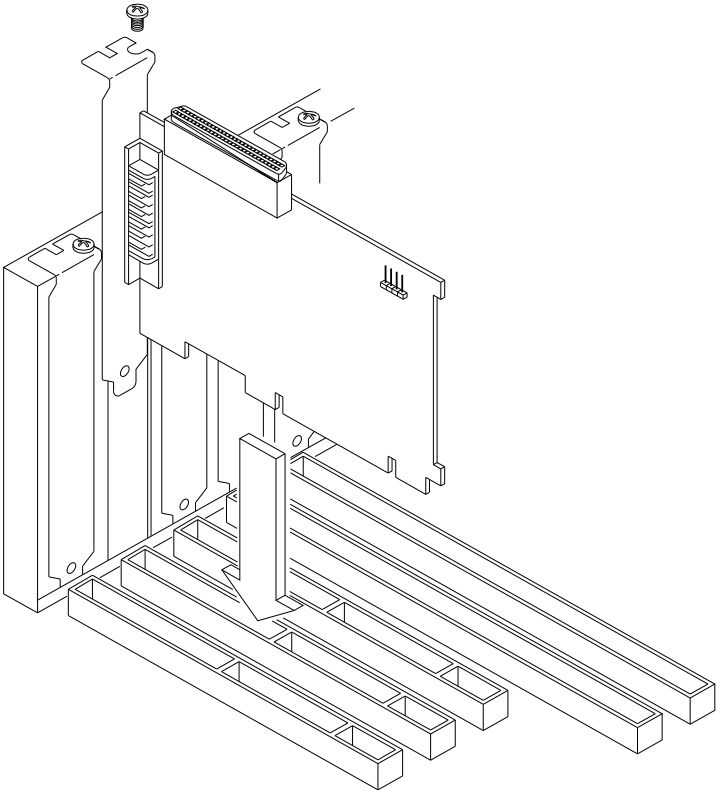
Figure 2-1
Hardware Connections for Your SYM8751D Host Adapter



6 Carefully insert the 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 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 Your Host Adapter



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

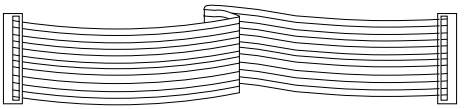
Connecting Your SCSI Peripherals

SCSI bus connections to your SYM8751D host adapter inside your computer are made with an unshielded, 68-conductor ribbon cable (see Figure 2-3). One side of this cable is marked with a color to indicate the pin-1 side. Sometimes the connectors on this cable are keyed to insure proper pin-1 connection.

All external SCSI bus connections to your SYM8751D host adapter are made with shielded, 68-conductor cables (see Figure 2-3). The connectors on this cable are always keyed to insure proper pin-1 connection.

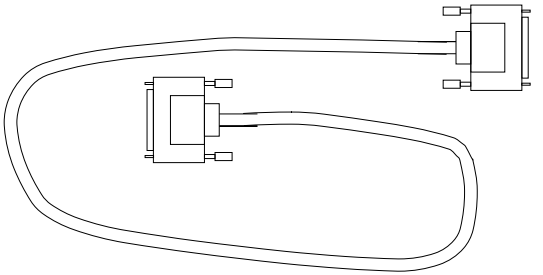
Remember: You should use only cables designed and specified for operation with Ultra SCSI devices to make connections to your SYM8751D host adapter.

Figure 2-3
SCSI Cables



SCSI Cable for Internal Connections

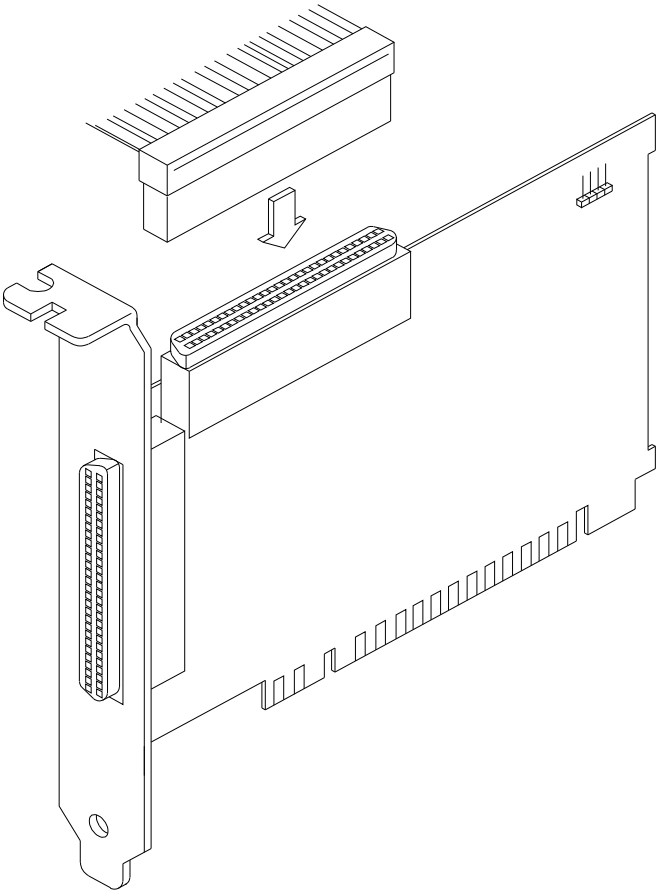
SCSI Cable for External Connections



Making Internal SCSI Bus Connections

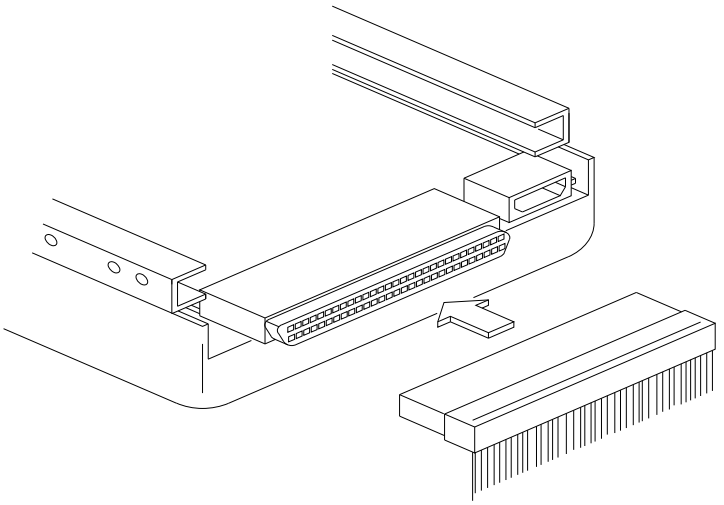
1 If you are connecting an internal SCSI device, plug the 68-pin connector on one end of the internal SCSI ribbon cable into the connector J2 (see Figure 2-4). Make certain to match pin one on both connectors.

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



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. Make sure to match pin-1 on all connections.

Figure 2-5
Internal SCSI Ribbon Cable to Internal SCSI Device Connection



3 Additional internal SCSI devices are 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

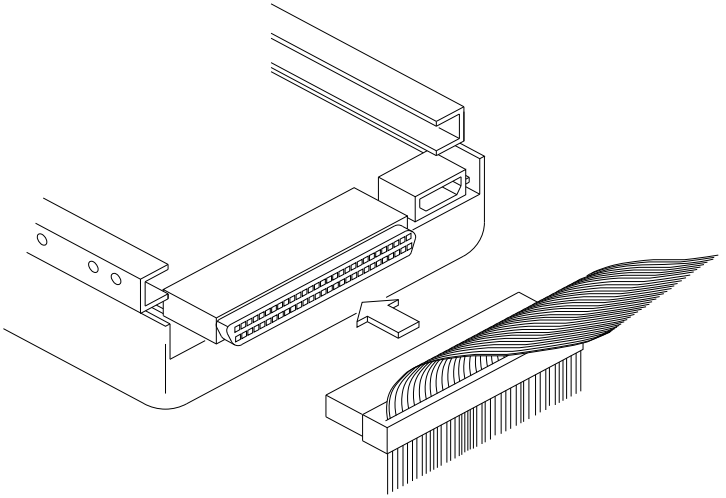
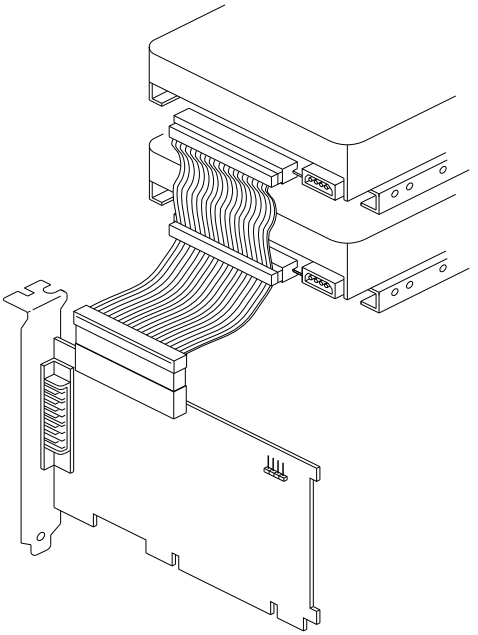


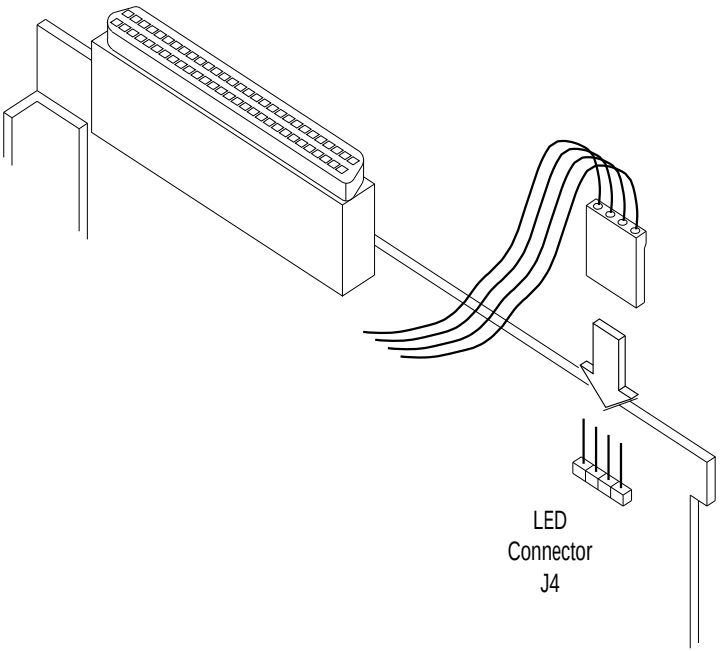
Figure 2-7
Multiple Internal SCSI Devices Chained Together



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 indicate 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 connected.

Figure 2-8
SCSI LED Connector



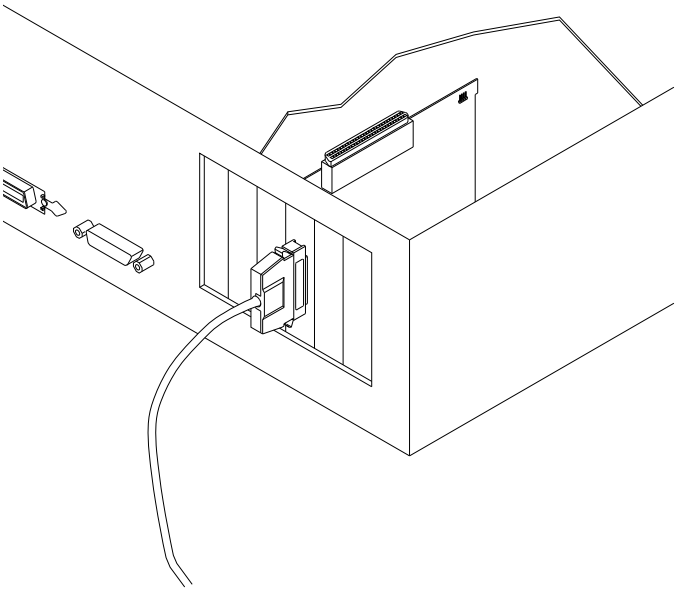
Some LED cables have only two wires. In this case, place the connector on one end or the other of J4. If the LED does not light during SCSI bus activity from this host adapter, you may have to rotate the LED cable 180º on J4.

Making External SCSI Bus Connections

1 If you need to connect external SCSI devices to your SYM8751D host adapter, plug the 68-pin connector on one end of a shielded external SCSI cable (see Figure 2-3) into the host adapter connector J3 (see Figure 2-1).

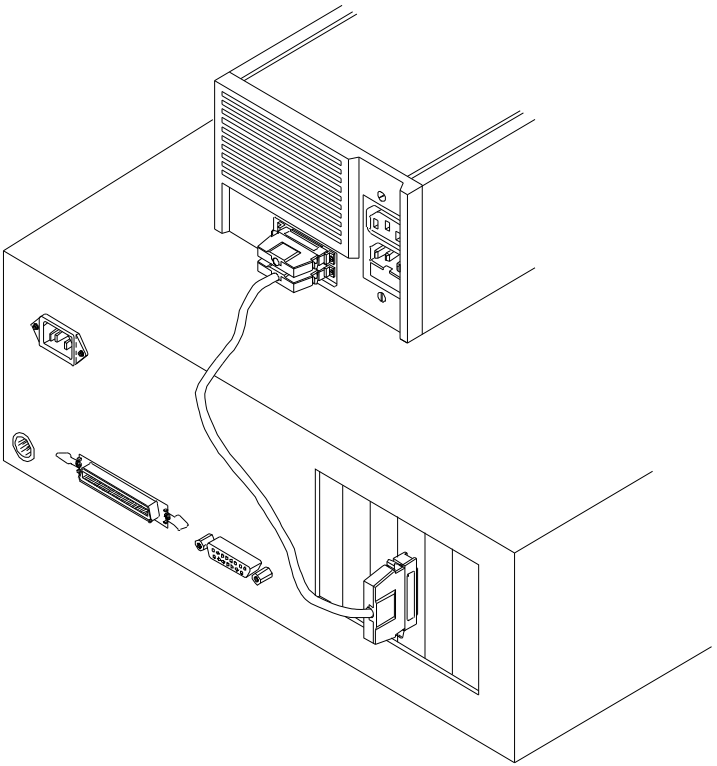
This connector is now bracketed to the back panel of your computer. Figure 2-9 shows how this connection is made.

Figure 2-9
External Cable to Host adapter



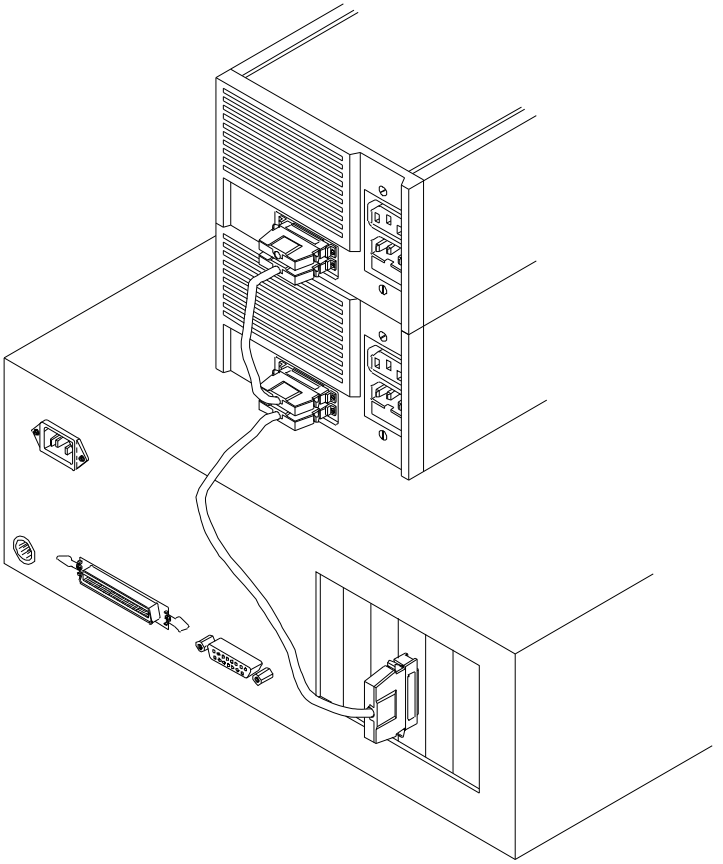
2 Plug the 68-pin connector on the other end of the shielded external SCSI cable into the SCSI connector on your external SCSI device. An example of this connection is shown in Figure 2-10.

Figure 2-10
External Cable to External SCSI Device



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.

Figure 2-11
Multiple External SCSI Devices Chained Together



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 that your SYM8751D Host Adapter is also on the SCSI bus — if your host adapter is ever positioned at the end of the SCSI bus, you must place the supplied differential terminator on the unused connector (J2 or J3).

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.

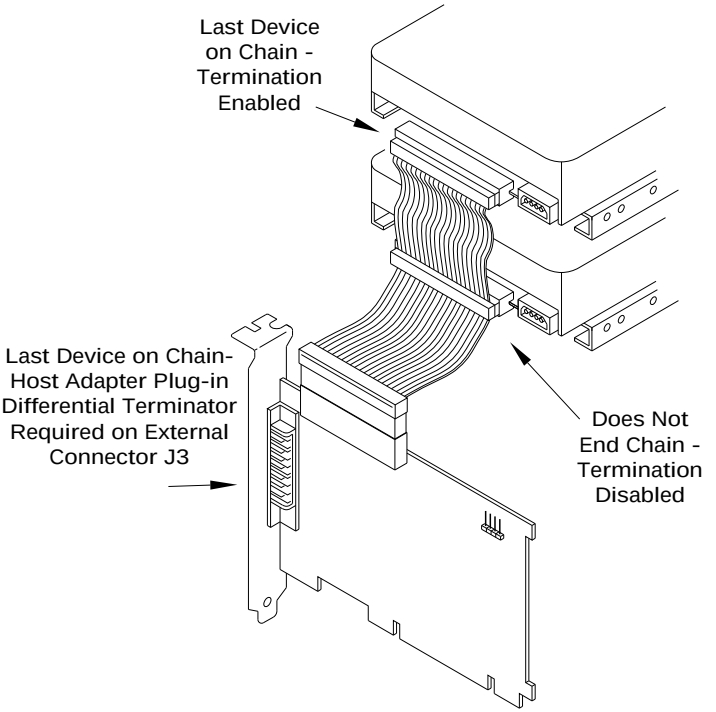
We cover SCSI bus termination for three different bus configurations, depending on your use of connectors J2 and J3 on your SYM8751D (see Figure 2-1):

- If you have made only internal SCSI connections to connector J2.
- If you have made only external SCSI connections to connector J3.
- If you have made connections to both J2 and J3.

1 If you have made only internal SCSI device connections to your host adapter, you must terminate the last internal device on the SCSI bus. You must disable the termination on all other device(s). Termination on your host adapter is required in this case. Insert the plug-in differential terminator into the external connector J3 on your host adapter.

Figure 2-12 shows an example of how termination is determined for this SCSI bus configuration.

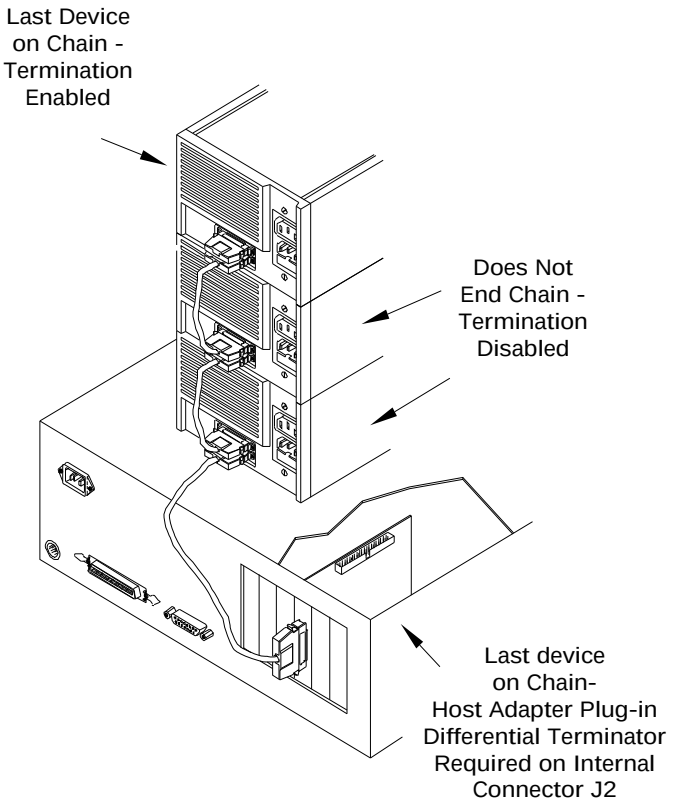
Figure 2-12
Internal SCSI Device Termination



2 If you have made only external SCSI device connections to your host adapter, you must terminate the last external device on the SCSI bus. You must disable the termination on all other device(s). Termination on your host adapter is required in this case. Insert the plug-in differential terminator into the internal connector J2 on your host adapter.

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

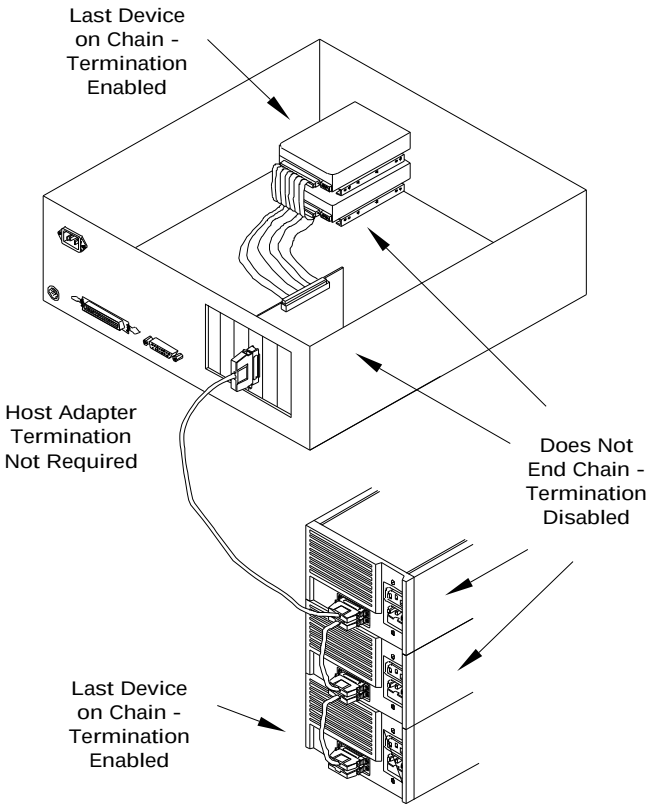
Figure 2-13
External SCSI Device Termination



3 If you have made internal and external SCSI device connections to your 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 your host adapter is not required in this case. Save the plug-in differential terminator so you can change the SCSI bus configuration in the future.

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

Figure 2-14
Internal and External SCSI Device Termination



Setting SCSI IDs

Each SCSI device and the host adapter must have 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. Chapter 3, *Configuring Your Host Adapter*, explains how to set your host adapter ID using the Symbios Logic SCSI 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. No duplication of SCSI IDs is allowed on a SCSI bus.

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

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	SYM8751D 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 Logic SDMS User's Guide* (or the guide for the software you use) to load the driver software for your particular operating system.

Chapter 3

Configuring Your Host Adapter

When to Configure Your SYM8751D 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.

Requirements

To perform the configuration described in this chapter you must have SDMS BIOS version 4.x or higher, and it must include the Symbios Logic SCSI Configuration utility. You can see the version number of your SDMS BIOS in a banner displayed on your computer monitor during boot. If the utility is available, a message appears on your computer monitor (for about 5 seconds) during boot that looks like this:

```
Press Ctrl-C to start Configuration Utility
```

Your SYM8751D host adapter is designed with NVRAM (non-volatile memory on your adapter). The configuration changes described in this chapter are possible only if NVRAM is present.

The Symbios Logic SCSI Configuration Utility

The menu driven Symbios Logic SCSI Configuration Utility allows you to view and change the default configuration settings for your host adapter.

IMPORTANT **This utility is a powerful tool. If, while using it, you somehow disable all your controllers, pressing "Ctrl-A" after memory count during reboot allows you to recover and reconfigure.**

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	On
Parity Checking	Enabled
Host Adapter SCSI ID	7
Scan Order	Low to High (0-Max)

Table 3-2
Device Default Settings

Settings for Individual SCSI Devices	Default Settings
Synchronous Transfer Rate (MB/sec)	20
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	Enabled

Starting the SCSI Configuration Utility

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

After a brief pause, your computer monitor displays the Main menu of the Symbios Logic SCSI Configuration utility.

Main Menu

When you start the Symbios Logic Configuration Utility, your computer monitor displays the Main menu. This menu (see Figure 3-1) is your entry to the utility.

The Main menu displays a list of up to four Symbios Logic PCI to SCSI host adapters in your system, and information about each of them.

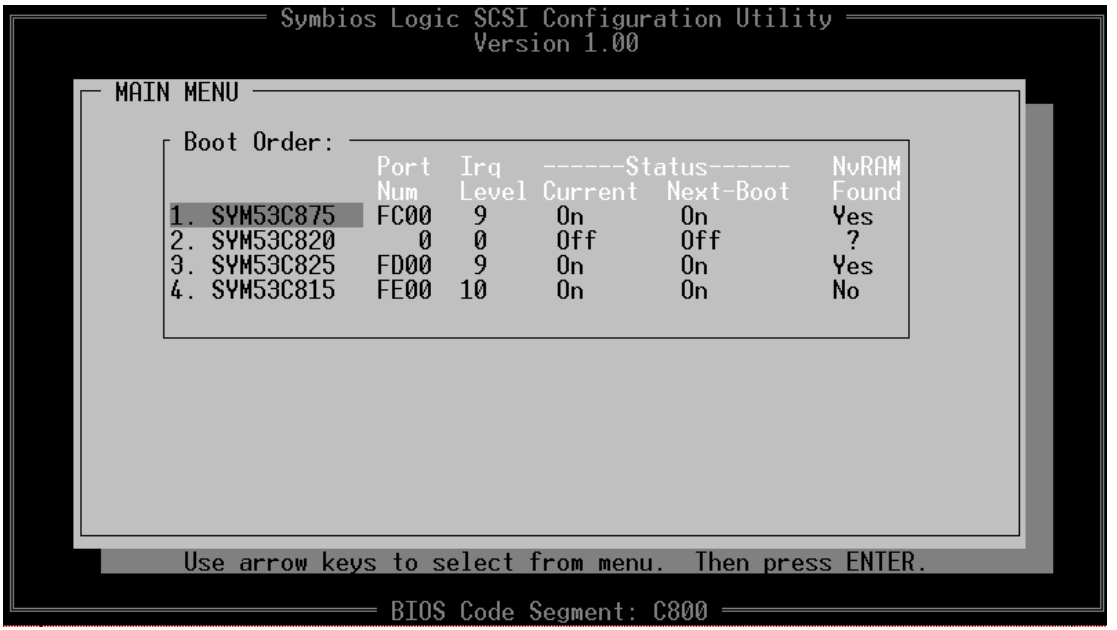
By using the arrow keys, an adapter is selected to view and/or change current settings for the adapter, and the SCSI devices attached to it. An adapter is selectable only if the current status is “On”. Changes are possible only if NVRAM (non-volatile memory on your adapter) is present.

Figure 3-1
Main Menu Display

Following the list of host adapters on the Main menu display, you see the options described below. If these settings are altered, the system reboots upon exit from the configuration utility via the **Quit** option.

Adapter Boot Order Allows you to set the order in which host adapters boot when you have more than one Symbios Logic host adapter in your system (otherwise this option does not appear). When this option is selected the Boot Order menu shown in Figure 3-2 is displayed.

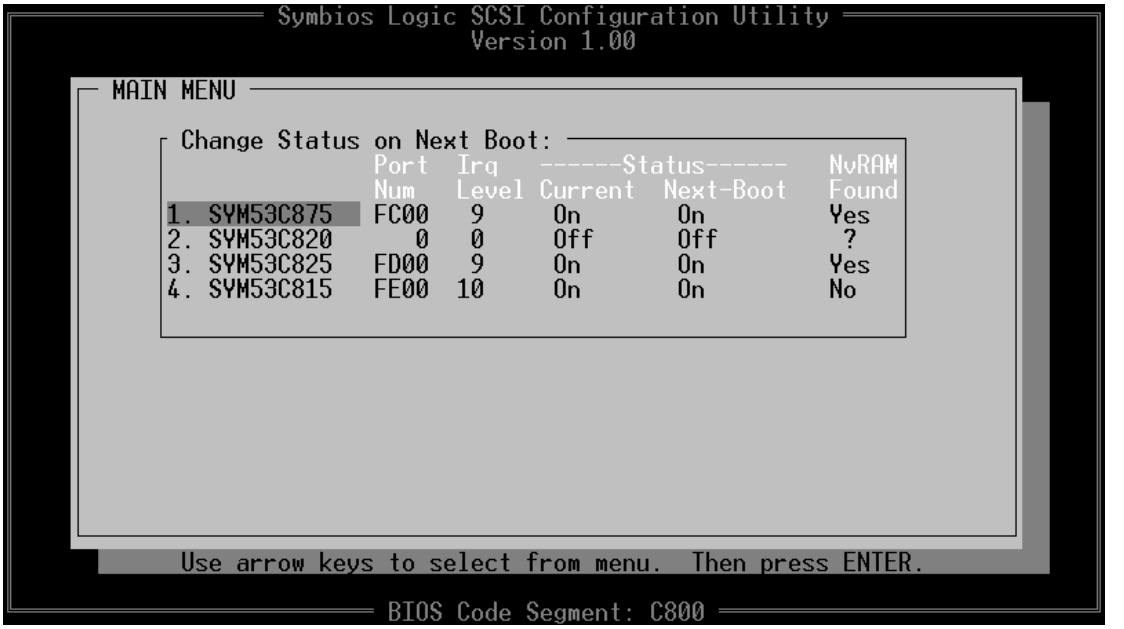
Figure 3-2
Boot Order Menu Display



To change an adapter's boot order, select it and press **Enter**. You are then prompted to enter the new boot sequence number. When the adapters are ordered properly, press the escape key to exit this menu.

Change Adapter Status Allows you to activate or deactivate a host adapter and all SCSI devices attached to it. The change takes place after a reboot, which is automatic upon exit from the utility when this option is used to make a change. When this option is selected the Change Status menu shown in Figure 3-3 is displayed.

Figure 3-3
Change Status Menu Display



To change an adapter's status, select it and press **Enter**. Then press the escape key to exit this menu.

Display Mode Determines how much information about your host adapter(s) and SCSI devices is displayed on your computer monitor during boot. For more complete information, choose the verbose setting. For a faster boot, choose the terse setting.

Mono/Color Allows you to choose between a black and white or color display for the SCSI Configuration utility. You might need to choose the mono setting to get a more readable screen on a black and white monitor.

Help Brings up a help screen with information about the Main menu.

Quit Gets you out of the SCSI Configuration utility.

Adapter Utilities Menu

When you select a host adapter from the Main menu, your computer monitor displays the screen shown in Figure 3-4. 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.

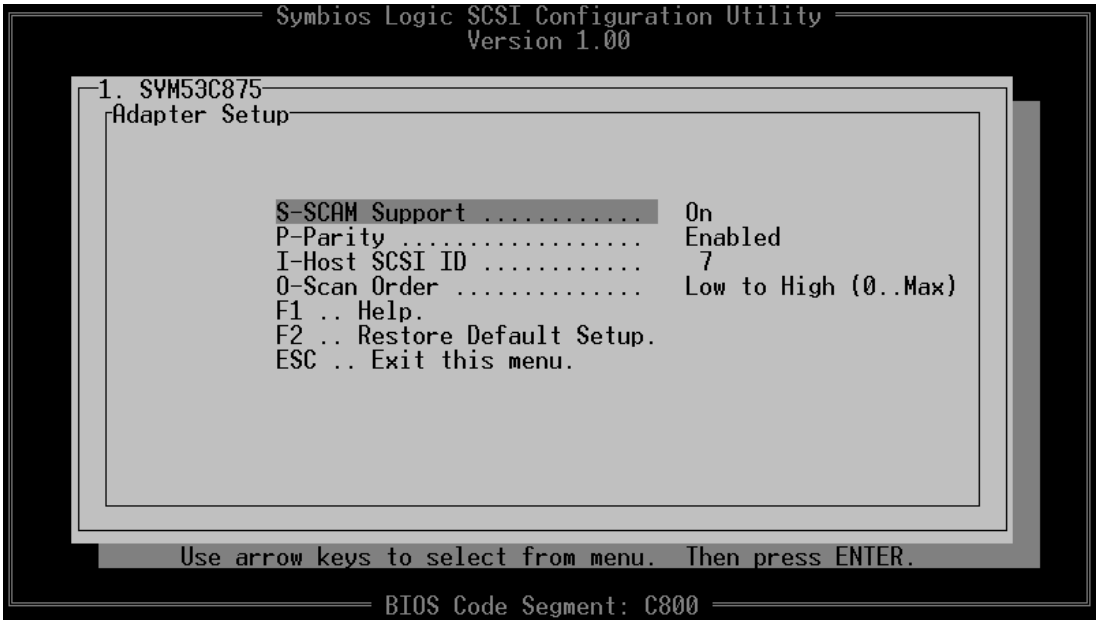
Figure 3-4
Adapter Utilities Menu Display

You come back 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 the changes.

Adapter Setup Menu

When you select **Adapter Setup** your computer monitor displays the Setup menu shown in Figure 3-5.The settings in this menu are global settings that effect the selected host adapter and all SCSI devices attached to it.

Figure 3-5
Adapter Setup Menu Display



SCAM Support The Symbios Logic BIOS version 4.x and above supports the SCSI Plug and Play protocol called SCAM (SCSI Configured AutoMatically).You may choose to turn this off.

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

Note: When disabling parity checking, you may have to disable disconnects for certain 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.

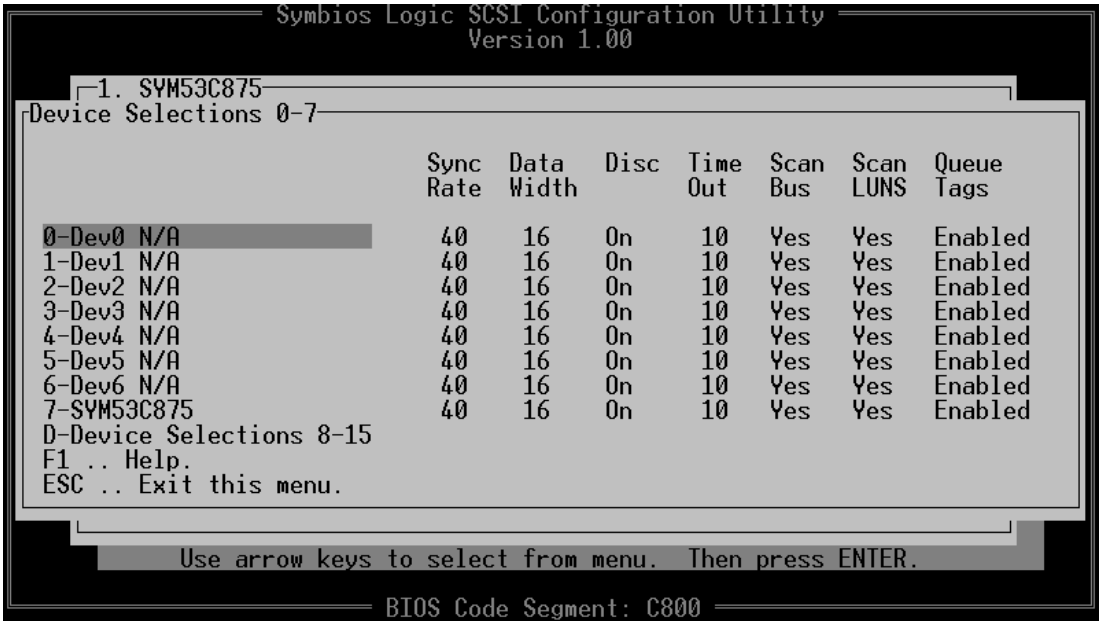
Host SCSI ID In general, it is suggested that you not change your host adapter ID from the default value of 7, as this gives it the highest priority on the SCSI bus. However, if you have two adapters sharing the same SCSI devices, you should give one of them a currently unassigned ID to avoid duplication of SCSI IDs.

Scan Order This option allows you to tell the host adapter BIOS and your 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.

Device Selections Menu

When you select **Device Selections** your computer monitor displays the menu shown in Figure 3-6. This menu provides information about individual SCSI devices attached to the selected host adapter, and the adapter itself. To make changes to these settings select a device from this display and press **Enter** to bring up the individual Device Setup menu.

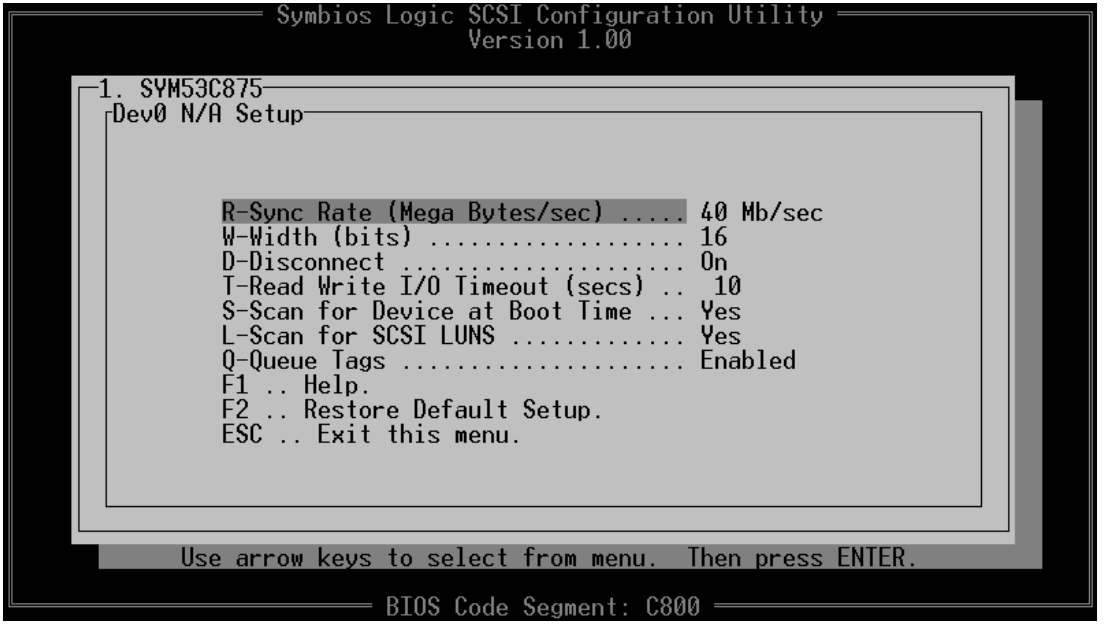
Figure 3-6
Device Selections Menu Display



Device Setup Menu

When you select a specific device from the Device Selections menu, your computer monitor displays the Device Setup menu shown in Figure 3-7. The settings in this menu effect 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.

Figure 3-7
Device Setup Menu Display



Sync Rate (Mega Bytes/sec) The value set with this option defines the maximum 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 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 bus during an I/O transfer. 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 Timeout (secs) This option sets the time the host adapter waits for a read, write, verify, 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 (no time-out).

Scan for Device at Boot Time When there is a device you do not wish to make available to the system, set this option to "No" for that device. Also, on a wide bus (16 devices) 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 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.

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

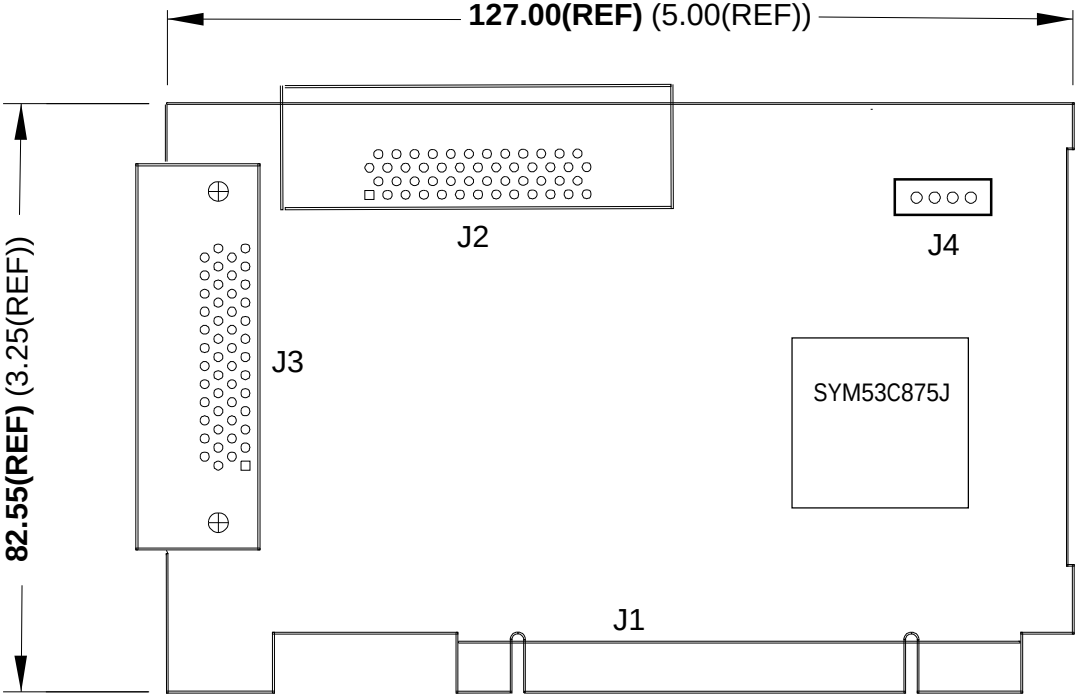
Quitting the SCSI Configuration Utility

Since some changes only take effect after your system reboots, it is important that you quit this Configuration utility properly. You should return to the Main Menu and exit via the **Quit** option. If you reboot the system without properly quitting the utility, some changes do not take effect.

Appendix A

Technical Specifications

SYM8751D
Mechanical Drawing



All dimensions are given in **mm** and (inches)

Physical Environment

Physical Characteristics

The dimensions of the SYM8751D host adapter board are 5.00” x 3.25”. PCI connection is made through the 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 high density connector J3. The J3 connector extends external to the cabinet the SYM8751D is installed in through a bracket attached to the face of the connector. The bracket is a standard ISA type with a cutout to accommodate connector J3. The J4 connector is for the Busy LED connection using a 4-pin one row right angle header. The component height on the top and bottom of the board follows the PCI specification.

Electrical Characteristics

- +5V DC ±5% 1.5A over the operating range 5-55ºC
- +3.3V ±0.3V 130mA over the operating range 5-55ºC when operating in a 3.3V PCI slot

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

Thermal,

- Temperature range: 5-55ºC (dry bulb)
- Relative humidity range: 5-90% non-condensing
- Maximum dew point temperature: 32ºC

Electromagnetic Compliance

The board is designed and implemented so as to minimize electromagnetic emissions, susceptibility, and the effects os electromagnetic discharge. The board meets the requirements of FCC and CISPR Class B limits and is marked with the FCC Class B ID: B8J8251AD.

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 SYM8751D is designed for use in PCI computer systems with an ISA/EISA bracket type. The Symbios Logic SDMS (SCSI Device Management Software) operates the board, but the design of the board does not prevent the use of other software.

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 top and bottom 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 PCI portion of the SYM53C875J chip is powered from the 3V/5V pins.

Table A-1
PCI Connector J1 (Top)

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
KEYWAY	12	C_BE2/	33	AD07	53
KEYWAY	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	3V/5V	59
3V/5V	19	PERR/	40	ACK64/	60
AD31	20	+3.3V	41	+5V	61
AD29	21			+5V	62

Note: Shaded signals are not connected.

Table A-2
PCI Connector J1 (Bottom)

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
3V/5V	10	AD18	31	KEYWAY	51
RESERVED	11	AD16	32	C_BE0/	52
KEYWAY	12	+3.3V	33	+3.3V	53
KEYWAY	13	FRAME/	34	AD06	54
RESERVED	14	GND	35	AD04	55
RST/	15	TRDY/	36	GND	56
3V/5V	16	GND	37	AD02	57
GNT/	17	STOP/	38	AD00	58
GND	18	+3.3V	39	3V/5V	59
RESERVED	19	SDONE	40	REQ64/	60
AD30	20	SBO/	41	+5V	61
+3.3V	21			+5V	62

Note: Shaded signals are not connected.

The SCSI Interface

The SCSI interface operates as 16-bit, synchronous or asynchronous, differential, and supports SCSI-3 protocols and 16-bit arbitration. The signal definitions conform to the SCSI-2 differential standard. The interface is made through connectors J2 and J3.Connector J2 is a 68-pin high density right angle receptacle used for internal connections. Connector J3 is a 68-pin high density right angle receptacle that protrudes through the back panel bracket. SCSI termination is provided through a differential plug-in terminator. SCSI termination power is also supplied by the board. The following tables show the signal assignments for J2 and J3.

Table A-3
SCSI Connectors J2 and J3

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

The LED Interface

The LED interface on the SYM8751D 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 0.4V 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 SYM8751D is J4.

Table A-4
LED Connector J4

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

Glossary

A

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

ASPI Advanced SCSI Programming Interface. A specification for a common structured method of supporting SCSI peripherals.It provides an interface between host adapters and SCSI device drivers.

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 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.

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, key board, 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 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 older term "Fast-20". Please see Ultra 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

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.

I

Internal SCSI Device A SCSI device installed inside the computer cabinet. Internal SCSI 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 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.

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 transfer rate.

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. 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 keyed to insure proper alignment, but internal SCSI ribbon cables are 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 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 allows 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.

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 to the original SCSI-1 standard.

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

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

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

SCSI ID A way to uniquely identify each SCSI device on the SCSI bus. Each SCSI bus has eight available SCSI IDs numbered 0 through 7 (or 0 through 15 for Wide SCSI). The host adapter usually gets ID 7 giving it priority to control the bus.

SDMS 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. It is faster than asynchronous data transfer, but cannot be used for certain kinds of transfers, so some negotiation is required.

System BIOS Controls the low level POST (Power On Self Test), and basic operation of the CPU and computer system.

T

Termination The electrical connection required at each end of the SCSI bus, composed of a set of resisters. It improves the integrity of bus signals.

U

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

V

VCCI Voluntary Control Council for Interference.

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.

Index

P

Q

R

S