

# **USER'S GUIDE**

## **PCI Storage Device Management System SDMS™ 4.0**

**September 2001**

*Version 12*

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# Preface

This book is the user's guide for the PCI Storage Device Management System SDMS™ 4.0. Version 12 of this user's guide is intended to explain how to install and configure the LSI Logic SDMS software in your PCI computer system.

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## Audience

This document was prepared for OEM customers and provides an overview of the LSI Logic SDMS software. This document explains the installation of software drivers as they relate to specific operating systems.

- **Chapter 1, Using the SDMS Software**, describes the standard method of interfacing SCSI I/O subsystems with devices, operating systems, and application software.
- **Chapter 2, SCSI BIOS and Configuration Utility**, describes the SDMS SCSI BIOS and its Configuration Utility, which allows modifications or changes to the host adapters. It also provides information about the Multilanguage Configuration Utility.
- **Chapter 3, Windows 95, Windows 98, Windows Me Device Driver Installation**, describes the SYMC8XX.MPD, SYM\_HI.MPD, and SYM\_U3.MPD drivers along with installation instructions for new and existing Windows 95/98 systems.
- **Chapter 4, Windows NT 4.0 Device Driver Installation**, describes the SYMC8XX.SYS, SYM\_HI.SYS, and SYM\_U3.SYS drivers along with installation instructions for new and existing Windows NT systems. This chapter also includes Windows NT DMI 2.0 Component Instrumentation information.

- [Chapter 5, Windows 2000 Device Driver Installation](#), describes the SYMC8XX.SYS, SYM\_HI.SYS, SYM\_895A.SYS, and SYM\_U3.SYS drivers along with installation instructions for new and existing Windows 2000 systems. This chapter also includes Windows 2000 DMI 2.0 Component Instrumentation information.
- [Chapter 6, DOS Device Driver Installation](#), describes the ASPI8XX.SYS, SYMDISK.SYS, and SYMCD.SYS drivers. It also provides information about various DOS utilities.
- [Chapter 7, OS/2 Device Driver Installation](#), describes the SYM8XX.ADD and SYMH1.ADD drivers along with installation instructions for new or existing OS/2 systems.
- [Chapter 8, SCO OpenServer 5 Device Driver Installation](#), describes the Boot Time Loadable Driver (BTLD) along with installation instructions for new or existing SCO UNIX systems.
- [Chapter 9, UnixWare 7 Device Driver Installation](#), describes the C8XX driver along with the installation instructions for new or existing UnixWare systems.
- [Chapter 10, Solaris Device Driver Installation](#), describes the SYMHISL driver along with installation instructions for new or existing Solaris systems.
- [Chapter 11, Linux Device Driver Installation](#), describes Linux drivers to use with LSI Logic controllers along with installation instructions and patch information.
- [Chapter 12, NetWare Device Driver Installation](#), describes NWPA LSI8XXNW.HAM, LSIHINW.HAM, and LSI\_U3NW.HAM drivers along with installation instructions for new or existing NetWare systems.
- [Appendix A, Glossary of Terms and Abbreviations](#), describes various terminology that is referenced throughout this user's guide.

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## Related Publications

*LSI8750SP PCI to Ultra SCSI Host Adapter User's Guide, Version 2.1*, LSI Logic Corporation, Order Number 14020.A

*LSI8751SP PCI to Ultra SCSI Host Adapter User's Guide, Version 2.1*, LSI Logic Corporation, Order Number S14016.A

*LSI8751SPE PCI to Ultra SCSI Host Adapter User's Guide, Version 1.1*, LSI Logic Corporation, Order Number S14023.A

*LSI8751D PCI to SCSI Host Adapter User's Guide, Version 2.1*, LSI Logic Corporation, Order Number S14011.A

*LSI8951U PCI to Ultra2 SCSI Host Adapter User's Guide, Version 2.1*, LSI Logic Corporation, Order Number S14019.A

*LSI8952U PCI to Ultra2 SCSI Host Adapter User's Guide, Version 2.1*, LSI Logic Corporation, Order Number S14002.B

*LSI8953U PCI to Ultra2 SCSI Host Adapter User's Guide, Version 1.1*, LSI Logic Corporation, Order Number S14036.A

*LSI22801 Dual Channel PCI to Ultra SCSI Host Adapter User's Guide, Version 2.1*, LSI Logic Corporation, Order Number S14017.A

*LSI22802 PCI to Dual Channel SCSI Host Adapter User's Guide, Version 2.1*, LSI Logic Corporation, Order Number S14012.A

*LSI22910 Dual Channel PCI to Ultra2 SCSI Host Adapter User's Guide, Version 1.1*, LSI Logic Corporation, Order Number S14018.A

*LSI22915A PCI to Dual Channel Ultra160 SCSI Host Adapter User's Guide, Version 1.2*, LSI Logic Corporation, Order Number S14068

*LSI21002 PCI to Dual Channel SCSI Host Adapter User's Guide, Version 1.1*, LSI Logic Corporation, Order Number S14001.A

*LSI21003 PCI to Dual Channel SCSI Host Adapter User's Guide, Version 1.0*, LSI Logic Corporation, Order Number S14051

*LSI22902 PCI to Ultra2 SCSI Dual Channel Low Profile PCI Host Adapter User's Guide, Version 1.0*, LSI Logic Corporation, Order Number S14039

*LSI22903 PCI to Ultra160 Dual Channel SCSI Low Profile PCI Host Adapter User's Guide, Version 1.1*, LSI Logic Corporation, Order Number S14045.A

*LSI21040 PCI to Dual Channel Ultra160 SCSI Host Adapter User's Guide, Version 1.1*, LSI Logic Corporation, Order Number S14043.B

*Ultra160 SCSI PCI Host Adapters User Guide, Version 1.0*, LSI Logic Corporation (only available in PDF format from the LSI Logic Web Site <http://www.lsillogic.com>)

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<b>Appendix A</b>	<b>Glossary of Terms and Abbreviations</b>
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# Chapter 1

## Using the SDMS Software

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This chapter describes the LSI Logic Storage Device Management System (SDMS™) software, and includes these topics:

- [Section 1.1, “Introduction,” page 1-1](#)
- [Section 1.2, “Overview,” page 1-2](#)
- [Section 1.3, “SDMS Device Drivers,” page 1-4](#)
- [Section 1.4, “Basic Guidelines,” page 1-4](#)

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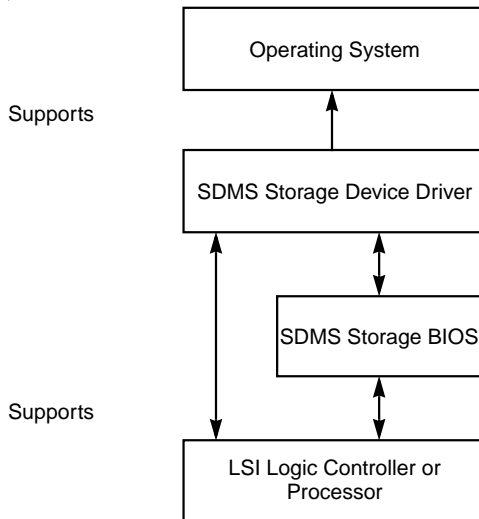
## 1.1 Introduction

The LSI Logic PCI SDMS is a complete software package that solves the increasingly complex problem of managing system I/O. It seamlessly addresses hardware and software interfaces by supporting the LSI Logic family of SCSI processors and controllers, and a wide range of SCSI peripheral devices. At the same time, it offers interoperability across application programs, operating systems, and host platforms.

SDMS 4.0 software provides a standard method to interface SCSI I/O subsystems with devices, operating systems, and application software. It also enhances system capabilities already provided by SCSI controllers and processors by facilitating system-wide SCSI device access.

Figure 1.1 illustrates the format of the LSI Logic SDMS software.

**Figure 1.1 The LSI Logic SDMS Software**



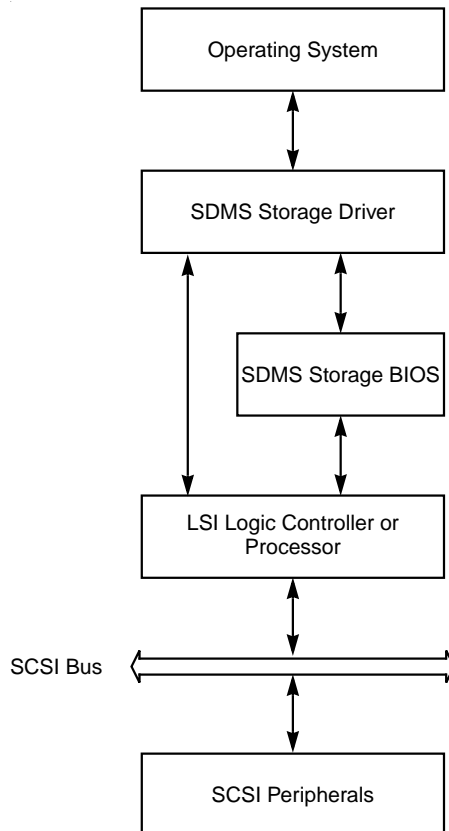
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## 1.2 Overview

An LSI Logic SCSI controller or processor can control peripherals such as hard disk drives, CD-ROM drives, tape drives, scanners, and removable media. You can connect up to 15 wide (16-bit) SCSI peripheral devices or seven 8-bit SCSI peripheral devices (by using the SCSI bus) to a SCSI host adapter on which the SCSI controller or processor resides.

Figure 1.2 illustrates the flow of SDMS information within an operating system.

**Figure 1.2 SDMS Information Flow**



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## 1.3 SDMS Device Drivers

The SDMS device drivers translate an operating system I/O request into a SCSI request. Each SDMS SCSI device driver is operating system specific and is designed to work on standard LSI Logic chip implementations.

Currently, LSI Logic provides PCI to SCSI device drivers for the following operating systems:

- MS-DOS 6.0/Windows 3.1X
- Windows 95, Windows 98, and Windows Me (Millennium Edition)
- Windows NT - 4.0
- Windows 2000
- OS/2 - 4.XX
- SCO OpenServer - Release 5.XX
- UnixWare - 7
- Solaris - 7 and 8
- Linux
- NetWare - 4.XX and 5.XX (NWPA)

This user's guide provides device driver installation and configuration instructions for each of these operating systems.

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## 1.4 Basic Guidelines

Some basic rules for using SDMS software and installing a SCSI host adapter device follow. The SDMS software requires an IBM PC/AT or compatible computer with an 80486 or higher microprocessor. An understanding of basic operating system commands is assumed. In addition, users of this manual should have a general knowledge of the SCSI standard.

Before using the SDMS software, you should configure the SCSI controller into your system, taking into account the configuration of other host adapters and system resources.

LSI Logic recommends that you back up all data before making any changes or installing any software, including LSI Logic SCSI controllers and software. Failure to adhere to this accepted computer practice may lead to loss of data. You must terminate both ends of the SCSI bus.

Refer to the hardware manuals for the devices and users' guides for the host adapters to properly terminate the bus. Also you should locate where jumpers or dip switches are for setting SCSI ID numbers. Usually, the host adapter is ID 7. The devices are then set at IDs 0 through 6 (plus 8 through 15 for Wide SCSI). The bootable hard drive must have the lowest numerical SCSI ID, unless you are able to use the BIOS Boot Specification (BBS). Refer to [Chapter 2](#) for additional information regarding the BBS.

The red or blue line on a standard SCSI cable (or the black line on one end of a multicolored SCSI cable) designates pin 1 on the cable connector and must connect to pin 1 on the device and host adapter connector. Refer to the hardware manuals for the devices and the controller to locate pin 1 of the connector.

If the system already has an internal bootable hard drive (IDE, ESDI, or ST506), the drivers for the SCSI device(s) must reside on the internal bootable drive.





# Chapter 2

## SCSI BIOS and Configuration Utility

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This chapter describes the SDMS SCSI BIOS and Configuration Utility. It includes these topics:

- [Section 2.1, “Introduction,” page 2-1](#)
  - [Section 2.2, “Boot Initialization with BBS,” page 2-3](#)
  - [Section 2.3, “Using the SCSI BIOS Configuration Utility,” page 2-3](#)
  - [Section 2.4, “Starting the SCSI BIOS Configuration Utility,” page 2-4](#)
  - [Section 2.5, “Exiting the SCSI BIOS Configuration Utility,” page 2-22](#)
- 

### 2.1 Introduction

The SDMS SCSI BIOS is the bootable ROM code that manages SCSI hardware resources. It is specific to a family of LSI Logic SCSI controllers or processors. The SDMS SCSI BIOS integrates with a standard system BIOS, extending the standard disk service routine provided through INT13h.

During the boot time initialization, the SCSI BIOS determines if there are other hard disks, such as an IDE drive, already installed by the system BIOS. If there are, the SCSI BIOS maps any SCSI drives it finds behind the drive(s) already installed. Otherwise, the SCSI BIOS installs drives starting with the system boot drive. In this case, the system boots from a drive controlled by the SCSI BIOS. For version 4.05.00 and higher, LSI Logic supports the BIOS Boot Specification (BBS).

The next section, [“Boot Initialization with BBS,”](#) discusses selecting boot and drive order.

## 2.1.1 Features

The SDMS SCSI BIOS supports these features:

- Configuration for up to 256 adapters-any 4 can be chosen for INT13h (boot ROM) support
- All LSI53C8XX devices including LSI53C895A
- LSI53C1000 and LSI53C1010 devices
- SPI-3 Parallel Protocol Request (PPR)
- Domain Validation

## 2.1.2 LSI Logic Devices Supported

All LSI Logic devices and host adapters have undergone a name change. They have transitioned from a SYM prefix to an LSI prefix. The SDMS SCSI BIOS supports the following devices and their associated LSI Logic host adapters:

- LSI53C810, LSI53C810A, LSI53C810AE (LSI8100S, LSI8100ASP, LSI20810)
- LSI53C815 (LSI815XS, LSI8150SP)
- LSI53C825, LSI53C825A (LSI8250S, LSI8251S, LSI8251D, LSI8250ASP, LSI8251ASP, LSI8251AD)
- LSI53C860, LSI53C860AE (LSI8600SP, LSI20860)
- LSI53C875, LSI53C875E (LSI8750SP, LSI8751SP, LSI8751SPE, LSI8751D)
- LSI53C876 (LSI22801, LSI22802)
- LSI53C885
- LSI53C895 (LSI8951U, LSI8952U)
- LSI53C895A (LSI8953U)
- LSI53C896 (LSI22910, LSI21002, LSI22902)
- LSI53C1000 (LSI20160, LSI20160L)
- LSI53C1010 (ITI6200U3LP, LSI22915A, LSI21040, LSI22903, LSI21003)

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## 2.2 Boot Initialization with BBS

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

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

### 2.2.1 CD-ROM Boot Initialization

The SCSI BIOS supports boot initialization from a CD-ROM drive. The five types of emulation are:

- No emulation disk
- Floppy 1.2 Mbyte emulation disk
- Floppy 1.44 Mbyte emulation disk
- Floppy 2.88 Mbyte emulation disk
- Hard disk emulation

The type of emulation determines the drive letter assignment for the CD-ROM. For example, if you load a 1.44 Mbyte floppy emulation CD-ROM, then the CD-ROM drive would become the designated **A:** drive, and the existing floppy would become drive **B:**.

---

## 2.3 Using the SCSI BIOS Configuration Utility

This section provides the menu formats and user inputs available to inform all users about this utility prior to running it. All SCSI BIOS Configuration Utility screens that display various menus are partitioned into fixed areas. This area provides static general help text information.

## 2.3.1 User Inputs

You make configuration changes in the main area of the menu. As in the example menus, it is lighter in color than the header or footer areas. [Table 2.1](#) lists the various keyboard options you use to make changes. Settings with grey or yellow text can be changed, settings with white text cannot. This is true regardless of the Color/Mono setting chosen.

**Table 2.1 Keyboard Options**

Keyboard Options	Description
F1 = Help	Provides context sensitive help for the cursor resident field.
F2 = menu	Sets cursor context to the menu Area. Select a menu item and press Enter. This option is only available from the Main menu.
Arrow Keys = Select Item	Move the cursor up, down, left, or right.
+/- = Change [Item]	Changes items with values in [ ] brackets. Use the '+' and '-' keys in the top row of the main keyboard or use the numeric keypad '+' and '-' keys to change values. When pressed, they toggle a modifiable field to its next relative value. '+' toggles the value up and '-' toggles the value down.
Esc = Abort/Exit	Aborts the current context operation and/or exits the current screen. This option calls an Exit menu, described further in <a href="#">Section 2.5, "Exiting the SCSI BIOS Configuration Utility,"</a> page 2-22.
Home/End = Select Item	Moves the cursor to the start/end of a scrollable field.
Enter = Execute <Item>	Executes options with values in < > brackets. Press Enter to execute the field's associated function.

---

## 2.4 Starting the SCSI BIOS Configuration Utility

If you have SCSI BIOS version 4.XX, and it includes the SDMS SCSI BIOS Configuration Utility, you can change the default configuration of your SCSI host adapters. You may decide to alter these default values if

there is a conflict between device settings or if you need to optimize system performance.

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

Press Ctrl-C to start LSI Logic 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 LSI Logic Configuration Utility...

After a brief pause, your computer monitor displays the Main menu of the SCSI BIOS Configuration Utility.

The following messages may appear during the boot process:

- Adapter removed from boot order, parameters will be updated accordingly! appears when an adapter is removed from the system or relocated behind a PCI bridge.
- Configuration data invalid, saving default configuration! appears if none of the information in NonVolatile Random Access Memory (NVRAM) is valid.
- Found SCSI Controller not in following Boot Order List, to Add: Press Ctrl-C to start LSI Logic Configuration Utility... or Adapter configuration may have changed, reconfiguration is suggested! could appear when fewer than four adapters are in the boot order and adapters exist in the system which are not in the boot order.

The SDMS SCSI BIOS does not control all devices detected by this configuration utility. Devices such as tape drives and scanners require that a device driver specific to that peripheral be loaded.

To make changes with this menu-driven utility, one or more LSI Logic SCSI host adapters must have NVRAM to store the changes. You can change four sets of configurations. You make changes on subordinate menus called from the Main menu, which is opened when you start the SCSI BIOS Configuration Utility. The subordinate menus are:

- Adapter Properties
- Device Properties
- Boot Adapter List
- Global Properties

All of these properties are controlled by menus you access through the SCSI BIOS Configuration Utility's Main menu. The Main menu also gives an overview of some properties of installed LSI Logic host adapter boards.

Important: The SCSI BIOS Configuration Utility is a powerful tool. While using it, if you somehow disable all of your controllers, press `Ctrl-A` (or `Ctrl-E` on version 4.04 or later) after memory initialization during reboot. This will allow you to re-enable and reconfigure your controllers. Also, if the system locks up due to NonVolatile Storage (NVS), press `Ctrl-N` to bypass the BIOS in order to reflash the card.

## 2.4.1 Accessing the Configuration Utility Main Menu

After invoking the SCSI BIOS Configuration Utility, the Main menu appears and displays a list of up to 256 PCI to SCSI host adapters in the system and information about each of them. To select an adapter, use only the arrow keys and enter key. The system scans the adapter's SCSI bus after selecting an adapter.

Only adapters with LSI Logic Control enabled can be accessed. Adapters without NonVolatile Memory (NVM) display default settings and cannot be changed. [Figure 2.1](#) illustrates this menu.

**Figure 2.1 Main Menu**

LSI Logic SDMS (TM) PCI SCSI Configuration Utility Version PCI-4.XX.00							
<Boot Adapter List>				<Global Properties>			
LSI53C8XX Host Bus Adapters							
Adapter	PCI Bus	Dev/Func	Port Number	IRQ	NVM	Boot Order	LSI Logic Control
<53C1010-66	0	60>	E400	9	Yes	1	Enabled
<53C1010-66	0	61>	E000	10	Yes	0	Enabled
<53C895	0	58>	FC00	11	Yes	2	Enabled
F1 =Help		ArrowKeys=Select Item			-/+ =Change [Item]		
Esc=Abort/Exit		Home/End =Select Item			Enter=Execute <Item>		
F2 =Menu							

[Table 2.2](#) lists the fields on this menu and their descriptions.

**Table 2.2 Main Menu Fields and Descriptions**

Fields	Field Type [Value]	Descriptions
Adapter	Information	Indicates the specific LSI Logic family of host adapters. Clicking on an entry under Adapter will lead to the Adapter Properties menu.
PCI Bus	Information	Indicates the PCI bus number (range 0x00–0xFF, 0–255 decimal) assigned by the system BIOS to an adapter.
Dev/Func	Information	Indicates the PCI Device/Function assigned by the system BIOS to an adapter. An 8-bit value is mapped as follows:  Bit # 7 6 5 4 3 2 1 0 Bits [7:3]: Device (range 0x00–0x1F, 0–31 decimal) Bits [2:0]: Function (range [0–7])
Port Number	Information	Indicates the I/O port number that communicates with an adapter, which the system BIOS assigns.
IRQ	Information	Indicates the Interrupt Request Line used by an adapter, which is assigned by the system BIOS.
NVM	Information	Indicates whether an adapter has NVM associated with it. An adapter's configuration is stored in its associated NVM. NVM can refer to NVRAM that is resident on a host adapter or to system NVS.
Boot Order	Information	Indicates the relative boot order (0 to 3) of an adapter. The SDMS SCSI BIOS traverses up to four adapters in the specified order in search of bootable media. To modify this field, access the Boot Adapter List menu.
LSI Logic Control	Information	Indicates whether an adapter is eligible for LSI Logic software control or is reserved for control by non-LSI Logic software.

Below the header area of the Main menu, the Boot Adapter List and Global Properties options are available for you to configure their host adapters. The Boot Adapter List allows selection and ordering of boot adapters. Global Properties allow changes to global scope settings. Refer to [Section 2.4.4, “Boot Adapter List Menu,” page 2-17](#) and [Section 2.4.5, “Global Properties Menu,” page 2-20](#) for more detailed information.



## 2.4.2 Adapter Properties Menu

The Adapter Properties menu allows you to view and modify adapter settings and SCSI devices connected to it. It also provides access to an adapter's device settings. To display this menu, select a device under Adapter field on the Main menu and press Enter. [Figure 2.2](#) illustrates the Adapter Properties menu.

**Figure 2.2 Adapter Properties Menu**

LSI Logic SDMS (TM) PCI SCSI Configuration Utility Version PCI-4.XX.00		
<b>Adapter Properties</b>		
Adapter	PCI	Dev/
	Bus	Func
53C895	0	60
<b>&lt;Device Properties&gt;</b>		
SCSI Parity	[Yes]	
Host SCSI ID	[7]	
SCSI Bus Scan Order	[Low to High (0..Max)]	
Removable Media Support	[None]	
CHS Mapping	[SCSI Plug and Play Mapping]	
Spinup Delay (Secs)	[2]	
Secondary Cluster Server	[No]	
Termination Control	[Auto]	
<b>&lt;Restore Defaults&gt;</b>		
F1 =Help	ArrowKeys=Select Item	-/+ =Change [Item]
Esc=Abort/Exit	Home/End =Select Item	Enter=Execute <Item>

Table 2.3 lists the fields on this menu and their descriptions.

**Note:** If the field displays in grey or yellow text it is available for changes. If it displays in white text it is not available.

**Table 2.3 Adapter Properties Menu Fields and Descriptions**

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

**Table 2.3 Adapter Properties Menu Fields and Descriptions (Cont.)**

Field	Field Type [Value]	Descriptions
CHS Mapping	Configuration [SCSI Plug and Play Mapping/ Alternate CHS Mapping]	<p>Defines how the Cylinder Head Sector (CHS) values are mapped onto a disk without pre-existing partition information. <i>SCSI Plug and Play Mapping</i> automatically determines the most efficient and compatible mapping. <i>Alternate CHS Mapping</i> utilizes an alternate, possibly less efficient mapping that may be required if a device is moved between adapters from different vendors.</p> <p><b>Caution:</b> Neither of these options has any effect after a disk has been partitioned using the <code>FDISK</code> command. The <code>FDISK</code> utility is a tool that you can use to delete partition entries, one or all of them. If all partition entries are deleted, it is necessary to reboot to clear memory or the old partitioning data will be reused, thus nullifying the previous operation. Use care to ensure that the correct disk is the target of an <code>FDISK</code> command.</p>
Spinup Delay (secs)	Configuration [1 to 15]	Indicates the delay in seconds between spinups of devices attached to an adapter. Staggered spinups balance the total electrical current load on the system during boot. The default value is 2 seconds.
Secondary Cluster Server	Configuration [Yes/No]	<p>Indicates whether an adapter has one or more devices attached that are shared with one or more other adapters. Therefore, the SDMS SCSI BIOS should avoid SCSI bus resets as much as possible.</p> <p>This option allows you to enable an adapter to join a cluster of adapters without doing any SCSI bus resets. This is a requirement for the Microsoft Cluster Server. The default value is No with an alternate option of Yes.</p>
Termination Control	Configuration [Auto/Off]	<p>If available, the field Indicates whether an adapter has automatic termination control. If not available, its current status is either <i>Auto</i> or <i>Off</i>.</p> <p><i>Auto</i> means that the adapter automatically can determine whether it should enable or disable its termination.</p> <p><i>Off</i> means termination on the adapter is off and the devices at the ends of the SCSI bus must terminate the bus.</p>
Restore Defaults	Executable	Press Enter to obtain default settings.

### 2.4.3 Device Properties Menu

The Device Properties menu allows you to view and update individual device settings for an adapter. Changing a setting for the host device (for example, SCSI ID 7) changes the setting for all devices. The number of fields displayed requires the menu to scroll left/right in order to display the information. When accessing this menu online, use the Home/End keys to scroll to columns currently not displayed. The scroll indicator on the bottom of the menu shows where the cursor is relative to the first and last columns. The example for the Device Properties menu is split (Figure 2.3 and Figure 2.4) due to the width of its multiple fields/columns.

**Figure 2.3 Device Properties Menu (Left Half)**

LSI Logic SDMS (TM) PCI SCSI Configuration Utility Version PCI-4.XX.00								
Device Properties								
SCSI ID	Device Identifier	MB/Sec	MT/Sec	Data Width	Scan ID	Scan LUNs>0	Dis-connect	
0	Quantum Viking 4.5	[160]	[80]	[16]	[Yes]	[Yes]	[On]	
1	Quantum Viking 4.5	[160]	[80]	[16]	[Yes]	[Yes]	[On]	
2	Quantum Viking 4.5	[160]	[80]	[16]	[Yes]	[Yes]	[On]	
3	Quantum Viking 4.5	[160]	[80]	[16]	[Yes]	[Yes]	[On]	
4	Quantum Viking 4.5	[160]	[80]	[16]	[Yes]	[Yes]	[On]	
5	Quantum Viking 4.5	[160]	[80]	[16]	[Yes]	[Yes]	[On]	
6	-	[160]	[80]	[16]	[Yes]	[Yes]	[On]	
7	53C895	[160]	[80]	[16]	[Yes]	[Yes]	[On]	
8	-	[160]	[80]	[16]	[Yes]	[Yes]	[On]	
9	-	[160]	[80]	[16]	[Yes]	[Yes]	[On]	
10	-	[160]	[80]	[16]	[Yes]	[Yes]	[On]	
11	-	[160]	[80]	[16]	[Yes]	[Yes]	[On]	
12	-	[160]	[80]	[16]	[Yes]	[Yes]	[On]	
13	-	[160]	[80]	[16]	[Yes]	[Yes]	[On]	
14	-	[160]	[80]	[16]	[Yes]	[Yes]	[On]	
15	-	[160]	[80]	[16]	[Yes]	[Yes]	[On]	
F1 =Help		ArrowKeys=Select Item				-/+ =Change [Item]		
Esc=Abort/Exit		Home/End =Select Item				Enter=Execute <Item>		

**Figure 2.4 Device Properties Menu (Right Half)**

LSI Logic SDMS (TM) PCI SCSI Configuration Utility Version PCI-4.XX.00								
Device Properties								
SCSI ID	Device Identifier	SCSI Timeout	Queue Tags	Boot Choice	Format	Verify	Restore Defaults	
0	Quantum Viking 4.5	< 10>	[On]	[No]	[Format]	[Verify]	<Defaults>	
1	Quantum Viking 4.5	< 10>	[On]	[No]	[Format]	[Verify]	<Defaults>	
2	Quantum Viking 4.5	< 10>	[On]	[No]	[Format]	[Verify]	<Defaults>	
3	Quantum Viking 4.5	< 10>	[On]	[No]	[Format]	[Verify]	<Defaults>	
4	Quantum Viking 4.5	< 10>	[On]	[No]	[Format]	[Verify]	<Defaults>	
5	Quantum Viking 4.5	< 10>	[On]	[No]	[Format]	[Verify]	<Defaults>	
6	-	< 10>	[On]	[No]	[Format]	[Verify]	<Defaults>	
7	53C895	< 10>	[On]	[No]	[Format]	[Verify]	<Defaults>	
8	-	< 10>	[On]	[No]	[Format]	[Verify]	<Defaults>	
9	-	< 10>	[On]	[No]	[Format]	[Verify]	<Defaults>	
10	-	< 10>	[On]	[No]	[Format]	[Verify]	<Defaults>	
11	-	< 10>	[On]	[No]	[Format]	[Verify]	<Defaults>	
12	-	< 10>	[On]	[No]	[Format]	[Verify]	<Defaults>	
13	-	< 10>	[On]	[No]	[Format]	[Verify]	<Defaults>	
14	-	< 10>	[On]	[No]	[Format]	[Verify]	<Defaults>	
15	-	< 10>	[On]	[No]	[Format]	[Verify]	<Defaults>	
F1 =Help		ArrowKeys=Select Item				-/+ =Change [Item]		
Esc=Abort/Exit		Home/End =Select Item				Enter=Execute <Item>		

Table 2.4 lists the fields on this menu and their descriptions.

**Table 2.4 Device Properties Menu Fields and Descriptions**

Field	Field Type [Value]	Description
SCSI ID	Information	Displays the device's SCSI identifier.
Device Identifier	Information	Indicates the ASCII device identifier string, as extracted from the device's inquiry data.
MB/Sec	Information [0/5/10/20/40/ 80/160]	Indicates the maximum synchronous data transfer rate of the adapter in megabytes per second corresponding to the width and transfer rate settings that follow.
MT/Sec	Configuration [0/5/10/20/40/ 80]	Indicates the maximum synchronous data transfer rate of the adapter in megatransfers per second. Can be changed to a lower transfer rate.
Data Width	Configuration [8/16]	Displays the maximum data width of the adapter in bits. Can be changed to narrower, if available.
Scan ID	Configuration [Yes/No]	<p>Indicates whether to scan for this SCSI identifier at boot time. Utilizing this setting allows you to ignore a device. This decreases boot time by disabling inquiry of unused SCSI identifiers.</p> <p>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.</p>
Scan LUNs > 0	Configuration [Yes/No]	<p>Indicates whether to scan for Logical Unit Numbers (LUNs) greater than zero for a device. LUN 0 is always queried. Use this option if a multi-LUN device responds to unoccupied LUNs or if it is desired to reduce the visibility of a multi-LUN device to LUN 0 only.</p> <p>Set this option to No if you have problems with a device that responds to all LUNs whether they are occupied or not. Also, if a SCSI device with multiple LUNs exists on your system but you do not want all of those LUNs to be available to the system, then set this option to No. This will limit the scan to LUN 0.</p>
Disconnect	Configuration [On/Off]	Indicates whether to allow a device to disconnect during SCSI operations. Some (usually newer) devices run faster with disconnect enabled, while some (usually older) devices run faster with disconnect disabled.

**Table 2.4     Device Properties Menu Fields and Descriptions (Cont.)**

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



## 2.4.4 Boot Adapter List Menu

The Boot Adapter List menu specifies the order in which adapters boot when more than one LSI Logic host adapter is in a system. Up to four of the total adapters in a system can be selected as bootable. To control a Boot Volume, only one of the four “active” controllers can be used.

To select this menu:

1. Press F2 while on the Main menu to move the cursor to the menu Area.
2. Move the cursor to Boot Adapter List with the arrow keys.
3. Press Enter.

Adapters can be added or deleted using this menu. To add an adapter to the boot list, press the Insert key while on the Boot Adapter List. Use the arrow keys to select the desired adapter and press Enter to add it to the end of the Boot Adapter List.

To remove an adapter from the boot list, press the Delete key while on the desired adapter in the Boot Adapter List. You can also change the boot order by using the “+” or “-” keys. For example, place the cursor on the adapter that you want to change, and use the “+” or “-” key to raise or lower the boot order.

Figure 2.5 illustrates the Boot Adapter List menu.

**Figure 2.5 Boot Adapter List Menu**

LSI Logic SDMS (TM) PCI SCSI Configuration Utility Version PCI-4.XX.00					
Boot Adapter List					
Insert=Add an adapter			Delete=Remove an adapter		
Adapter	PCI Bus	Dev/Func	Boot Order	Current Status	Next Boot
53C895	0	98	[2]	Off	[On]
53C1010-66	0	60	[0]	On	[On]
53C1010-66	0	61	[1]	On	[On]
Hit Insert to select an adapter from this list.					
<53C895	0	98>			
<53C1010-66	0	60>			
<53C1010-66	0	61>			
F1=Help	ArrowKeys=Select Item		-/+ =Change [Item]		
Esc=Abort/Exit	Home/End =Select Item		Enter=Execute <Item>		

Table 2.5 lists the fields on this menu and their descriptions.

**Table 2.5 Boot Adapter List Menu Fields and Descriptions**

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

# 2.4.5 Global Properties Menu

The Global Properties menu allows you to view boot information and to set display and video modes. [Figure 2.6](#) illustrates the Global Properties menu. [Table 2.6](#) lists the fields and their descriptions.

**Figure 2.6 Global Properties Menu**

LSI Logic SDMS (TM) PCI SCSI Configuration Utility Version PCI-4.XX.00		
Global Properties		
	Pause When Boot Alert Displayed	[No]
	Boot Information Display Mode	[Verbose]
	Negotiate with devices	[Supported]
	Language	[English]
	Video Mode	[Color]
	Support Interrupt	[Hook Interrupt, the Default]
	<Restore Defaults>	
F1 =Help	ArrowKeys=Select Item	-/+ =Change [Item]
Esc=Abort/Exit	Home/End=Select Item	Enter=Execute <Item>

**Table 2.6 Global Properties Fields and Descriptions**

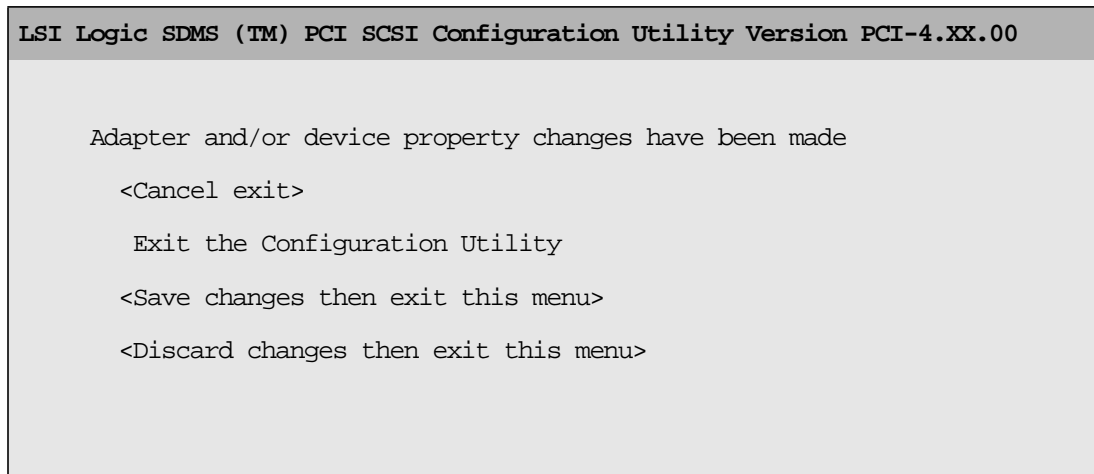
Field	Field Type [Value]	Description
Pause When Boot Alert Displayed	Configuration [Yes/No]	<p>Specifies a pause during the boot for user acknowledgement. The pause occurs after displaying an alert message.</p> <p>To continue after displaying a message, specify No.</p> <p>To wait for any key after displaying a message, specify Yes.</p>
Boot Information Display Mode	Configuration [Terse/Verbose]	<p>Specifies how much BIOS information displays during boot.</p> <p>To display minimum information, specify Terse mode.</p> <p>To display detailed information, specify Verbose mode.</p>
Negotiate with Devices	Configuration [All, None, Supported]	Sets the default value for synchronous and wide negotiations with specified devices.
Language	Configuration	This option specifies the current language set for using this utility.
Video Mode	Configuration [Color/Monochrome]	Specifies the default video mode for the SCSI BIOS Configuration Utility. The monochrome setting enhances readability on a monochrome monitor.
Support Interrupt	Configuration for BBS Systems [Hook Interrupt, the default/Bypass Interrupt Hook]  Fixed for non-BBS systems	<p>This option allows the ability to prevent a hook on INT40h, if required. The two settings are: Hook Interrupt, the default, and Bypass Interrupt Hook.</p> <p>Hook Interrupt is the normal operation that supports booting CD-ROMs in floppy emulation mode on most machines.</p> <p>On certain platforms, the system BIOS uses the INT40h interrupt chain in a nonstandard way. On these platforms, you should use the "Bypass Interrupt Hook" setting. This setting prevents a hook into the INT40h chain. If the "Bypass Interrupt Hook" setting is used on systems that do not require it, the CD-ROM may fail to boot and an error message may appear and indicate it is unable to read the boot device.</p> <p><b>Note:</b> Try toggling this value if your machine fails to boot a CD-ROM in floppy emulation mode.</p>
Restore Defaults	Executable	Press Enter to obtain default settings.

---

## 2.5 Exiting the SCSI BIOS Configuration Utility

The Exit menu for the SCSI BIOS Configuration Utility is used for all five of the menus listed above. However, the available functionality is different for the Main menu and the four subordinate menus. [Figure 2.7](#) illustrates the Exit menu.

**Figure 2.7 Exit Menu**



To exit from the Adapter Properties, Device Properties, Boot Adapter List, or Global Properties menus, use these exit options:

- |  |  |
|--|--|
| <b>Cancel exit</b>                         | This option returns you to the previous menu.  |
| <b>Save changes then exit this menu</b>    | This option implements any changes you made on the previous menu and returns you to the Main menu. |
| <b>Discard changes then exit this menu</b> | This option restores the default settings and returns you to the Main menu.                        |

To exit from the Main menu, use these exit options:

- |                                       |  |
|---------------------------------------|--|
| <b>Cancel exit</b>                    | This returns you to the Main menu.   |
| <b>Exit the Configuration Utility</b> | This option exits the configuration and automatically reboots your system. |

**Important:** If you reboot the system without properly exiting from this utility, some changes may not take effect.

# Chapter 3

## Windows 95, Windows 98, Windows Me Device Driver Installation

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This chapter describes the device drivers for the Windows 95, Windows 98, and Windows Me operating systems. It provides installation instructions for new and existing system installations and includes these topics:

- [Section 3.1, "Introduction," page 3-1](#)
  - [Section 3.2, "Using the SYMC8XX/SYM\\_HI/SYM\\_U3 Drivers," page 3-4](#)
  - [Section 3.3, "Installing Drivers for Windows 95/98/Me," page 3-5](#)
  - [Section 3.4, "Troubleshooting," page 3-13](#)
  - [Section 3.5, "Using the Command Line Options," page 3-14](#)
  - [Section 3.6, "Using SCSI Tools for Windows 95/98," page 3-20](#)
- 

### 3.1 Introduction

Windows 95, Windows 98, and Windows Millennium Edition (Me) are operating systems designed to run on Intel processors using current technology. This chapter refers to Windows 95, Windows 98, and Windows Me as Windows 95/98/Me in many instances.

Windows 95/98/Me provides a graphical user interface (GUI) environment incorporating many high-level features. Refer to the Microsoft Windows 95/98/Me documentation for more details. An I/O manager handles I/O requests by going through the appropriate drivers to address a SCSI peripheral.

Windows 95/98/Me provides class drivers for hard disk, floptical, CD-ROM, printer, and scanner peripherals. Other class drivers, provided by peripheral manufacturers, are added to support new devices. Microsoft provides the port driver and LSI Logic provides the miniport drivers, which are called `SYMC8XX.MPD`, `SYM_HI.MPD`, and `SYM_U3.MPD`.

These drivers complete the path to an LSI Logic controller or processor with an optional SDMS SCSI BIOS.

LSI Logic uses the same filenames for their drivers for different Windows operating systems. The driver files are packaged either in separate subdirectories based on the Windows operating system or on different flex disks. To determine the driver file for Windows 95/98/Me, note that the filename ends with `.MPD`. The following sections describe these drivers and their installation.

### 3.1.1 Features

The SDMS device drivers for Windows 95/98/Me support these features:

- Ultra160 data transfers (for LSI53C1000 and LSI53C1010)
- Domain Validation (for the `SYM_U3.MPD` driver only)
- Parallel Protocol Request (PPR) (for the `SYM_U3.MPD` driver only)
- Cyclic Redundancy Check (CRC) (for the `SYM_U3.MPD` driver only)
- Synchronous negotiation (including Fast SCSI, Ultra SCSI, Ultra2 SCSI)
- Wide negotiation
- Auto Request Sense
- Multiple host adapters
- Multiple LUNs
- Disconnect/Reselect
- Scatter/Gather
- Differential support
- SCSI pass-through functionality
- SCSI Configured AutoMatically (SCAM)
- Target Initiated Negotiation (TIN)
- NVRAM (wide/sync parameters, SCSI Host ID, SCAM on/off)

### 3.1.2 LSI Logic Devices Supported

All LSI Logic devices and host adapters have undergone a name change. They have transitioned from a SYM prefix to an LSI prefix. No name changes have occurred for the SDMS Windows 95/98/Me drivers.



The `SYMC8XX.MPD` driver supports the following devices and their associated LSI Logic host adapters:

- LSI53C810, LSI53C810A, LSI53C810AE (LSI8100S, LSI8100ASP, LSI20810)
- LSI53C815 (LSI815XS, LSI8150SP)
- LSI53C825, LSI53C825A (LSI8250S, LSI8251S, LSI8251D, LSI8250ASP, LSI8251ASP, LSI8251AD)
- LSI53C860, LSI53C860AE (LSI8600SP, LSI20860)
- LSI53C875, LSI53C875E (LSI8750SP, LSI8751SP, LSI8751SPE, LSI8751D)
- LSI53C876, LSI53876E (LSI22801, LSI22802)
- LSI53C885
- LSI53C895 (LSI8951U, LSI8952U)

The `SYM_HI.MPD` driver supports the following devices and their associated LSI Logic host adapters:

- LSI53C895A (LSI8953U)
- LSI53C896 (LSI22910, LSI21002, LSI22902)

The `SYM_U3.MPD` driver supports the following devices and their associated LSI Logic host adapters:

- LSI53C1000 (LSI20160, LSI20160L)
- LSI53C1010 (LSI22915A, LSI22903, LSI21040, LSI21003, ITI6200U3LP).

### 3.1.3 Description

The `SYMC8XX.MPD`, `SYM_HI.MPD`, and `SYM_U3.MPD` drivers conform to the Microsoft specification for miniport drivers. These drivers allow connection of SCSI devices including disk drives, CD-ROMs, and tape drives for PCI-based machines. To support a new SCSI device, Windows 95/98/Me architecture requires that a class driver for that type of device be present. These are usually supplied by Microsoft, or possibly by the peripheral manufacturer. No changes to `SYMC8XX.MPD`, `SYM_HI.MPD`, or `SYM_U3.MPD` are required. These drivers are only supported under Windows 95/98/Me.

A Windows application passes SCSI commands directly to the SCSI devices by using the SCSI pass-through facility. Refer to Microsoft Windows 95/98/Me documentation for more details. This facility allows applications to directly control and access SCSI devices by filling in a data structure and calling into the port driver.

The SYMC8XX.MPD and SYM\_HI.MPD drivers support Ultra SCSI protocol, providing twice the raw data transfer rate of Fast SCSI for disk drives and LSI Logic host adapters that support Ultra SCSI. These drivers also support Ultra2 SCSI protocol, providing quadruple the raw data transfer rate of Fast SCSI.

The SYM\_U3.MPD driver supports Ultra160 SCSI protocol providing up to 160 Mbytes/s data transfer for double transition. Ultra160 also includes CRC, PPR, and Domain Validation. The standard Ultra160 SCSI protocol performs 80 megatransfers per second resulting in approximately double the synchronous data transfer rates of Ultra2 SCSI.

**Caution:** Ultra SCSI requires more stringent SCSI bus cabling setups than Fast SCSI. Ultra2 SCSI and Ultra160 SCSI require Low Voltage Differential (LVD) termination.

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## 3.2 Using the SYMC8XX/SYM\_HI/SYM\_U3 Drivers

The SDMS Software Device Driver and Utilities CD-ROM contains the SYMC8XX.MPD, SYM\_HI.MPD, and SYM\_U3.MPD drivers and their associated files in this directory:

```
{CD-ROM Drive Letter}:\DRIVERS\WIN9X
```

You must prepare an SDMS Driver Diskette before proceeding with the installation instructions.

### 3.2.1 Preparing an SDMS Driver Diskette

Copy the files listed in this section to the root directory of a clean diskette. Various subdirectories contain the appropriate driver files. You will use this SDMS driver diskette during installation.

For the SYMC8XX.MPD driver, locate the files at:

```
{CD-ROM Drive Letter}:\DRIVERS\WIN9X\8XX9X.
```

- SYMC8XX.MPD
- SYMC8XX.INF

For the SYM\_HI.MPD driver, locate the files at:

{CD-ROM Drive Letter}:\DRIVERS\WIN9X\WIN9XHI.

- SYM\_HI.MPD
- SYM\_HI.INF

For the SYM\_U3.MPD driver, locate the files at:

{CD-ROM Drive Letter}:\DRIVERS\WIN9X\9XULTRA3

- SYM\_U3.MPD
- SYM\_U3.INF

You may also obtain the Windows 95/98/Me drivers from the LSI Logic web site at: <http://www.lsilogic.com>. After you are connected to this web site, place your cursor on the Get Drivers option in the menu bar. Click on the Drivers selection. Choose the Windows 95/98/Me operating system for SCSI and click on the Go button. Follow the instructions on subsequent screens to download the drivers.

---

## 3.3 Installing Drivers for Windows 95/98/Me

This section provides installation instructions for new and existing Windows 95/98/Me systems.

### 3.3.1 New System Installation

Use this procedure to install the SYMC8XX.MPD, SYM\_HI.MPD, or SYM\_U3.MPD drivers onto Windows 95/98/Me systems. Windows 95/98/Me automatically adds the driver to the registry and copies the driver to the appropriate directories. You must install drivers for all host adapters that are listed as "PCI SCSI Bus Controller." Installing these drivers can be done completely before rebooting your system.

**Note:** A driver bundled in Windows 95, Windows 98, or Windows Me supports some LSI Logic PCI to SCSI host adapters. For those adapters, the bundled driver is automatically

installed during Windows Setup. To change to the SYMC8XX.MPD, SYM\_HI.MPD, or SYM\_U3.MPD drivers, follow the instructions in [Section 3.3.2, “Existing System Installation,”](#) after the Windows 95/98/Me installation has completed.

Follow these instructions for new system installations:

Step 1. Start the Windows 95, Windows 98, or Windows Me Setup according to the Microsoft instructions.

Step 2. Setup enters the hardware detection phase after a system reboot.

If the message *Symbios™ PCI SCSI Host Adapter* appears, then the bundled driver supports the host adapter, and it installs automatically. After the Windows installation has completed, you can install the SYMC8XX.MPD, SYM\_HI.MPD, and/or SYM\_U3.MPD drivers according to the instructions for an existing system installation

Step 3. If the bundled driver does not support the host adapter, Setup displays a New Hardware Found - PCI SCSI Bus Controller dialog box.

Step 4. Select Driver from disk provided by hardware manufacturer and click OK.

**Note:** If ASPI8XX.SYS (the SDMS 4.0 DOS ASPI driver) is loaded when beginning the Windows 95/98/Me installation, no messages about PCI SCSI Bus Controllers will appear. The installation completes, but real-mode disk drivers are used. Refer to [Section 3.3.4, “Verifying Correct Driver Installation,”](#) page 3-11 for more information.

To install the SYMC8XX.MPD, SYM\_HI.MPD, or SYM\_U3.MPD, drivers, (which disable loading of the ASPI8XX.SYS driver under Windows 95/98/Me) refer to [Section 3.3.3, “Existing System Using ASPI8XX.SYS DOS ASPI Driver,”](#) page 3-10 for installation instructions.

Step 5. Insert the SDMS driver diskette into drive A: (or B:) If using drive B:, you must select it from the pick list.

Windows 95/98/Me automatically copies the appropriate driver files and rebuilds its driver database.

The System Settings Change dialog box appears.

- Step 6. Remove the diskette from the drive and click Yes to restart the computer.

At this point, Windows 95/98/Me Setup has completed and the new driver is operational. To verify this, see [Section 3.3.4, "Verifying Correct Driver Installation."](#)

Note: These instructions for Windows 98 are similar to the installation instructions for Windows Me. Although some differences exist with a new system installation for Windows Me, an experienced user should be able to follow the prompts as they appear. LSI Logic recommends that you also refer to the Microsoft documentation that is included with the Windows Me operating system.

### 3.3.2 Existing System Installation

This procedure installs the SYMC8XX.MPD, SYM\_HI.MPD, or SYM\_U3.MPD drivers onto an existing Windows 95/98/Me system. Steps 1 through 7 are general instructions that apply to both operating systems. Starting at Step 8, specific information for Windows 95, Windows 98, or Windows Me is listed separately. Review the steps below before starting the installation and then follow these instructions to install the drivers:

- Step 1. Boot Windows 95, Windows 98, or Windows Me.
- Step 2. Click on the Start button. Move to Settings-->Control Panel.
- Step 3. Double click on the System icon.
- Step 4. Click on the Device Manager tab.

Note: If the SCSI controllers entry, or the PCI LSI Logic C8XX SCSI Host Adapter entry do not exist, the system is probably using the ASPI8XX.SYS DOS ASPI driver. Refer to [Section 3.3.3, "Existing System Using ASPI8XX.SYS DOS ASPI Driver,"](#) page 3-10 for more information.

- Step 5. Either double click on the SCSI controllers entry or click once on the plus sign to the left of it.
- Step 6. Select the PCI LSI Logic C8XX SCSI Host Adapter entry and click on the Properties button.

Step 7. Click on the Driver button.

In Windows 95, the version of the currently active driver should display in the File details section. In Windows 98 and Windows Me, press the Driver File Details button to get this information to appear.

Note: In certain versions of Windows 95, the version of the active driver appears as *not* available. This operating system issue is fixed in later versions of Windows 95. To verify the version of the driver, click on the Properties field of the SYMC8XX.MPD, SYM\_HI.MPD, or SYM\_U3.MPD file under the Version tab. The MPD driver is generally found in the \WINDOWS\SYSTEM\IOSUBSYS\ directory.

### **For Windows 95**

Step 8. Click on the Change Driver... button.

Step 9. Even though you may have previously installed the SYMC8XX.MPD, SYM\_HI.MPD, or SYM\_U3.MPD drivers, proceed to click on the Have Disk... button to install a newer version.

Step 10. Insert the SDMS driver diskette in drive A: (or B:) (the one prepared in [Section 3.2.1, "Preparing an SDMS Driver Diskette"](#)) and click OK. If using drive B:, you must select it from the pick list.

The Select Device dialog box should display Symbios 8xx PCI SCSI Host Adapter, where 8xx matches the installed adapter.

Step 11. Click on the OK button.

The Driver tab is updated to display the new driver files.

Step 12. Click on the OK button to install these drivers.

(Do not click on the Change Driver... button.) The system copies the driver files and builds a new driver database.

### **For Windows 98**

The Update Device Driver Wizard starts and provides several windows with choices. Follow the steps below to correctly install the device driver for Windows 98.

Step 8. Click on the Change Driver...button

Step 9. Click on the Next button after the Intro window appears.

The Wizard provides a choice between having this utility search for a better driver than the one in use or displaying a list of drivers from a specific location.

Step 10. Choose `search...` and click on the Next button.

The next window allows you to specify which device(s) are searched, such as a floppy diskette, CD-ROM, or to specify a precise path.

Step 11. Select `Floppy disk drive only`, then click on the Next button.

The next window queries you about utilizing the currently installed driver.

Step 12. Mark `Install one of the other drivers`, then click on the View List button.

Next, a list of drivers appears from the specified search devices as well as the currently installed driver.

Step 13. Highlight the driver of choice, and click on the OK button.

The previous window (in Step 12) appears with the selected driver displayed as the driver to be installed.

Step 14. Click on the Next button.

The next window displays the chosen driver along with reference to the designated path to install it in.

Step 15. Click on the Next button.

The Wizard Summary window appears.

Step 16. Click on the Finish button.

When installation has completed, the System Settings Change dialog box appears.

Step 17. Remove the diskette from the drive and click Yes to restart the computer.

## **For Windows Me**

Step 8. Select the radio button that specifies the location of the driver.

Step 9. Click on the Next button.

Another window appears.

Step 10. Choose search as well as specifying the media to search, such as floppy diskette, CD-ROM, or specific path.

Step 11. Click on the Next button.

For example, if floppy diskette was chosen, the system would search for the correct driver on this diskette and automatically select it.

Step 12. Click on the Next button.

The system displays a window indicating the directory where the file will reside.

Step 13. Click on the Next button.

Step 14. Click on the Finish button.

The system displays a window prompting you to reboot your computer.

Step 15. Reboot your system at this point for the installation of the driver to take effect.

At this point, the new driver is operational. To check this, see [Section 3.3.4, "Verifying Correct Driver Installation."](#)

### 3.3.3 Existing System Using ASPI8XX.SYS DOS ASPI Driver

This procedure installs the `SYMC8XX.MPD`, `SYM_HI.MPD`, or `SYM_U3.MPD` drivers onto an existing Windows 95/98/Me system that is using the `ASPI8XX.SYS` DOS ASPI driver. Follow these instructions to install the miniport drivers:

Step 1. Boot Windows 95 or Windows 98 or Windows Me.

Step 2. Click on the Start button. Select Settings-->Control Panel.

Step 3. Double click on the System icon.

Step 4. Click on the Device Manager tab.

Step 5. Either double click on the Other entry or click once on the plus sign to the left of it.

Step 6. Select the `PCI SCSI Bus Controller` entry and click the Properties button.

Step 7. Click on the Driver button.



A message should state that no drivers are installed for this device.

- Step 8. Click on the Change Driver... button.
- Step 9. Select `SCSI Controllers` in the Select Hardware Type dialog box.
- Step 10. Click on the Have Disk button in the Select Device dialog box.
- Step 11. Insert the SDMS driver diskette in drive A: (or B:) and click OK. If using drive B:, you must select it from the pick list.
- Step 12. The Select Device dialog box should display `Symbios 8xx PCI SCSI Host Adapter`, where 8xx matches the installed adapter. Click on the OK button.

The Driver tab is updated to display the new driver files.

- Step 13. Click on the OK button to install these driver files.

(Do *not* click on the Change Driver... button.)

The system copies the driver files and builds a new driver database. The System Settings Change dialog box appears. Ignore the message saying to turn off your computer and change hardware settings.

- Step 14. Remove the diskette from the drive and click on the Yes button to shut down the computer.
- Step 15. Press the `Ctrl-Alt-Delete` keys or the system reset button to restart the system.

At this point, the new driver is operational. To confirm this, refer to [Section 3.3.4, "Verifying Correct Driver Installation."](#)

### 3.3.4 Verifying Correct Driver Installation

After installing or updating the `SYMC8XX.MPD`, `SYM_HI.MPD`, or `SYM_U3.MPD` drivers, LSI Logic recommends that you verify the operation of these drivers. Follow these steps to verify the correct driver has been installed.

- Step 1. Check that all devices on the SCSI bus are available by using the Windows Explorer option called "My Computer."
- Step 2. Double click on the My Computer icon.  
All CD-ROMs available appear here.

- Step 3. Check the SCSI hard drives entry in the Device Manager.
- Step 4. Click on the Start button. Select Settings-->Control Panel.
- Step 5. Double click on the System icon.
- Step 6. Click on the Device Manager tab.
- Step 7. Check that no host adapter appears with a yellow or red symbol under the SCSI controllers entry.

If none, you have completed the verifying process.

or

If there is, continue with the steps below to help determine the problem.

- Step 8. Either double click on the SCSI controllers entry, or click once on the plus sign to the left of it.

One entry for each host adapter installed in the system appears.

- Step 9. Select an entry, and then click on the Properties button.

The Device Status message should read *This device is working properly*. If any other messages appear, continue with the steps below to get more information about the problem.

- Step 10. Click on the Driver tab for Windows 95.

-or-

Press Driver File Details for Windows 98.

Two entries should appear: one for the INF file and one for the MPD file. The INF file does not contain embedded version information, so the File Details are all "Not Available."

- Step 11. Select the MPD file. The file version of the driver appears.

- Step 12. Click Cancel to leave the Host Adapter Properties dialog box.

- Step 13. Click on the Performance tab.

A list of performance attributes appears. Below the list, you should see the message *Your system is configured for optimal performance*.

If any other messages appear, select each message and click on the Details button. This provides more information on why

the system is not performing optimally and methods to correct the problem.

If you do not encounter any problems, the new driver is operating properly. Otherwise, consult [Section 3.4, “Troubleshooting,”](#) for additional information.

---

## 3.4 Troubleshooting

Some potential problems and their suggested solutions are:

### **During installation, no SCSI devices are found.**

- Ensure that all devices are powered on and terminated correctly.
- Check that no devices have duplicate SCSI IDs.
- Make sure INTA is assigned for the PCI slot(s) where your SCSI host adapter(s) are installed.
- Be sure that all devices appear properly in the display banner of the SDMS SCSI BIOS at boot time.

### **Problems with Ultra SCSI devices using Ultra SCSI protocol.**

If the system is configured with an LSI Logic host adapter that supports Ultra SCSI, an Ultra SCSI device is on the SCSI bus, and Ultra SCSI support by the SYMC8XX.MPD, SYM\_HI.MPD, or SYM\_U3.MPD driver is enabled, intermittent problems and possible system crashes can occur. It may be that the SCSI bus cable and terminators do not conform to the Ultra SCSI specification.

To resolve problems with Ultra SCSI devices, follow these steps:

Step 1. Disable Ultra SCSI support using the procedure described in [Section 3.5.1, “Enabling/Disabling Ultra SCSI Support,”](#) [page 3-15](#) if the system is bootable.

or

Hold down the F8 function key when Starting Windows 95/98/Me . . . appears if the system is not bootable to Windows 95/98/Me.

Step 2. Select Safe Mode.

Step 3. Disable Ultra SCSI support using the procedure described [Section 3.5.1, “Enabling/Disabling Ultra SCSI Support,”](#) once the system is booted.

If the system operates properly without Ultra SCSI enabled, it is highly likely that the SCSI bus cable and terminators are not configured correctly for Ultra SCSI. Refer to the LSI Logic host adapter user's guide for information on Ultra SCSI cabling requirements.

Step 4. Verify that the devices appear with the proper value for speed in the SDMS SCSI BIOS banner at boot time. Refer to [Chapter 2, “SCSI BIOS and Configuration Utility,”](#) for additional details.

### **Problems with scanners.**

If a scanner is not operating properly (either the scanner is not found or a SCSI interface error occurs during scanning), it is possible that the third party scanner drivers do not support the auto request sense feature of LSI Logic host adapters. Disable the auto request sense feature as described in [Section 3.5.2, “Disabling Auto Request Sense Support,”](#) and try the scanner operation again.

### **The system hangs at boot, has a long boot time, or SCSI device not available.**

Some older SCSI devices do not tolerate Domain Validation operations. At system boot time, Domain Validation is performed to test the data integrity of the SCSI bus between the host adapter and each target device. With some older SCSI devices, these operations can cause the device to stop responding to SCSI commands.

Refer to the Command Line Options [Section 3.5.4, “Disabling Domain Validation Support,” page 3-17](#). Disable this support as described either for a specific problem SCSI target or all adapters controlled by the SYMC8XX.MPD, SYM\_HI.MPD, or SYM\_U3.MPD driver.

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## **3.5 Using the Command Line Options**

This section describes various command line options that allow changes to the host adapter.

### 3.5.1 Enabling/Disabling Ultra SCSI Support

Settings in the adapter NVRAM control Ultra SCSI support. These settings can be viewed or changed through the SCSI BIOS Configuration Utility. During system boot, after the LSI Logic PCI SCSI BIOS banner, the message `Press Ctrl-C to start Configuration Utility` appears for a few seconds.

To enable/disable Ultra SCSI support, follow these steps:

Step 1. Press `Ctrl-C` to start this utility.

Step 2. Select one of the adapters displayed, then select `Device Properties`.

This shows the Sync Rate for each device and the selected adapter.

Step 3. Set the speed to 20 Mbytes/s for an Ultra device (for width of 8) or 40 Mbytes/s (for width of 16).

or

Set the speed to 10 Mbytes/s (for width of 8) or 20 Mbytes/s (for width of 16) to disable Ultra. If the speed of the adapter itself is changed, the speed for all devices will be set no higher than the adapter speed.

### 3.5.2 Disabling Auto Request Sense Support

When the system installs the `SYMC8XX.MPD`, `SYM_HI.MPD`, and/or `SYM_U3.MPD` drivers, support for auto request sense is enabled. Auto request sense is a feature of the adapter where certain device information is obtained automatically without system control, thereby increasing overall performance. However, some third party peripheral drivers do not support the use of auto request sense, resulting in perceived device failures.

To allow these devices to operate properly, the auto request sense feature can be disabled using the Device Manager on a per adapter basis. Follow this procedure to disable auto request sense support:

Step 1. Click on the Start button. Select `Settings-->Control Panel`.

Step 2. Double click on the System icon.

- Step 3. Click on the Device Manager tab.
- Step 4. Either double click on the SCSI controllers entry or click once on the plus sign to the left of it.
- One entry for each host adapter installed in the system appears.
- Step 5. Select the desired adapter, and click on the Properties button.
- Step 6. Click on the Settings tab.
- Step 7. Type `DisableAutoReqSense=1;`. If there is already an entry displayed, type the above at the end of the existing entry. Be sure to include the semicolon.
- Step 8. Click OK to exit the Settings tab.
- Step 9. Click OK again.
- If the entry was changed, the System Settings Change dialog box appears.
- Step 10. Click Yes to restart the computer.

After the system reboots, auto request sense is disabled for the selected adapter. To re-enable auto request sense, delete the entry that was made above. If other entries exist, be sure to leave them intact.

### 3.5.3 Enabling SCAM Support

SCAM is a protocol that allows SCAM-compliant peripherals to assign their SCSI IDs dynamically at boot time, eliminating the need for you to check and set unique SCSI IDs. The SDMS PCI BIOS and the `SYMC8XX.MPD`, `SYM_HI.MPD`, and `SYM_U3.MPD` drivers have this feature disabled by default.

Some peripherals have problems with the SCAM protocol, resulting in the device either not being seen by the operating system, or not working correctly. Windows 98 and Windows Me do not support the use of SCAM.

If you desire usage of the SCAM protocol, follow these steps to enable SCAM

- Step 1. Click on the Start button. Select Settings-->Control Panel.
- Step 2. Double click on the System icon.

- Step 3. Click the Device Manager tab.
- Step 4. Either double click on the SCSI controllers entry or click once on the plus sign to the left of it.
- One entry for each host adapter installed in the system appears.
- Step 5. Select the adapter desired, then click the Properties button.
- Step 6. Click on the Settings tab.
- Step 7. Type in the Adapter settings entry:
- ```
do_SCAM=1 ;
```
- If an entry already appears there, type the above at the end of the existing entry. Be sure to include the semicolon.
- Step 8. Click OK to exit the Settings tab.
- Step 9. Click OK again.
- If you changed the entry, the System Settings Change dialog box appears.
- Step 10. Click Yes to restart the computer.

After the system reboots, SCAM is enabled for the selected adapter. To disable SCAM, delete the entry that was made above. If other entries exist, be sure to leave them intact.

### 3.5.4 Disabling Domain Validation Support

When the `SYMC8XX.MPD`, `SYM_HI.MPD`, or `SYM_U3.MPD` driver is installed, support for Domain Validation is enabled. Domain Validation is a feature of the adapter where the data transfer speed between the adapter and each target is tested at system boot. If the test fails, the data transfer speed is reduced and the test is repeated until a supported data transfer speed is found.

However, some older SCSI devices do not properly support the standard SCSI commands used during this testing, resulting in the system not booting or a device not available. To allow these devices to operate properly, you can disable the Domain Validation feature by using the Device Manager for all adapters controlled by the respective driver, or by using the SCSI BIOS Configuration Utility on a per device basis.

To disable Domain Validation support for all adapters controlled by the SYMC8XX.MPD, SYM\_HI.MPD, or SYM\_U3.MPD driver, follow these steps:

- Step 1. Click on the Start button. Select Settings-->Control Panel.
- Step 2. Double click on the System icon.
- Step 3. Click on the Device Manager tab.
- Step 4. Either double click on the SCSI controllers entry, or click once on the plus sign to the left of it.

One entry for each host adapter installed in the system appears.

- Step 5. Select any adapter controlled by the desired driver, then click on the Properties button.

- Step 6. Click on the Settings tab.

- Step 7. Type `DisableDomainValidation=1;` in the Adapter settings entry.

If there is already an entry displayed, type the above at the end of the existing entry. Be sure to include the semicolon.

- Step 8. Click OK to exit from the Settings tab.

- Step 9. Click OK again.

If the entry was changed, the "System Settings Change" dialog box appears.

- Step 10. Click Yes to restart the computer.

After the system reboots, Domain Validation is disabled for adapters controlled by the selected driver. To re-enable Domain Validation, delete the entry that was made above. If other entries exist, be sure to leave them intact.

To disable Domain Validation support for a selected device, using the SCSI BIOS Configuration Utility, follow these steps:

- Step 1. Press `Ctrl-C` to start this utility when prompted to do so during system boot.
- Step 2. Select the desired adapter and press Enter.
- Step 3. Choose "Device Selections" and press Enter.



This shows the Sync Rate and Width for each device and the selected adapter.

Step 4. Set the Sync Rate to 0 and Width to 0 for the selected device.

This sets the device to asynchronous/narrow transfers and Domain Validation functions are not issued to this device.

Step 5. Exit the SCSI BIOS Configuration Utility and save changes.

### **3.5.5 Multiple LSI Logic Host Adapters Considerations**

If multiple LSI Logic PCI SCSI host adapters are installed in the system, special actions are sometimes required to install or change drivers. This is due to the fact that the bundled driver supports some LSI Logic host adapters, and also that one SDMS device driver can support multiple LSI Logic host adapters installed in the system.

With multiple LSI Logic adapters, it is possible to have a situation where one adapter is assigned to one driver, and another is assigned to a different version of the same driver. This can cause conflicts that may cause the system to switch to real-mode drivers, affecting performance and access to CD-ROM or tape drives.

When installing additional boards or updating drivers, only one version of the appropriate driver controls all the LSI Logic host adapters. To update your system to the correct driver, two methods are available.

#### **3.5.5.1 Method 1**

Follow these steps:

Step 1. Change the driver for a particular host adapter to the desired driver by using the Device Manager.

Step 2. Click No when prompted to reboot the system for the new settings to take effect.

Step 3. Change drivers for all LSI Logic host adapters in the system supported by that same driver to the new driver, and reply No to rebooting until the final adapter is changed.

If booting from a SCSI device, ensure that the adapter controlling this device is the last one changed.

### 3.5.5.2 Method 2

Follow these steps:

- Step 1. Determine which driver file is active for all adapters through the Properties tab in Device Manager. Go to the:

`\WINDOWS\SYSTEM\IOSUBSYS`

directory and rename the driver file to an extension other than MPD.

- Step 2. Reboot the system.

While booting, the system may ask to load the bundled driver file from the Windows 95/98 installation disk.

- Step 3. Click OK.

- Step 4. Click Skip File when the system says it cannot find the file.

Repeat this step for all adapter messages while booting.

- Step 5. Use the Device Manager to change the driver for each adapter to the desired driver after the system is booted.

- Step 6. Do not reply Yes to reboot the system until the final adapter has been changed.

---

## 3.6 Using SCSI Tools for Windows 95/98

SDMS SCSI Tools software for Windows 95/98 is a support utility that provides a mechanism for examining host adapters and SCSI devices within the Windows 95/98 environment. Under Windows 95/98, the ASPI support is bundled with the operating system.

### 3.6.1 Features

The SCSI Tools for Windows 95/98 support these features:

- Examination of SCSI device parameters
- Power management support
- Disk cache management support

### 3.6.2 Installing SCSI Tools for Windows 95/98

To install the SCSI Tools software for Windows 95/98, you execute an InstallShield setup program. If you obtained the software from the LSI Logic web site, it is in the form of a self-extracting zip file. Expand the zip file into a directory on the hard disk drive or to a diskette and then run `SETUP.EXE` program.

If you obtained this software from the SDMS Software Device Drivers and Utilities CD-ROM, run the `SETUP.EXE` program directly from:

```
{CD-ROM Drive Letter}:\UTILITY\WINDOWS\SYMTOOLS\I386
```

The setup program installs the SCSI Tools files into the proper directories and makes the appropriate registry entries. Reboot your computer after installing the software.



# Chapter 4

## Windows NT 4.0 Device Driver Installation

---

This chapter describes the device drivers for the Windows NT 4.0 operating system. It provides installation instructions for new and existing system installations along with utility information. This chapter includes these topics:

- [Section 4.1, "Introduction," page 4-1](#)
- [Section 4.2, "Using the SDMS Windows NT Drivers," page 4-7](#)
- [Section 4.3, "Installing Drivers for Windows NT," page 4-7](#)
- [Section 4.4, "Performance Tuning for Windows NT 4.0," page 4-13](#)
- [Section 4.5, "Troubleshooting," page 4-17](#)
- [Section 4.6, "Using the NT Configuration Utility," page 4-20](#)
- [Section 4.7, "Using the Domain Validation Utility," page 4-32](#)
- [Section 4.8, "Using SDMS ASPI for Windows NT 4.0," page 4-33](#)
- [Section 4.9, "Using SCSI Tools for Windows NT," page 4-34](#)

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### 4.1 Introduction

Windows NT 4.0 is an operating system designed to run on processors using current technology. It provides a graphical user interface environment that incorporates many high-level features. Refer to the Microsoft Windows NT documentation for more information. An I/O manager handles I/O requests in Windows NT by going through the appropriate drivers to address a SCSI peripheral.

Windows NT provides class drivers for hard disk, floptical, CD-ROM, printer, and scanner peripherals. Other class drivers, provided by peripheral manufacturers, may be added to support new devices. Tape device support is built into the operating system itself and does not

require a class driver. Microsoft provides the port driver and LSI Logic provides the miniport drivers, which are called `SYMC8XX.SYS`, `SYM_HI.SYS`, and `SYM_U3.SYS`. These drivers complete the path to an LSI Logic controller or processor with an optional SDMS SCSI BIOS.

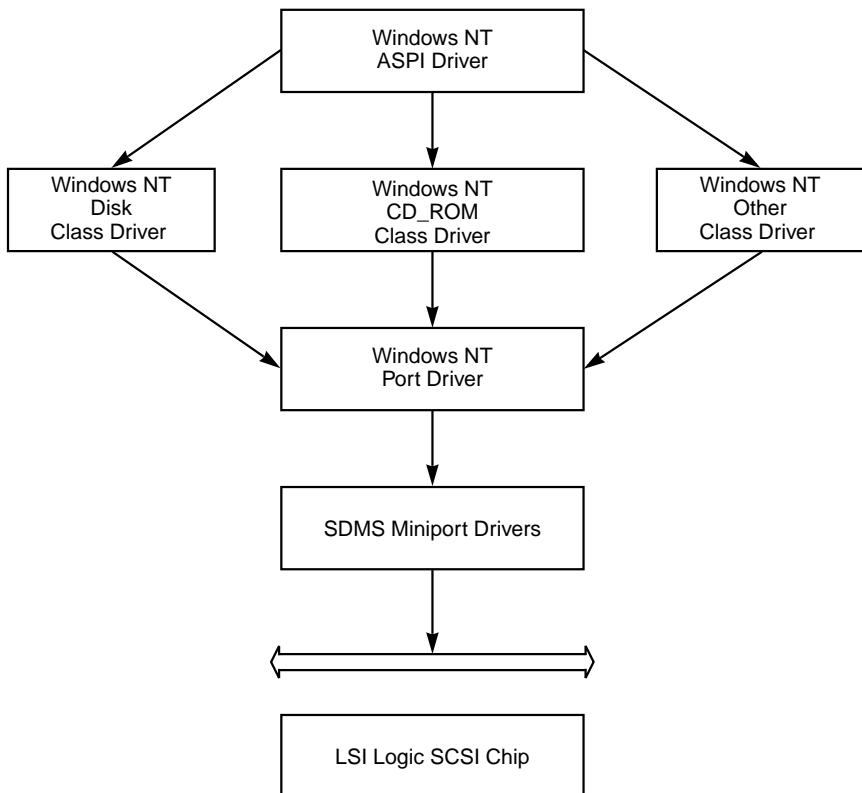
LSI Logic uses the same filenames for their drivers for different Windows operating systems. The driver files are packaged either in separate subdirectories based on the Windows operating system or on different flex disks. To determine the driver file for Windows NT 4.0, note that the filename ends with `.SYS`.

To determine the operating system version, go into Windows Explorer, display the driver file, right click on the filename, click on Properties, and click on the Version tab. Finally, click on the Internal Filename in the lower section. For Windows NT 4.0, the filename appears as filename (NT 4.0). For example, `SYMC8XX.SYS (NT 4.0)`.

The sections below describe these drivers and their installations.

Figure 4.1 illustrates the SCSI I/O flow in Windows NT 4.0.

**Figure 4.1 SCSI I/O Flow in Windows NT**



## 4.1.1 Features

The SDMS device drivers for Windows NT 4.0 support these features:

- Synchronous negotiation (including Fast SCSI, Ultra SCSI, Ultra2 SCSI)
- Ultra160 data transfers (for LSI53C1000 and LSI53C1010)
- Domain Validation (for `SYM_U3.SYS` driver only)
- Cyclic Redundancy Check (CRC) (for `SYM_U3.SYS` driver only)
- Parallel Protocol Request (PPR) (for `SYM_U3.SYS` driver only)
- Wide negotiation
- Tagged command queuing
- Multiple host adapters
- Multiple Logical Unit Numbers (LUNs)
- Disconnect/Reselect
- Scatter/Gather
- Differential support
- SCSI pass-through functionality
- Disk array configurations with no LUN 0
- Disk array configurations with noncontiguous LUNs
- Target Initiated Negotiation (TIN)
- Auto Request Sense
- Maximum block size of 1 Mbyte for NT 4.0
- NVRAM (wide/sync parameters, SCSI Host ID)

## 4.1.2 LSI Logic Devices Supported

All LSI Logic devices and host adapters have undergone a name change. They have transitioned from a SYM prefix to an LSI prefix. No name changes have occurred for the SDMS Windows NT 4.0 miniport drivers.

The `SYMC8XX.SYS` driver is named “Symbios PCI (53C8XX)” for driver installation. It supports the following devices and their associated LSI Logic host adapters:



- LSI53C810, LSI53C810A, LSI53C810AE (LSI8100S, LSI8100ASP, LSI20810)
- LSI53C815 (LSI815XS, LSI8150SP)
- LSI53C825, LSI53C825A (LSI8250S, LSI8251S, LSI8251D, LSI8250ASP, LSI8251ASP, LSI8251AD)
- LSI53C860, LSI53C860AE (LSI8600SP, LSI20860)
- LSI53C875, LSI53C875E (LSI8750SP, LSI8751SP, LSI8751SPE, LSI8751D)
- LSI53C876 (LSI22801, LSI22802)
- LSI53C885
- LSI53C895 (LSI8951U, LSI8952U)

The `SYM_HI.SYS` driver is named “Symbios PCI High Performance Driver” for driver installation. It supports the following devices and their associated LSI Logic host adapters:

- LSI53C895A (LSI8953U)
- LSI53C896 (LSI22910, LSI21002, LSI22902)

The `SYM_U3.SYS` driver is named “Symbios Ultra3 PCI SCSI Driver” for driver installation. It supports the following devices and their associated LSI Logic host adapters:

- LSI53C1000 (LSI20160, LSI20160L)
- LSI53C1010 (LSI21040, LSI22915A, LSI22903, LSI21003, ITI6200U3LP).

### 4.1.3 Description

The `SYMC8XX.SYS`, `SYM_HI.SYS`, and `SYM_U3.SYS` drivers meet the Microsoft specification for miniport drivers. These drivers allow connection of SCSI devices including disk drives, CD-ROMs, and tape drives for PCI-based machines.

To support a new SCSI device, the Windows NT architecture requires that a class driver for that type device be present (usually supplied by Microsoft, or possibly by the peripheral manufacturer). No changes to `SYMC8XX.SYS`, `SYM_HI.SYS`, or `SYM_U3.SYS` are required. These drivers

are only supported under Windows NT 4.0 and later versions. They do not run under earlier versions of Windows NT.

A Windows application passes SCSI commands to the SCSI devices by using the SCSI pass-through facility. Refer to the Microsoft Windows NT 4.0 documentation for more information. This facility allows applications to directly control and access SCSI devices by filling in a data structure and calling into the port driver or class driver.

The `SYMC8XX.SYS` and `SYM_HI.SYS` drivers support Ultra SCSI protocol, providing twice the raw data transfer rate of Fast SCSI. These drivers also support Ultra2 SCSI protocol, providing quadruple the raw data transfer rate of Fast SCSI.

The `SYM_U3.SYS` driver supports the Ultra160 SCSI protocol providing up to 160 Mbytes/s data transfer rates using double transition clocking. Ultra160 also includes CRC, PPR, and Domain Validation. The Ultra160 SCSI protocol performs 80 megatransfers per second resulting in approximately double the synchronous data transfer rates of Ultra2 SCSI.

**Caution:** Ultra SCSI requires more stringent SCSI bus cabling setups than Fast SCSI. Ultra2 and Ultra160 require LVD termination.

The SDMS driver bundled in Windows NT 4.0 is named `SYMC810.SYS`. When Windows NT selects the bundled SDMS driver during setup, the driver information (that is, “Symbios C810 PCI SCSI Host Adapter”) appears. Although this implies that the driver only supports the LSI53C810, it actually supports the LSI53C810, LSI53C810A, LSI53C815, LSI53C825, LSI53C825A, LSI53C860, LSI53C875, and LSI53C876.

This bundled driver does not “see” or “support” the LSI53C885, LSI53C895, LSI53C896, LSI53C895A, LSI53C1000, and LSI53C1010 chipsets and any newer host adapters based on these chipsets that LSI Logic currently produces.

**Note:** Keep in mind that the Windows NT 4.0 setup only displays the driver information, not every controller found by that driver.

---

## 4.2 Using the SDMS Windows NT Drivers

The SDMS Software Device Drivers and Utilities CD-ROM contains the SYMC8XX.SYS, SYM\_HI.SYS, and SYM\_U3.SYS drivers at this location:

```
{CD-ROM Drive Letter}:\ DRIVERS\WINNT
```

You must prepare an SDMS Driver Diskette before proceeding with the installation instructions.

### 4.2.1 Preparing an SDMS Driver Diskette

Various subdirectories contain the miniport drivers and their associated files. The subdirectory structure is:

```
{CD-ROM Drive Letter:} \DRIVERS\WINNT\XXXXX\I386
```

where XXXXX represents the specific Windows NT subdirectory. For example, the SYMC8XX.SYS driver is located in the 8XXNT subdirectory. Copy all the files starting from the I386 subdirectory through the MINIPORT subdirectory (I386/WINNT/MINIPORT) to the root directory of a clean diskette. You will use this SDMS driver diskette during installation.

You may also obtain the Windows NT 4.0 drivers from the LSI Logic web site at: <http://www.lsillogic.com>. After you are connected to this web site, place your cursor on the Get Drivers option in the menu bar. Click on the Drivers selection. Choose the Windows NT operating system for SCSI and click on the Go button. Follow the instructions on subsequent screens to download the drivers.

---

## 4.3 Installing Drivers for Windows NT

This section provides installation instructions for new and existing Windows NT 4.0 systems.

### 4.3.1 New System Installation

This procedure installs the SYMC8XX.SYS, SYM\_HI.SYS, or SYM\_U3.SYS drivers onto a Windows NT 4.0 system. Use this procedure when installing Windows NT 4.0 onto an unused SCSI drive. Windows NT 4.0

automatically adds the driver to the registry and copies the driver to the appropriate directory.

Choose one of two methods to install these drivers onto a Windows NT 4.0 system:

1. Boot directly from the Windows NT CD-ROM.
- or
2. Use Windows NT Boot Diskettes.

Different steps are required depending on the method used. For Compaq/DEC systems based on the Alpha processor, CD-ROM installation is the only method available. The CD-ROM Installation and Boot Floppy Diskette Installation procedures are listed below. Select the appropriate installation for your system.

#### 4.3.1.1 CD-ROM Installation

The driver that is bundled with Windows NT 4.0 is SYMC810.SYS. This driver supports controllers that are listed in [Section 4.1.3, "Description."](#)

Step 1. Have the SDMS driver diskette available for inserting into the A: drive when prompted.

Important: Read Steps 2 and 3 before performing the instructions contained within these steps.

Step 2. Start the Windows NT 4.0 installation by booting from the Windows NT CD-ROM:

For Intel-based systems, the system BIOS must support booting from a CD-ROM. SDMS SCSI BIOS settings may need to be changed to allow CD-ROM booting.

For Alpha-based systems, select Supplementary menu from the firmware Boot Menu, and then select Install Windows NT from CD-ROM.

Step 3. Press the F6 key when the screen displays Windows NT Setup.

Note: Be sure to press the F6 key as any driver loaded later in the installation process is not recognized by the Windows

setup. If F6 is not pressed, all devices controlled by the drivers are not available during Windows NT setup.

- Step 4. Choose S to specify an additional device when the screen displays Setup could not determine the type of one or more mass storage devices....

Note: If this screen does not display as the first user input, then the F6 key that was pressed in Step 3 was not seen by the setup program. Reboot the system and try again.

The system prompts for the manufacturer-supplied hardware support disk.

- Step 5. Insert the appropriate SDMS driver diskette containing the Windows NT driver and press Enter.

This driver supports your LSI Logic adapter(s).

Note: If more than one SDMS driver needs to be installed, install additional drivers one after the other using Steps 4 through 6. Installation order is not important.

- Step 6. Depending on the driver being installed, either Symbios PCI (53C8XX), Symbios PCI High Performance Driver, or Symbios Ultra3 PCI SCSI Driver is shown highlighted. Press Enter to proceed.

Windows NT 4.0 should now recognize the miniport driver(s) and the SCSI hardware.

- Step 7. Press Enter to continue.

- Step 8. Continue with the Microsoft Windows NT 4.0 installation procedure at this point.

#### 4.3.1.2 Boot Diskette Installation

This section provides installation steps when using a boot diskette. The driver that is bundled with Windows NT 4.0 is SYMC810.SYS. This driver supports controllers that are listed in [Section 4.1.3, "Description."](#)

Important: Read these steps before performing the instructions contained within them.

- Step 1. Have the SDMS driver diskette available for inserting into the A: drive when prompted to do so.

- Step 2. Start the Windows NT 4.0 installation by booting from the Microsoft Setup diskette.
- Step 3. Press Enter when the Welcome to Setup screen appears.  
The Windows NT Workstation Setup window appears.
- Step 4. Press S to skip automatic detection and do manual selection.  
A screen displays the message "Setup has recognized the following mass storage devices in your computer..."
- Step 5. Choose S to configure additional SCSI adapters when a screen displays the SCSI adapters found.
- Step 6. Move the highlight bar to Other and press Enter.  
The system prompts for the manufacturer-supplied hardware support disk.
- Step 7. Insert the SDMS driver diskette containing the Windows NT 4.0 driver required to support your LSI Logic adapter(s) and press Enter.
- Step 8. Depending on the driver being installed, either Symbios PCI (53C8XX), Symbios PCI High Performance Driver, or Symbios Ultra3 PCI SCSI Driver is shown highlighted. Press Enter to proceed.

Note: If more than one SDMS driver needs to be installed, install additional drivers one after the other using Steps 5 through 8. Installation order is not important.

The Windows NT Workstation Setup window reappears.

- Step 9. Press S to load additional drives if using an IDE CD-ROM for installation.

Another window appears. Proceed to Step 10;

or

If you have completed configuring additional SCSI adapters, press Enter. Proceed to Step 11.

- Step 10. Scroll up and select:

IDE CD-ROM (ATAPI 1.2)/PCI IDE Controller

Press Enter.

Step 11. Upon exiting, a screen displays the message Setup will load support for the following mass storage device(s). Press Enter.

This message implies that Windows NT recognizes the miniport driver and the SCSI hardware.

Step 12. Follow the Microsoft Windows NT 4.0 installation procedure at this point.

### 4.3.2 Existing System Installation

This procedure installs the SYMC8XX.SYS, SYM\_HI.SYS, or SYM\_U3.SYS driver onto an existing Windows NT 4.0 system.

Note: Windows NT 4.0 uses the Windows 95/98/Me user interface, resulting in minor changes to the procedure for updating SCSI drivers. The Windows NT 4.0 procedure follows.

To install the SDMS miniport drivers onto an existing Windows NT 4.0 system, follow these steps:

- Step 1. Boot Windows NT 4.0 and log on as Administrator.
- Step 2. Click on the Start button. Select Settings-->Control Panel.
- Step 3. Double click on SCSI Adapters.
- Step 4. Click on the Drivers tab.

If NCRSDMS.SYS, NCRC810.SYS, NCRC8XX.SYS, or SYMC810.SYS drivers are listed, select the driver(s) and choose Remove before adding the new driver. Also, if the name of the driver you are installing (SYMC8XX.SYS, SYM\_HI.SYS, or SYM\_U3.SYS) is listed, remove it before adding the new driver.

- Step 5. Select OK when the Remove Driver message prompts, Are you sure you want to remove this driver?

Another message may appear saying The SCSI Adapter has been marked as a boot device... If so, click on the OK button.

- Step 6. Click Add.

A list of installed adapters appears.

- Step 7. Click on the Have Disk button.

The system prompts for the manufacturer-supplied hardware support disk.

- Step 8. Insert the appropriate SDMS driver diskette containing the Windows NT driver, which was created in [Section 4.2.1](#), “Preparing an SDMS Driver Diskette.”

This driver is required to support your LSI Logic adapter(s).

- Step 9. Enter or type the path to copy manufacturer's files from:

A:\WINNT\MINIPORT

Select OK.

- Step 10. Depending on the driver being installed, either Symbios PCI (53C8XX), Symbios PCI High Performance Driver, or Symbios Ultra3 PCI SCSI Driver is shown highlighted on the Install Driver menu. If it is not highlighted, select it. Choose OK.

At this point, the following message may occur:

The driver(s) for this SCSI Adapter are already on the system. Do you want to use the currently installed driver(s) or install new one(s)?

Selecting Current uses the driver already on the system, and selecting New uses the driver on the diskette.

- Step 11. Choose New unless you want to use the older version already on the system. If you choose Current, go to [Step 13](#).

- Step 12. Enter or type the path to the OEM SCSI Adapter files:

A:\WINNT\MINIPORT

Select Continue.

- Step 13. Remove the diskette from your A: drive.

The System Settings Change message displays You must restart your computer before the new settings take effect. Do you want to restart your computer now?

- Step 14. Click on the Yes button to restart and reboot Windows NT 4.0.

If you choose Cancel, remember that you must restart before the new driver is loaded.



Note: If more than one SDMS driver needs to be installed, they can be installed one after the other without rebooting for each one. Installation order is not important.

Step 15. Reboot your computer to load the new miniport driver(s).

---

## 4.4 Performance Tuning for Windows NT 4.0

Windows NT 4.0 has registry entries that can be used to increase the performance of SCSI I/O for certain configurations. The tunable parameters include large transfer block size support and a guaranteed number of concurrent I/Os for a particular SCSI bus.

### 4.4.1 Supporting Large Block Size

The `SYMC8XX.SYS`, `SYM_HI.SYS`, and `SYM_U3.SYS` drivers can support up to a 1 Mbyte transfer size in Windows NT 4.0. However, in Windows NT 4.0, the default transfer size is 64 Kbytes. To enable a larger transfer size, an entry must be added to the registry by using the `SYM_256K.REG` file. This file will set a 256 Kbytes maximum, but it can be edited to set other desired maximum transfer sizes.

Important: Be sure to read the information in the `SYM_256K.REG` data file before editing it.

Choose one of two methods to add this registry setting:

1. Locate the `SYM_256K.REG` data file (supplied with the driver files) using Windows Explorer and double click on the file.

or

2. Type at the command prompt:

```
REGEDIT SYM_256K.REG
```

This inserts an entry into the registry to enable 256 Kbytes block size support.

Editing the `SYM_256K.REG` file can set any maximum block size between 64 Kbytes and 1 Mbyte (– 8 Kbytes). The formula to calculate the proper value for `MaximumSGList` is:

$$\text{MaximumSGList} = (\text{Maximum Block Size}) / 4K + 1$$

For 256 Kbytes:  $256 \text{ Kbytes} / 4 \text{ Kbytes} = 64$ , add 1 for 65 (decimal) or 0x41 (hexadecimal). The maximum value allowed for MaximumSGLst is 255 or 0xFF. This denotes an absolute maximum transfer size of 1040384, which is 8 Kbytes less than 1 Mbyte ( $1040384 / 4K = 0xFE$ , add 1 for 0xFF or 255).

Reboot your system for the new registry setting to be effective. To reset the maximum block size to the default of 64 Kbytes, follow the instructions above, and use SYMDFBLK.REG as the data file.

#### 4.4.2 Maximum Number of Concurrent I/Os (Guaranteed)

Windows NT 4.0 only guarantees a maximum of 32 concurrent I/Os active on a particular SCSI bus. However, due to the method of memory allocation, the actual limit of concurrent I/Os can vary greatly between various drivers or versions of drivers. This can have a huge impact on performance benchmarking between different driver versions or adapter vendors. In effect, one adapter may actually be able to have 70 or 80 I/Os outstanding, while another adapter could only have 32. This can affect systems with high performance storage subsystems, such as disk arrays.

Important: Be sure to read the information in the SYM100IO.REG data file before editing it.

In order to have a guaranteed number of concurrent I/Os, an entry must be added to the registry, using the SYM100IO.REG. file for the SDMS miniport drivers.

Choose one of two methods to add this registry setting:

1. Locate the SYM100IO.REG data file (supplied with the driver files) using Windows Explorer and double click on the file.

or

2. Type at the command prompt:

```
REGEDIT SYM100IO.REG
```

This inserts an entry in the registry to guarantee a maximum of 100 concurrent I/Os per adapter.

If a maximum other than 100 is desired, the SYM100IO.REG file can be edited. The system administrator should be aware that increasing the

number of concurrent I/Os from the default of 32 will use increasing amounts of nonpaged pool memory. High values for this setting can degrade system performance.

Reboot the system for the new registry setting to be effective. To reset the guaranteed number of concurrent I/Os to the default of 32, follow the instructions above, and use the `SYMDEFIO.REG` data file.

#### 4.4.2.1 Auto Request Sense

Enabling and Disabling Auto Request Sense is found in [Section 4.5, "Troubleshooting."](#)

#### 4.4.3 Disk Mirroring

This section applies only to Intel x86 platforms where the SDMS 4.XX SCSI BIOS is used.

The SDMS 4.XX SCSI BIOS loads only one image into system memory at boot time regardless of how many host adapters are used in the system. All of the disk drives on all host adapters are recognized through the INT13h function call. Due to this implementation, disk mirroring under Windows NT needs to be done if it is desired. Disk mirroring allows booting from the mirrored partition in case the primary partition fails.

Note: These instructions may be different from Microsoft documentation.

To create an NT Fault Tolerant (FT) diskette, follow these instructions:

- Step 1. Format a diskette in drive A: using NT (File Manager or Windows Explorer) for use as a FT boot floppy.
- Step 2. Copy `NTLDR`, `NTDETECT.COM`, and `BOOT.INI` from the root directory of the primary partition to this diskette.
- Step 3. Temporarily remove the read only attribute of the `BOOT.INI` file so that it can be modified and saved.
- Step 4. Edit `BOOT.INI` on the FT diskette and modify the following line where you want to boot the mirrored partition.

```
MULTI(0)DISK(0)RDISK(X)PARTITION(Y)\<WINNT_DIRECTORY>
```

where:

multi(0) and disk(0) should always remain the same, and  
 $x$  = the drive number of the mirrored partition in the INT13h chain minus 80h.

The drive number of the mirrored partition can be found during system bootup of the SDMS 4.XX SCSI BIOS when the primary partition does not exist. It should say either BOOT (= 80h), 81h, 82h, and higher. Therefore, the value of  $x$  would be 0 when BOOT, 1 when 81h, 2 when 82h, etc.

$y$  = the partition number on the drive (starts at 1 which equals single partition on the drive)

The next example provides a scenario to better illustrate the above information.

**Example:** Two LSI Logic 8XX host adapters are in the system.

The first host adapter, #0 which is the boot path, has two SCSI hard drives on ID 0 and ID 5. The second host adapter, #1, has two SCSI hard drives on ID 2 and ID 4. Assuming that the SCSI bus scan starts from ID 0 and goes up, the drive number of INT13h will look like this:

Host Adapter #0, ID 0 = BOOT (which is 80h)

Host Adapter #0, ID 5 = 81h

Host Adapter #1, ID 2 = 82h

Host Adapter #1, ID 4 = 83h

Now Windows NT is installed on the boot drive, host adapter #0 ID 0, and a mirrored partition is established on host adapter #1 ID 2. If the primary partition fails, for example due to power failure, then the drive number of INT13h will change:

Host Adapter #0, ID 5 = BOOT (which is 80h)

Host Adapter #1, ID 2 = 81h

Host Adapter #1, ID 4 = 82h

Therefore, to boot from the mirrored partition, enter this line in the BOOT.INI file on the NT FT boot floppy:

```
MULTI(0)DISK(0)RDISK(1)PARTITION(1)\<WINNT_DIRECTORY
```

where the host adapter is #1 with ID 2.

Note that RDISK(1) was calculated from  $x = 81h - 80h$ .

Step 5. Save the `BOOT.INI` file and restore the “read only” attribute.

---

## 4.5 Troubleshooting

Some potential problems and their suggested solutions are:

### **During installation, no SCSI devices are found.**

- Ensure that the custom setup is chosen on the Setup Method screen.
- Ensure that all devices are powered on and terminated correctly.
- Check that no devices have duplicate SCSI IDs.
- Make sure INTA is assigned for the PCI slot(s) where your SCSI host adapter(s) are installed.
- Ensure that all devices can be seen in the display banner of the SDMS SCSI BIOS at boot time.
- For systems with some versions of the Award BIOS, ensure that the PCI IRQ is set to edge triggered.

### **System crashes during installation with a message indicating inaccessible boot device.**

- This error is usually associated with an IRQ, DMA channel, I/O (chip) address, or BIOS address conflict. Set the SCSI host adapter to use a different interrupt through the system BIOS in CMOS.
- A virus sometimes causes this error that infects the Master Boot Record of the boot device. Use a write-protected DOS bootable flex containing virus scanning and cleaning software to check for any viruses on the boot device, and remove if any are found.

### **A disk drive is recognized as seven different devices when only one is physically connected to the SCSI bus.**

Older SCSI devices that incorrectly indicate to Windows NT that they support multiple LUNs usually cause this error.

- Contact the device manufacturer for a firmware upgrade.
- Ensure that there are no devices with the same SCSI ID as the host adapter board.

## **Problems with SCSI devices installation or operation.**

If a SCSI device is not operating properly (either the device is not found or a SCSI interface error occurs during scanning), it is possible that the third party device drivers do not support the auto request sense feature of LSI Logic host adapters. Disable the auto request sense feature as described below and try the device operation again.

Step 1. To disable the auto request feature, use the `SYMNO_AR.REG` file supplied with the SDMS driver files for Windows NT, either double click the file in Windows Explorer/File Manager.

or

Type `REGEDIT SYMNO_AR.REG` at the command prompt.

This inserts a registry entry that disables the auto request sense feature. The system must be rebooted for this change to take effect.

Step 2. To re-enable the auto request sense feature, use the `SYM_AUTO.REG` file and perform one of the update methods as described in the preceding paragraph.

## **Problems with certain SCSI devices when using an Ultra SCSI adapter.**

Some SCSI devices do not function properly when the adapter attempts to negotiate Ultra SCSI transfer rates. If a device is not operating properly, check the transfer speed setting using the SDMS 4.XX SCSI BIOS Configuration Utility (press `Ctrl-C` when the LSI Logic SDMS PCI BIOS banner appears during the system boot process). Devices that do not support Ultra SCSI should be set to a maximum of 10 Mbytes/s for 8-bits, or 20 Mbytes/s for 16-bits.

## **Problems with Ultra SCSI devices using Ultra SCSI protocol.**

- If the system is configured with an LSI Logic host adapter that supports Ultra SCSI and an Ultra SCSI device is on the SCSI bus, intermittent problems and possible system crashes can occur if the SCSI bus cable and terminators do not conform to the Ultra SCSI specification.
- Disable Ultra SCSI support for all devices using the SDMS 4.XX SCSI BIOS Configuration Utility (press `Ctrl-C` when the LSI Logic PCI SCSI BIOS banner appears during the system boot process).

- If the system operates properly without Ultra SCSI enabled, it is highly likely that the SCSI bus cable and terminators are not configured correctly for Ultra SCSI. Refer to the appropriate LSI Logic Host Adapter User's Guide as listed in the [Related Publications](#) section on [page v](#).

**At Ultra3 speed (160 Mbytes/s), the system hangs (waits forever), has a long boot time, or SCSI device is not available.**

Some older SCSI devices do not tolerate Domain Validation operations. At system boot time, Domain Validation is performed to test the data integrity of the SCSI bus between the host adapter and each target device. With some older SCSI devices, these operations can cause the device to stop responding to SCSI commands.

To resolve this problem, disable Domain Validation either for a specific SCSI target or all adapters controlled by the driver. To do so, follow these steps:

- To disable Domain Validation for a specific SCSI target, use the SDMS 4.XX PCI SCSI BIOS Configuration Utility to set the Sync Rate to 0 (async) and the Data Width to 8. This target will now run in async/narrow mode and no Domain Validation operations will be performed on it.
- To disable Domain Validation for all host adapters controlled by this driver, use the `SYMNO_DV.REG` file (supplied with the SDMS Windows NT driver files).

Either double click on the file in Windows Explorer/File Manager  
or

Type `REGEDIT SYMNO_DV.REG` at the command prompt.

This inserts a registry entry that disables Domain Validation operations. You must reboot your system for the new registry setting to take effect.

- To re-enable the Domain Validation feature, use the `SYM_DOMV.REG` file and perform one of the update methods described in the preceding paragraph.

---

## 4.6 Using the NT Configuration Utility

You may use the NT Configuration Utility to change selected configuration parameters of LSI Logic SCSI host adapters. You must have installed Windows NT 4.0 and the latest SDMS Windows NT driver(s) (`SYMC8XX.SYS`, `SYM_HI.SYS`, or `SYM_U3.SYS`) to match your hardware prior to using this utility. You may decide to alter configuration values if a conflict exists between device settings or if you need to optimize system performance. You must reboot the system for the changes to take effect. During boot, the version number of Windows NT appears in a banner on the computer monitor.

Important: The NT Configuration Utility may be used with Windows 2000 in conjunction with the following LSI Logic device drivers:

`SYMC8XX.SYS`, version 4.16 or later,

`SYM_895A.SYS`, version 4.16 or later,

`SYM_HI.SYS`, version 4.16 or later

`SYM_U3.SYS`, version 5.08 or later

These drivers may be obtained from the LSI Logic Web site ([www.lsillogic.com](http://www.lsillogic.com)) or on the SDMS Software Device Drivers and Utilities CD-ROM, release 4.8.

Since Windows NT and the SDMS Windows NT drivers do not need the adapter's BIOS to operate, only a limited number of the configuration parameters that can be changed by this utility will have any impact on the system once rebooted. These parameters are:

- SCSI ID of the adapter
- Wide data bits setting
- Synchronous rate (Mbytes/s)

If you have Windows NT 4.0 and are using the SDMS `SYM_U3.SYS` driver, the NT Configuration Utility allows you to perform Domain Validation testing on the installed LSI Logic LSI53C1000 or LSI53C1010 host adapter and connected devices. This testing verifies that the installed LSI Logic hardware functions correctly with the configuration information (synchronous speed and bus width) set through either the SCSI BIOS Configuration Utility or by using the capabilities of this utility.



Changes to the wide data bit setting and/or synchronous rate can be made during this testing to ensure functionality. These settings can also be saved in a similar way as when doing the configuration settings. The difference when saving these new values during Domain Validation testing is that they are in effect immediately, and no system reboot is necessary.

Important: The companion product to the NT Configuration Utility is the Domain Validation Utility, which monitors the SYM\_U3.SYS miniport driver. Refer to [Section 4.7, "Using the Domain Validation Utility,"](#) for more information.

### 4.6.1 Installing the NT Configuration Utility (x86 Platforms)

You execute an InstallShield program to install the NT Configuration Utility. Use the SDMS Software Device Drivers and Utilities CD-ROM that contains the InstallShield program to perform the installation.

Run the `SETUP.EXE` program directly from:

```
{CD-ROM Drive Letter}: \UTILITY\WINDOWS\NTCONFIG\I386
```

A shortcut icon appears automatically on the desktop after installation.

### 4.6.2 Starting the NT Configuration Utility

To start the NT Configuration Utility, double click on the shortcut icon. After a brief pause, your computer monitor displays the Main Menu of this utility.

To make changes with this menu-driven utility, one or more LSI Logic SCSI host adapters installed in the system must have NVRAM to store the changes. Also, due to Windows NT constraints, each of the adapters must have at least one hard drive attached to it so that NT Configuration can properly identify the adapter.

Important: The NT Configuration Utility is a powerful tool. The system can be rendered inoperable if care is not taken when reconfiguring the parameters.

#### 4.6.2.1 Main Menu

After starting the NT Configuration Utility, the Main menu appears and displays a summary list of all LSI Logic PCI to SCSI host adapters in

your system and information about each of them. [Figure 4.2](#) illustrates the Main menu.

**Figure 4.2 NT Configuration Main Menu**

| Symbios NVRAM Configuration Utility |          |           |             |
|-------------------------------------|----------|-----------|-------------|
| File Options Help                   |          |           |             |
| Devices Found                       | Port Num | IRQ Level | NvRAM Found |
| LSI53C895                           | FC00     | 9         | Yes         |
| LSI53C1010-66                       | F800     | 9         | Yes         |
| LSI53C1010-66                       | F400     | 11        | Yes         |
|                                     | Accept   | Cancel    |             |

#### 4.6.2.2 Main Menu Bar

The menu bar offers three items:

- File
- Options
- Help

The menu bar provides a drop-down menu displaying more choices. Click on the menu item to display the selections. [Table 4.1](#) provides a description of each menu choice.

**Table 4.1 Main Menu Bar and Footer**

| Items   | Descriptions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| File    | <p>Displays the menu path for Save and Exit choices. To save NVRAM data pertinent to the adapters using the NT Configuration Utility, select Save. To exit from the NT Configuration Utility, select Exit.</p> <p><b>Note:</b> No automatic update to the adapter(s) is done. Select Save or click on the Accept button to save all changes.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Options | <p>Displays utility or adapter configuration options to change. To change the language used for the interface, select Language. This list is dynamic and is based on the number/type of language DLLs found in the directory with the executable.</p> <p>To change settings for host adapter cards, select Adapter Settings. To change settings for SCSI devices, select Device Selections. To execute Domain Validation on an installed LSI53C1010 based host adapter, select Domain Validation.</p> <p>The selected option displays a corresponding menu with adapters found. Click on the adapter whose related values are to be changed. When the values of the adapters in the NVRAM Found column indicate Yes, then changes are allowed. If the value is No, the adapter can be selected to display default values, but no changes are allowed.</p> |
| Help    | <p>To display information pertinent to a particular menu, click on the Help menu selection.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Accept  | <p>To save the configuration change(s) and exit from the Main menu, click on the Accept button. If concluding Domain Validation testing and new values were saved, it is not necessary to click on the Accept button.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Cancel  | <p>To exit from a particular menu level and discard any changes that may have been made, click on the Cancel button. Changes are not discarded once changes have been saved during Domain Validation testing. Exiting from previous menu levels does not affect changes made and saved at the Domain Validation Test level.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

Table 4.2 lists the fields, field types, and descriptions shown on this menu.

**Table 4.2 Main Menu Fields and Descriptions**

| Fields       | Field Type<br>[Value] | Descriptions                                                                                               |
|--------------|-----------------------|------------------------------------------------------------------------------------------------------------|
| Device Found | Information           | Indicates the specific LSI Logic family of host adapters.                                                  |
| Port Number  | Information           | Indicates the I/O port number that communicates with an adapter. The system BIOS assigns this port number. |
| IRQ          | Information           | Indicates the Interrupt Request Line used by an adapter. The system BIOS assigns the IRQ.                  |
| NVRAM Found  | Information           | Indicates NonVolatile Random Access Memory.                                                                |

**Note:** The NT Configuration display defaults to the English language. Versions with the Domain Validation option have English displays only at this time. For earlier versions, if the display language is to be Czechoslovakian, Russian, Korean, or Japanese, you must install Windows NT into the corresponding language so that the display is readable. This is not applicable to other languages that use the Roman alphabet.

#### 4.6.2.3 Adapter Settings Menu

When you click on an adapter, the corresponding menu appears.

Figure 4.3 illustrates the Adapter Settings menu.

**Figure 4.3 Adapter Settings Menu**

| Adapter Settings |                     |        |
|------------------|---------------------|--------|
| Help             |                     |        |
| SCAM Support     | On                  |        |
| Parity           | Enabled             |        |
| Host SCSI ID     | 7                   |        |
| Scan Order       | Low to High <0.Max> |        |
| Set Defaults     | OK                  | Cancel |

To change a setting, double click on it. For example, if you double click on SCAM Support, a window appears with two options: On or Off. Once

you select an option, this window closes and the new values appear on the Adapter Settings screen.

To set default values, click on the Set Defaults button, and then click on the OK button to accept the values. To set changed values, click on the OK button. To abort any changes made on this screen, click on the Cancel button. When you click on OK or Cancel, the system returns to the Main menu.

The settings in this menu are global settings that affect the selected host adapter and all SCSI devices attached to it. [Table 4.3](#) provides a description of each setting.

**Table 4.3 Adapter Properties Fields and Descriptions**

| Fields       | Field Type<br>[Value]                                                      | Descriptions                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SCAM Support | Configuration<br>[On/Off]                                                  | Represents SCAM support and depends upon whether the BIOS issues or does not issue SCAM negotiations during initialization.<br><br><b>Note:</b> Windows NT does not support the use of SCAM. Turn this selection Off. Turning SCAM On may have adverse effects on your system.                                                                                                                                                                                                |
| Parity       | Configuration<br>[Enable/Disable]                                          | Allows you to disable parity checking, since the LSI Logic PCI to SCSI host adapters always generate parity. Note that some older SCSI devices do not generate parity.<br><br><b>Note:</b> When disabling parity checking, you <i>must</i> also 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 | Configuration<br>[0 to 7/<br>0 to 15]                                      | Indicates the host adapter's SCSI ID, which is a unique number used to identify the device on the SCSI bus.<br><br><b>Note:</b> In general, LSI Logic suggests that you do not change the host adapter ID from the default value of 7, as this gives it the highest priority on the SCSI bus. Note that if you have 8-bit SCSI devices, these devices cannot see host IDs greater than 7.                                                                                     |
| Scan Order   | Configuration<br>[Low to High<br>(0 .. Max)/<br>High to Low<br>(Max .. 0)] | Allows you to tell your device drivers to scan the SCSI bus from low-to-high (0 .. 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.<br><br><b>Note:</b> This scan order option may conflict with operating systems that automatically assign a drive order.                                                               |

#### 4.6.2.4 Device Selections Menu

When you select the Device Selections option, the corresponding menu appears. [Figure 4.4](#) illustrates the Device Selections menu.

**Figure 4.4 Device Selections Menu**

| Device Selections |      |       |      |      |      |        |         |  |
|-------------------|------|-------|------|------|------|--------|---------|--|
| Help              | Sync | Data  | Disc | Time | Scan |        | Queue   |  |
|                   | Rate | Width |      | Out  | Bus  | LUNS   | Tags    |  |
| 0-Dev0 N/A        | 80   | 16    | On   | 10   | Yes  | Yes    | Enabled |  |
| 1-Dev1 N/A        | 80   | 16    | On   | 10   | Yes  | Yes    | Enabled |  |
| 2-Dev2 N/A        | 80   | 16    | On   | 10   | Yes  | Yes    | Enabled |  |
| 3-Dev3 N/A        | 80   | 16    | On   | 10   | Yes  | Yes    | Enabled |  |
| 4-Dev4 N/A        | 80   | 16    | On   | 10   | Yes  | Yes    | Enabled |  |
| 5-Dev5 N/A        | 80   | 16    | On   | 10   | Yes  | Yes    | Enabled |  |
| 6-Dev5 N/A        | 80   | 16    | On   | 10   | Yes  | Yes    | Enabled |  |
| LSI53C895         | 80   | 16    | On   | 10   | Yes  | Yes    | Enabled |  |
|                   |      |       |      |      | Ok   | Cancel |         |  |

The settings in this menu affect individual SCSI devices attached to the selected host adapter. Double click on one of the displayed devices to change the listed options. Use the scroll bar on the right side of the Device Selections menu to scroll down the list of possible SCSI IDs/devices. [Table 4.4](#) provides a description of the fields on this menu.

**Table 4.4 Device Selections Fields and Descriptions**

| Fields                             | Field Type [Value]             | Descriptions                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sync Rate (Mbytes/s)               | Configuration [20, 40, 80...]  | Indicates 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. The width column affects this value.                                                                                                                                                                         |
| Width (bits)                       | Configuration                  | Indicates 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                         | Configuration [On/Off]         | Tells the host adapter whether or not to allow a device to disconnect. SCSI devices have the ability to disconnect from the initiator during an I/O transfer. This disconnect frees the SCSI Bus to allow other I/O processes. 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 (seconds)   | Configuration [Value>0]        | 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 that allows the system to recover if an I/O operation fails, LSI Logic recommends that you always set the time-out to a value greater than zero.                                                            |
| Scan for Device at Boot Time       | Configuration [Yes/No]         | Set this option to No when you do not want a specific device 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) | Configuration [Yes/No]         | Set this option to No if you have problems with a device that responds to all LUNs whether they are occupied or not. For example, if there is a SCSI device with multiple LUNs but you do not want all of those LUNs to be available to the system, then set this option to No. This will limit the scan to LUN 0 only.                                                         |
| Queue Tags                         | Configuration [Enable/Disable] | Enables or disables the issuing of queue tags during I/O requests when your device driver can do this.                                                                                                                                                                                                                                                                          |

#### 4.6.2.5 Domain Validation Menu

When you select the Domain Validation option, the Domain Validation - Current Negotiated Settings menu appears. [Figure 4.5](#) illustrates this menu.

**Figure 4.5 Domain Validation Menu**

| Domain Validation - Current Negotiated Settings |           |           |
|-------------------------------------------------|-----------|-----------|
| Help                                            | Sync Rate | Bus Width |
| 0-Quantum Atlas                                 | 40        | 16        |
| 1-Dev1 N/A                                      | N/A       | N/A       |
| 2-Dev2 N/A                                      | N/A       | N/A       |
| 3-IBM DDRS-3                                    | 80        | 16        |
| 4-Dev4 N/A                                      | N/A       | N/A       |
| 5-Dev5 N/A                                      | N/A       | N/A       |
| 6-Dev6 N/A                                      | N/A       | N/A       |
| LSI53C895                                       | N/A       | N/A       |

The displayed values reflect the current negotiated synchronous speed and bus width settings between the driver (`SYM_U3.SYS`) and the individual SCSI devices attached to the selected host adapter. These values may be different than those displayed in the Device Settings menu as those values are the starting values to be used during negotiations. Double clicking on the Adapter entry will have no effect.



#### 4.6.2.6 Test Selection Menu

When you double click on a device in the Domain Validation - Current Negotiated Settings menu, the Test Selection menu appears. The Sync Speed and Bus Width values are preset to the current negotiated settings of the selected device. [Figure 4.6](#) illustrates the Test Selections menu.

**Figure 4.6 Test Selections Menu**

| Test Selections        |                |
|------------------------|----------------|
| Help                   | Code Defs.     |
| Adjustments:           |                |
| Sync Speed (MB/s)      | 40             |
| Bus Width (in bits) 0  | 16             |
| LVD Driver Signal      | Nominal        |
| Req/Ack Skew           | Nominal        |
| Data Pattern           | 0x00000000     |
| Test Procedures        | Status (code): |
| Back-to Back Inquiries |                |
| Write/Read Buffers     |                |
| Stress Pattern IOs     |                |
| Apply                  | Cancel         |

The Adjustments box contains values that are changeable by you and passed to the Windows NT miniport driver when the tests are executed. Double click on an entry to change its value. The only values that can be permanently changed at this level are the Sync Speed and Bus Width values. Once all three test procedures have passed with the specified values, click on the Apply button to save these new values. This action also exits you from this menu. The `SYM_U3.SYS` miniport driver begins using these new values immediately.

Table 4.5 lists the fields within the Adjustments box along with their descriptions.

**Table 4.5 Adjustments Fields and Descriptions**

| Field             | Description                                                                                                                                                                                                                                            |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sync Speed        | Indicates starting synchronous value to be used by the miniport driver when negotiating with the drive to test.                                                                                                                                        |
| Bus Width         | Indicates starting bus width value, in bits, to be used by the miniport driver when negotiating with the drive to test.                                                                                                                                |
| LVD Driver Signal | Indicates the LVD Driver Signal strength requested for this test run. A value other than Nominal will adjust this signal in order to run the requested test at a slightly altered LVD signal level. Only applicable during the Stress Pattern IO test. |
| Req/Ack Skew      | Indicates the Req/Ack Skew value requested for this test run. A value other than Nominal will adjust this timing in order to run the requested test with a slightly altered bus timing environment. Only applicable during the Stress Pattern IO test. |
| Data Pattern      | Allows you to select one of three data patterns to be used for the Write/Read buffers test.                                                                                                                                                            |

The Test Procedures box contains the test sequences, which can be executed on the selected device. Double click on the sequence name to execute.

Note: During test executions, the adapter channel on which the specified device resides is blocked from all other activity. For the LSI53C1000 or LSI53C1010 based host adapter card(s), the second channel is also blocked during execution of the Stress Pattern I/O test if the LVD Driver Signal or the Req/Ack Skew values are anything except Nominal. This could have a negative impact in the performance and/or stability of the system under high loads.

Table 4.6 lists the fields within the Test Procedures box along with their descriptions.

**Table 4.6 Test Procedures Fields and Descriptions**

| Fields                 | Descriptions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Back-to-Back Inquiries | This test issues two inquiries to the selected device. The first inquiry occurs after negotiating Async/Narrow, while the second inquiry occurs after negotiating with the passed values. The Inquiry data from the two are then compared. If a miscompare is noted, the test fails. I/O errors can also cause this test to fail. You may wish to execute the test again after stepping down the Sync Speed and/or Bus Width negotiation value(s).                                                                                                                                                                                                                                                                                                                                                                                                    |
| Write/Read Buffers     | This test issues write buffer commands to the device using the data pattern you have chosen. A read buffer command is then issued to read the data back. A data comparison is then done to verify data transfer. If a miscompare is noted, the test fails. The negotiation values used for both commands are your specified values. I/O errors can also cause this test to fail. You may wish to execute the test again after stepping down the Sync Speed and/or Bus Width negotiation value(s).                                                                                                                                                                                                                                                                                                                                                     |
| Stress Pattern IOs     | This test also issues write/read buffer command pairs. Instead of using the pattern specified by you, this test loops through sending I/O pairs and doing data compares using each of the possible patterns. Each pattern will have been used 10 times by the end of this loop. If a miscompare is noted, the test fails. The test finishes by doing 32 random reads to the device media to further stress the bus. The negotiation values used for the commands are your specified values. The values specified for the LVD driver signal and Req/Ack Skew value are also passed to the miniport driver during this test. I/O errors can cause this test to fail. You may wish to execute the test again after stepping down the Sync Speed and/or Bus Width negotiation value(s) and/or altering the LVD Driver Signal or Req/Ack Skewing value(s). |
| Status                 | This box reflects the outcome of the test executed. If the test failed, a status code appears along with the "Failed" status. To understand the code's meaning, click on the Defs. Code button on the menu bar.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

### 4.6.3 Exiting the NT Configuration Utility

Since changes only take effect after your system reboots, it is important that you exit from this configuration utility properly. Return to the Main menu and exit either by clicking the Accept button or following the menu path: File-->Save and then clicking on the Exit choice.

**Important:** If you reboot the system without properly exiting from this utility, these changes may not take effect.

---

## 4.7 Using the Domain Validation Utility

The Domain Validation Utility is a companion product to the NT Configuration Utility. Its purpose is to monitor I/O activity on Domain Validation enabled host adapters and alert you when the number of errors during a polling cycle may warrant the re-execution of Domain Validation tests.

Once installed, it runs in the background and polls the `SYM_U3.SYS` miniport driver for error information on a preset time schedule.

### 4.7.1 Installing the Domain Validation Service Module

To install the Domain Validation Service Module on the x86 platforms, log on with Administrator privileges. As Administrator, follow these steps:

Step 1. Find all the DV Service Module files on the SDMS Software Device Drivers and Utilities CD-ROM at this location:

`{CD-ROM Drive Letter}:\UTILITY\WINDOWS\NTDVSRVC\I386`

Step 2. Copy `DVSERVICE.EXE` to the directory `\%SYSTEMROOT%\SYSTEM`.

This may appear as `\WINNT\SYSTEM`.

Step 3. Open a DOS window and run the installation program to install the service module into the Windows NT environment:

`{CD-ROM Drive Letter}:\UTILITY\WINDOWS\NTDVSRVC\I386\SVINSTAL.EXE`

If successful, a message stating that the service has been correctly installed appears. It directs you to access the Service applet in the Control Panel.

Step 4. To start the service, follow the menu path: Start-->Control Panel-->Services.

Step 5. Locate the DV Service Module and click on the Start button.

At this point, the service module is installed and running. Unless the preset error limit is exceeded during a polling period, this service remains in the background. If exceeded, this service displays a message box suggesting that you should run the Domain Validation tests again on the stated adapter and its connected devices.

**Note:** The error counts are cleared whenever the system polls the driver. If multiple messages appear on a single adapter, errors are continuing to occur in subsequent polling periods.

## 4.7.2 Stopping the DV Service Module

To stop the DV service module on the x86 platforms, follow these steps:

Step 1. Access the Services applet under the Control Panel.

Step 2. Locate the DV Service Module and click on the Stop button.

---

## 4.8 Using SDMS ASPI for Windows NT 4.0

SDMS NT ASPI is a software support package based on the “ASPI for Win32,” version 2.3 specification. The ASPI software provides a mechanism used by Windows applications as an interface to access SCSI adapters and peripherals. Refer to the “ASPI for Win32,” version 2.3 specification for additional details.

### 4.8.1 Features

The ASPI for Windows NT 4.0 supports these features:

- Provides information about SCSI adapters
- Provides information about SCSI devices
- Use to issue SCSI I/O requests
- Multithreaded and multitasking operations
- 32-bit Windows applications

### 4.8.2 Description

SDMS NT ASPI conforms to the Advanced SCSI Programming Interface (ASPI) version 2.3 specification. Windows applications can use this interface to gain access to system SCSI devices. Additionally, Windows applications can retrieve information about installed SCSI adapters and the SCSI peripherals attached to the adapters. Applications using the ASPI interface can also issue SCSI I/O requests to the devices. Note that

NT ASPI is one method to use for gaining access to SCSI devices; the other method would be to use SCSI pass-through commands.

Typical of these types of applications are utility programs that investigate and explore SCSI devices or applications such as CD-ROM mastering software and scanner applications. SDMS NT ASPI is comprised of two modules: a user mode DLL, and a kernel mode device driver.

The DLL mode passes commands and makes requests to the kernel mode device driver, which in turn interfaces with the Windows NT operating system for execution of the request.

A current version of NT ASPI can be downloaded from the LSI Logic Web site (<http://www.lsillogic.com>). After you are connected to this Web site, place your cursor on the Get Drivers option in the menu bar. Click on the Drivers selection. Choose the Utilities for SCSI and click on the Go button. Follow the instructions on subsequent screens to download NT ASPI.

### 4.8.3 Installing NT ASPI

To install the NT ASPI software, you execute an InstallShield setup program. If you obtained the software from the LSI Logic web site, it is within a selfextracting zip file. Expand the zip file to install the software into a directory on your hard disk drive or to a diskette, and then run `SETUP.EXE`.

If you obtained the software from the SDMS Software Device Drivers and Utilities CD-ROM, run the `SETUP.EXE` program directly from:

```
{CD-ROM Drive Letter}:\UTILITY\WINDOWS\NTASPI
```

The setup program installs the NT ASPI files into the proper directories as well as making the appropriate registry entries. After installing the software, you must reboot the computer. There are no command line options with the NT ASPI software.

---

## 4.9 Using SCSI Tools for Windows NT

SDMS SCSI Tools for Windows NT is a software support utility for x86 platforms. It provides a mechanism for examining host adapters and SCSI devices within the Windows NT environment.

## 4.9.1 Features

The SCSI Tools for Windows NT support these features:

- Examination of SCSI device parameters
- Power management
- Disk cache management

## 4.9.2 Installing SCSI Tools for Windows NT

If your system already has NT ASPI, follow the instructions for running the InstallShield setup program. Otherwise, the NT ASPI utility must be installed first before installing this SCSI Tools package. Refer to [Section 4.8, "Using SDMS ASPI for Windows NT 4.0."](#)

To install the SCSI Tools for Windows NT software, you execute an InstallShield setup program. If you obtained the software from the LSI Logic web site, it is in the form of a self-extracting zip file. Expand the zip file to install the software into a directory on your hard disk drive, or to a diskette and then run `SETUP.EXE`. Note that the installer must have Windows NT Administrator capabilities for running the `SETUP` program.

If you obtained the software from the SDMS Software Device Drivers and Utilities CD-ROM, run the `SETUP.EXE` program directly from:

```
{CD-ROM Drive Letter}:\UTILITY\WINDOWS\SYMTOOLS\I386
```

The setup program installs the SCSI Tools files into the proper directories as well as making the appropriate registry entries. After installing the software, you must reboot the computer.





# Chapter 5

## Windows 2000 Device Driver Installation

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This chapter describes the device drivers for the Windows 2000 operating system. It provides installation instructions for new and existing system installations. This chapter includes these topics:

- [Section 5.1, "Introduction," page 5-1](#)
  - [Section 5.2, "Using the SDMS Windows 2000 Drivers," page 5-4](#)
  - [Section 5.3, "Installing Drivers for Windows 2000," page 5-6](#)
  - [Section 5.4, "Performance Tuning for Windows 2000," page 5-10](#)
  - [Section 5.5, "Troubleshooting," page 5-14](#)
  - [Section 5.6, "Using SDMS ASPI for Windows 2000," page 5-18](#)
  - [Section 5.7, "Using SCSI Tools for Windows 2000," page 5-20](#)
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### 5.1 Introduction

Windows 2000 is an operating system designed to run on Intel architecture processors using current technology. It provides a GUI environment that incorporates many high-level features (refer to the Microsoft Windows 2000 documentation for details). An I/O manager handles I/O requests in Windows 2000. To address a SCSI peripheral, the I/O manager goes through the appropriate drivers.

Windows 2000 provides class drivers for hard disk, floptical, CD-ROM, printer, and scanner peripherals. Other class drivers, provided by peripheral manufacturers, may be added to support new devices. Tape device support is built into the operating system itself and does not require a class driver.

Microsoft provides the port driver and LSI Logic provides the miniport drivers, which are called `SYMC8XX.SYS`, `SYM_HI.SYS`, `SYM_895A.SYS` and

`SYM_U3.SYS`. The `SYMC8XX.SYS` and `SYM_HI.SYS` drivers are bundled with the Windows 2000 operating system. The `SYM_895A.SYS` and `SYM_U3.SYS` drivers are nonbundled drivers. These miniport drivers complete the path to an LSI Logic controller or processor with an optional SDMS SCSI BIOS.

LSI Logic uses the same filenames for their drivers for different Windows operating systems. The driver files are packaged either in separate subdirectories based on the Windows operating system or on different flex disks. To determine the driver file for Windows 2000, note that the filename ends with `.SYS`. For example, `SYMC8XX.SYS`. (The same is true for Window NT 4.0).

To determine the operating system version, go into Windows Explorer, display the driver file, right click on the filename, click on Properties, and click on the Version tab. Finally, click on the Internal Filename in the lower section. For Windows 2000, the filename appears as filename (NT 5.0). For example, `SYMC8XX.SYS (NT 5.0)`.

The sections below describe these drivers and their installation.

## 5.1.1 Features

The SDMS device drivers for Windows 2000 support these features:

- Ultra160 data transfers (for LSI53C1000 and LSI53C1010)
- Domain Validation (for `SYM_U3.SYS` driver only)
- Cyclic Redundancy Check (CRC) (for `SYM_U3.SYS` driver only)
- Parallel Protocol Request (PPR) (for `SYM_U3.SYS` driver only)
- Synchronous negotiation (including Fast SCSI, Ultra SCSI, Ultra2 SCSI)
- Wide negotiation
- Tagged-command queuing
- Multiple host adapters
- Multiple LUNs
- Disconnect/Reselect
- Scatter/Gather
- Differential support

- SCSI pass-through functionality
- Disk array configurations with no LUN 0
- Disk array configurations with noncontiguous LUNs
- Target Initiated Negotiation (TIN)
- Auto Request Sense
- Maximum block size of 1 Mbyte in WIN2000
- NVRAM (wide/sync parameters, SCSI Host ID)

## 5.1.2 LSI Logic Devices Supported

All LSI Logic devices and host adapters have undergone a name change. They have transitioned from a SYM prefix to an LSI prefix. No name changes have occurred for the SDMS Windows 2000 drivers.

The `SYMC8XX.SYS` driver is named “Symbios 53C8XX PCI SCSI Driver” for driver installation. It supports the following devices and their associated LSI Logic host adapters:

- LSI53C810, LSI53C810A, LSI53C810AE (LSI8100S, LSI8100ASP, LSI20810)
- LSI53C815 (LSI815XS, LSI8150SP)
- LSI53C825, LSI53C825A (LSI8250S, LSI8251S, LSI8251D, LSI8250ASP, LSI8251ASP, LSI8251AD)
- LSI53C860, LSI53C860AE (LSI8600SP, LSI20860)
- LSI53C875, LSI53C875E (LSI8750SP, LSI8751SP, LSI8751D)
- LSI53C876 (LSI22801, LSI22802)
- LSI53C885
- LSI53C895, (LSI8951U, LSI8952U)

The `SYM_HI.SYS` driver is named “Symbios PCI High Performance Driver” for driver installation. It supports the following device and its associated LSI Logic host adapters: LSI53C896 (LSI22910, LSI21002, LSI22902).

The `SYM_895A` driver is named “Symbios 895A/8953U PCI SCSI Driver” for driver installation. It supports the following device and its associated LSI Logic host adapter: LSI53C895A (LSI8953U).

The `SYM_U3.SYS` driver is named “Symbios Ultra3 PCI SCSI Driver” for driver installation. It supports the following devices and their associated LSI Logic host adapters:

- LSI53C1000 (LSI20160, LSI20160L)
- LSI53C1010 (LSI21040, LSI22915A, LSI22903, LSI21003, ITI6200U3LP)

---

## 5.2 Using the SDMS Windows 2000 Drivers

The SDMS Software Device Drivers and Utilities CD-ROM contains the `SYMC8XX.SYS`, `SYM_HI.SYS`, `SYM_895A.SYS`, and `SYM_U3.SYS` drivers at this location:

```
{CD-ROM Drive Letter}:\DRIVERS\WIN2K
```

You must prepare an SDMS Driver Diskette before proceeding with the installation instructions.

### 5.2.1 Preparing an SDMS Driver Diskette

Various subdirectories contain the miniport drivers and their associated files. The subdirectory structure is:

```
{CD-ROM Drive Letter:}\DRIVERS\WIN2K\XXXXXX\I386
```

where `XXXXXX` represents the specific Windows 2000 subdirectory. For example, the `SYMC8XX.SYS` driver is located in the `8XX2K` subdirectory.

Copy all the files starting from the `I386` subdirectory through the `MINIPORT` subdirectory (`I386\WINNT\MINIPORT`) to the root directory of a clean diskette. You will use this SDMS driver diskette during installation.

You may also download current Windows 2000 drivers from the LSI Logic Web site at: <http://www.lsillogic.com>. After you are connected to this Web site, place your cursor on the Get Drivers option in the menu bar. Click on the Drivers selection. Choose the Windows 2000 operating system for SCSI from the list. Click on the Go button. Follow the instructions on subsequent screens to download the drivers.

## 5.2.2 Description

The `SYMC8XX.SYS`, `SYM_HI.SYS`, `SYM_895A.SYS`, and `SYM_U3.SYS` drivers meet the Microsoft specification for miniport drivers. Miniport drivers allow the connection of SCSI devices including disk drives, CD-ROMs, and tape drives for PCI-based machines. To support a new SCSI device, the Windows 2000 architecture requires that a class driver for that type device be present (usually supplied by Microsoft, or possibly by the peripheral manufacturer). No changes to these drivers are required.

The `SYMC8XX.SYS`, `SYM_HI.SYS`, `SYM_895A.SYS`, and `SYM_U3.SYS` drivers described by this document support Windows 2000 only. The `SYM_895A.SYS` driver is available for Windows 2000 only.

**Note:** The `SYM_HI.SYS` driver for Windows NT 4.0 supports the LSI53C895A (LSI8953U). Additionally, there are other versions of the `SYMC8XX.SYS`, `SYM_HI.SYS`, and `SYM_U3.SYS` drivers that are supported under Windows NT 4.0.

A Windows application passes SCSI commands directly to the SCSI devices by using the SCSI pass-through facility (refer to the Microsoft Windows 2000 documentation for details). This facility allows applications to directly control and access SCSI devices by filling in a data structure and calling into the port or class driver.

The `SYMC8XX.SYS`, `SYM_HI.SYS`, and `SYM_895A.SYS` drivers support Ultra SCSI protocol. This protocol provides twice the raw data transfer rate of Fast SCSI for disk drives and LSI Logic host adapters that support Ultra SCSI. These drivers also support Ultra2 protocol, providing quadruple the raw data transfer rate of Fast SCSI.

The `SYM_U3.SYS` driver supports Ultra160 SCSI protocol providing speeds up to 160 Mbytes/s data transfer rates using double transition clocking. Ultra160 also provides CRC, PPR, and Domain Validation. The Ultra160 SCSI protocol performs 80 megatransfers per second resulting in approximately double the synchronous data transfer rates of Ultra2 SCSI.

**Caution:** Ultra SCSI requires more stringent SCSI bus cabling setups than Fast SCSI, Ultra2, and Ultra160 SCSI require LVD termination.

**Note:** Please keep in mind that the Windows 2000 text mode setup only displays the driver information, not every controller found by that driver.

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## 5.3 Installing Drivers for Windows 2000

This section provides installation instructions for new and existing Windows 2000 systems.

### 5.3.1 New System Installation

This procedure installs the `SYMC8XX.SYS`, `SYM_HI.SYS`, `SYM_895A`, and/or `SYM_U3.SYS` drivers onto a Windows 2000 system. Use this procedure when installing Windows 2000 onto an unused SCSI drive. Windows 2000 automatically adds the driver to the registry and copies the driver to the appropriate directory. Refer to the Microsoft documentation about using boot floppy diskettes as a method of installation.

#### 5.3.1.1 CD-ROM Installation

The `SYMC8XX.SYS` and `SYM_HI.SYS` drivers are bundled with Windows 2000. These drivers support the LSI53C8XX family of LSI Logic controllers, with the exception of the LSI53C895A. The `SYM_895A.SYS` and `SYM_U3.SYS` drivers are nonbundled drivers. The `SYM_895A.SYS` driver supports the LSI53C895A controller. The `SYM_U3.SYS` driver supports the LSI53C1000 and LSI53C1010 controllers.

To install Windows 2000 on a new system, the system BIOS must support booting from a CD-ROM. SDMS BIOS settings may need to be changed to allow CD-ROM booting.

Step 1. Start the Windows 2000 installation by booting from the Windows 2000 CD-ROM.

**Note:** If only the `SYMC8XX.SYS` and/or `SYM_HI.SYS` drivers are needed, no user action is required as they will be loaded from the CD-ROM automatically.

Step 2. Press the F6 key to install the `SYM_895A.SYS` or `SYM_U3.SYS` nonbundled drivers.

Note: Be sure to press the F6 key as any driver loaded later in the installation process is not recognized by the Windows setup. If F6 is not pressed, all devices controlled by the drivers are not available during Windows 2000 setup.

Step 3. Choose S to specify an additional device when the screen displays Setup could not determine the type of one or more mass storage devices....

Note: If this screen is not displayed as the first user input, then the F6 keypress was not seen by the setup program. Reboot your system and try again.

The system prompts for the manufacturer-supplied hardware support disk.

Step 4. Insert the appropriate SDMS driver diskette containing the Windows 2000 driver required to support your LSI Logic adapter(s) and press Enter.

Step 5. Press Enter to proceed when the selected driver is shown highlighted.

Return to the Windows 2000 Setup screen.

Note: If both SDMS drivers need to be installed, they can be installed one after the other using Step 3 through Step 5. Installation order is not important.

Step 6. Press Enter to proceed.

The message about setup loading files appears.

Step 7. Follow the Microsoft Windows 2000 installation procedure at this point.

### 5.3.2 Existing System Installation

This procedure installs or upgrades the SYMC8XX.SYS, SYM\_HI.SYS, SYM\_895A.SYS and/or SYM\_U3.SYS drivers onto an existing Windows 2000 system.

When you add an LSI Logic adapter to an existing system, the new adapter is automatically detected at the next reboot. For adapters controlled by the SYMC8XX.SYS or SYM\_HI.SYS drivers, the bundled driver is loaded automatically with no user intervention. For adapters controlled

by the `SYM_895A.SYS` or `SYM_U3.SYS` drivers, the Device Driver Wizard will appear at boot. Click on the Next button and continue at [Step 8](#).

- Step 1. Boot Windows 2000 and log on as Administrator.
- Step 2. Right click on My Computer and click on Properties.
- Step 3. Click on the Hardware tab, and then click on the Device Manager button.
- Step 4. Click the "+" to the left of the SCSI and RAID controllers line. Find the adapter desired for the driver upgrade and double click on the entry.
- Step 5. Click on the Driver tab.

Information on the currently installed driver is displayed, and additional driver details can be viewed by clicking the Driver Details button.
- Step 6. Click on the Update Driver button to update the existing driver.

The Upgrade Device Driver Wizard begins.
- Step 7. Click on the Next button.
- Step 8. Make sure "Search for a suitable driver for my device" is selected, then click on the Next button.
- Step 9. Make sure the "Floppy disk drives" location is checked.
- Step 10. Insert the appropriate SDMS driver diskette that contains the Windows 2000 driver required to support your LSI Logic adapter(s) and press Enter.

The system scans the existing driver database and the floppy disk drive for drivers for the selected adapter. If a driver already exists on the system, and it is newer than the updated driver on the SDMS driver diskette, a message appears and gives you the option to keep or reinstall the existing driver.

In this case, if you desire to use the upgrade driver anyway, click the "Install one of the other drivers" box, then click on the Next button. If no current driver exists, the driver on the SDMS driver diskette is displayed.
- Step 11. Click on the Next button.



A list of suitable drivers appears. The entry for the upgrade driver can be verified by scrolling the display to the right, and viewing the Location field.

- Step 12. Highlight the driver for the upgrade installation disk and click on the Next button.

In some cases, a message will state that this driver is not digitally signed. This message informs you that a nonsigned driver is being installed.

Note: Drivers are digitally signed by the Microsoft Windows Hardware Quality Lab (WHQL). Due to the time lag between the general customer release by LSI Logic of Windows drivers and the completion of WHQL testing, some drivers that are distributed with adapters or downloaded from the LSI Logic Web site may not be digitally signed.

- Step 13. Click No to cancel the installation if the nonsigned driver is *not* desired or click Yes to continue the installation.

The system loads the driver from the SDMS driver diskette. A message box may appear indicating that the target (existing) driver is newer than the source (upgrade) driver.

- Step 14. Click No to cancel the driver upgrade at this point or click Yes to continue the installation.

The system copies the driver to the system disk.

For any adapter other than the boot adapter, the updated driver becomes active immediately. For the boot adapter, a message box displays indicating that you must reboot your system for the new driver to take effect.

- Step 15. Click on the Finish button to complete the driver upgrade.

When upgrading the driver on a multiple SCSI channel adapter, both channels of the adapter should be upgraded before the system is rebooted. Failure to do this can result in the upgraded driver being replaced by the original existing driver.

---

## 5.4 Performance Tuning for Windows 2000

Windows 2000 has registry entries that can be used to improve the performance of SCSI I/O for certain configurations. The tunable parameters are large transfer block size support and a guaranteed number of concurrent I/Os for a particular SCSI bus.

Important: Registry files for the SYMC8XX.SYS, SYM\_HI.SYS, and SYM\_895A.SYS and SYM\_U3.SYS drivers begin with SYMXXXXX.REG.

### 5.4.1 Large Block Size Support

The SYMC8XX.SYS, SYM\_HI.SYS, SYM\_895A.SYS, and SYM\_U3.SYS drivers can support up to a 1 Mbyte transfer size in Windows 2000, however the default transfer size is limited to 64 Kbytes. To enable a larger transfer size, an entry must be added to the registry, using the file SYM\_256K.REG. This file sets a 256 Kbytes maximum, but it can be edited to set other desired maximum transfer sizes.

Important: Be sure to read the information in the SYM\_256K.REG data file before editing it.

Choose one of two methods to add this registry setting:

1. Locate the SYM\_256K.REG data file (supplied with the driver files) using Windows Explorer and double click on the file.

or

2. Type at the command prompt:

```
REGEDIT SYM_256K.REG
```

This inserts an entry in the registry to enable 256 Kbytes block size support.

Editing the SYM\_256K.REG file can set any maximum block size between 64 Kbytes and 1 Mbyte (– 8 Kbytes). The formula to calculate the proper value for MaximumSGList is:

$$\text{MaximumSGList} = (\text{Maximum Block Size}) / 4K + 1$$

For 256 Kbytes:  $256K / 4K = 64$  Kbytes, add 1 for 65 (decimal) or 0x41 (hexadecimal). The maximum value allowed for MaximumSGList is

255 or 0xFF. This denotes an absolute maximum transfer size of 1040384, which is 8 Kbytes less than 1 Mbyte ( $1040384/4K = 0xFE$ , add 1 for 0xFF or 255).

You must reboot your system for the new registry setting to take effect. To reset the maximum block size to the default of 64 Kbytes, follow the instructions above, except use `SYMDFBLK.REG` as the data file.

## 5.4.2 Maximum Number of Concurrent I/Os (Guaranteed)

Windows 2000 only guarantees a maximum of 32 concurrent I/Os active on a particular SCSI bus. However, due to the method of memory allocation, the actual limit of concurrent I/Os can vary greatly between various drivers or versions of drivers. This can have a huge impact on performance benchmarking between different driver versions or adapter vendors. In effect, one adapter may actually be able to have 70 or 80 I/Os outstanding, while another adapter could only have 32. This can also affect systems with high performance storage subsystems, such as disk arrays.

In order to have a guaranteed number of concurrent I/Os, an entry must be added to the registry, using the `SYM100IO.REG` file.

Important: Be sure to read the information in the `SYM100IO.REG` data file before editing it.

Choose one of two methods to add this registry setting:

1. Locate the `SYM100IO.REG` (supplied with the driver files) using Windows Explorer and double click on the file.

or

2. Type at the command prompt:

```
REGEDIT SYM100IO.REG
```

This inserts an entry in the registry to guarantee a maximum of 100 concurrent I/Os per adapter.

If a maximum other than 100 is desired, the `SYM100IO.REG` file can be edited. However, setting this value to a high number uses increasing amounts of nonpaged pool memory, a critical Windows 2000 resource. High values for this setting can degrade system performance.

You must reboot your system for the new registry setting to take effect. To reset the guaranteed number of concurrent I/Os to the default of 32, follow the instructions above, except use `SYMDEFIO.REG` as the data file.

### 5.4.3 Auto Request Sense

Enabling and Disabling Auto Request Sense is found in [Section 5.5, "Troubleshooting."](#)

### 5.4.4 Disk Mirroring

This section applies only to Intel x86 platforms where the SDMS 4.XX PCI SCSI BIOS is used.

The SDMS 4.XX PCI SCSI BIOS loads only one image into system memory at boot time regardless of how many host adapters are used in the system. All of the disk drives on all host adapters are recognized through the INT13h function call. Due to this implementation, disk mirroring under Windows 2000 could be done if it is desired. Disk mirroring allows booting from the mirrored partition in case the primary partition fails.

**Note:** These instructions may be different from Microsoft documentation.

To create a Windows 2000 Fault Tolerant (FT) diskette, follow these instructions:

- Step 1. Format a diskette in drive A: by using Windows 2000 (Windows Explorer or My Computer) for use as a FT boot floppy.
- Step 2. From the root directory of the primary partition, copy `NTLDR`, `NIDETECT.COM`, and `BOOT.INI` to this diskette.
- Step 3. Temporarily remove the read only attribute of the `BOOT.INI` file so that it can be modified and saved.
- Step 4. Edit the `BOOT.INI` file on the FT diskette and modify the following line where you want to boot the mirrored partition:

```
multi(0)disk(0)rdisk(x)partition(y)\<winnt_directory>
```

where `multi(0)` and `disk(0)` should always remain the same.

`x` = the drive number of the mirrored partition in the INT13h chain minus 80h.

The drive number of the mirrored partition can be found during system bootup of the SDMS 4.XX PCI SCSI BIOS when the primary partition does not exist. It should say either BOOT (= 80h), 81h, 82h, or higher. Therefore, the value of x would be 0 when BOOT, 1 when 81h, 2 when 82h, etc.

y = the partition number on the drive (starts at 1 which equals single partition on the drive).

- Step 5. The next example provides a scenario to better illustrate the above information.

**Example:** Two LSI Logic 8xx host adapters are in the system.

The first host adapter, #0 which is the boot path, has two SCSI hard drives on ID 0 and ID 5. The second host adapter, #1, has two SCSI hard drives on ID 2 and ID 4. Assuming that the SCSI bus scan starts from ID 0 and goes up, the drive number of INT13h will look like this:

Host Adapter #0, ID 0= BOOT (which is 80h)

Host Adapter #0, ID 5= 81h

Host Adapter #1, ID 2= 82h

Host Adapter #1, ID 4= 83h

Now Windows 2000 is installed on the boot drive, host adapter #0 ID 0, and a mirrored partition is established on host adapter #1 ID 2. If the primary partition fails, for example due to power failure, then the drive number of INT13h will change:

Host Adapter #0, ID 5= BOOT (which is 80h)

Host Adapter #1, ID 2= 81h

Host Adapter #1, ID 4= 82h

Therefore, to boot from the mirrored partition, enter this line in the `BOOT.INI` file on the Windows 2000 FT boot floppy:

```
multi(0)disk(0)rdisk(1)partition(1)\<winnt_directory>  
where the host adapter is #1 with ID2.
```

Note that `rdisk(1)` was calculated from `x=81h` minus 80h.

- Step 6. Save the `BOOT.INI` and restore the "read only" attribute.

---

## 5.5 Troubleshooting

Some potential problems and their suggested solutions are:

### **Upgrading Windows NT 4.0 Server to Windows 2000 Server**

Follow these steps to retain file folders created within Windows NT:

- Step 1. Boot your Windows NT 4.0 computer.  
The system displays your computer's desktop.
- Step 2. Insert the Windows 2000 installation CD-ROM.  
The system prompts to ensure you want to upgrade your server.
- Step 3. Reply yes.  
A window appears and asks if you want to upgrade to Windows 2000.
- Step 4. Click on the Next button.  
The system prompts with a license agreement.
- Step 5. Read the license agreement and select the radio button that reads:  
*I accept this Agreement.*
- Step 6. Click on the Next button.  
The system prompts for the serial number.
- Step 7. Type in the serial number assigned to your installation CD-ROM.
- Step 8. Click on the Next button.  
The Select Special Options window may appear. If so, make the applicable settings, then click on the Next button.  
The system copies the files and then prompts to reboot your computer.
- Step 9. Reboot your computer and leave the Windows 2000 installation CD-ROM in your CD-ROM drive.  
The system boots up your computer using the Windows 2000 CD-ROM.

- Step 10. Press the F6 key when the screen displays: Setup is inspecting your computer's hardware configuration.
- Be sure to press the F6 key to load the nonbundled drivers. For example: the SYM\_U3.SYS driver.
- Step 11. Choose S to specify an additional device when the screen displays:
- Setup could not determine the type of one or more mass storage devices....*
- The system prompts for the manufacturer-supplied hardware support disk.
- Step 12. Insert the appropriate SDMS driver diskette containing the Windows 2000 driver required to support your LSI Logic adapter(s) and press Enter.
- Return to the Windows 2000 Setup screen.
- Step 13. Press Enter to proceed.
- The message about setup loading files appears.
- The system prompts with another license agreement.
- Step 14. Click on the Agreement selection.
- The system displays partition table information.
- Step 15. Press Enter.
- The system prompts to continue setup.
- Step 16. Press C.
- Step 17. Select a new location to install Windows 2000 so that it does not overwrite the information in the Windows NT section of your hard drive. For example, the WINNT location appears.
- Step 18. Press Esc to use a different location.
- Step 19. Type in WIN2K for the system to create a new folder.
- Step 20. Press Enter.
- Step 21. Follow the Microsoft Windows 2000 installation procedure at this point.

When the installation has completed, you can move the files from the Windows NT (WINNT) folders to appropriate folders within the Windows 2000 (WIN2K) folder.

**During installation, no SCSI devices are found.**

- Ensure that the custom setup is chosen on the Setup Method screen.
- Ensure that all devices are powered on and terminated correctly.
- Check that no devices have duplicate SCSI IDs.
- Make sure INTA is assigned for the PCI slot(s) where your SCSI host adapter(s) are installed.
- Ensure that all devices can be seen in the display banner of the SDMS SCSI BIOS at boot time.
- For systems with some versions of the Award BIOS, ensure that the PCI IRQ is set to edge triggered.

**System crashes during installation with a message indicating inaccessible boot device.**

- This error is usually associated with an IRQ, DMA channel, I/O (chip) address, or BIOS address conflict. Set the SCSI host adapter to use a different interrupt.
- A virus sometimes causes this error that infects the Master Boot Record of the boot device. Use a write protected DOS bootable flex containing virus scanning and cleaning software to check for any viruses on the boot device, and remove if any are found.

**A disk drive is recognized as seven different devices when only one is physically connected to the SCSI bus.**

Older SCSI devices that incorrectly indicate that they support multiple LUNs to Windows 2000 usually cause this error.

- Contact the device manufacturer for a firmware upgrade.
- Ensure that there are no devices with the same SCSI ID as the host adapter board.



## **Problems with SCSI devices installation or operation.**

If a SCSI device is not operating properly (either the device is not found or a SCSI interface error occurs during scanning), it is possible that the third party device drivers do not support the auto request sense feature of LSI Logic host adapters. Disable the auto request sense feature as described below and try the device operation again.

- Step 1. To disable the auto request sense feature, use the `SYMNO_AR.REG` file (supplied with the SDMS driver installation files). Either double click on the file in Windows Explorer or type `REGEDIT SYMNO_AR.REG` at the command prompt.

This inserts a registry entry that disables the auto request sense feature. You must reboot your system for this change to take effect.

- Step 2. To re-enable the auto request sense feature, use the `SYM_AUTO.REG` file and perform one of the update methods described in the preceding paragraph.

## **Problems with certain SCSI devices when using an Ultra SCSI adapter.**

Some SCSI devices do not function properly when the adapter attempts to negotiate Ultra SCSI transfer rates. If a device is not operating properly, check the transfer speed setting using the SDMS 4.XX PCI SCSI BIOS Configuration Utility (press `Ctrl-C` when the SDMS PCI SCSI BIOS banner appears during the system boot process). Devices that do not support Ultra SCSI should be set to a maximum of 10 Mbytes/s for 8-bits, and 20 Mbytes/s for 16-bits.

## **Problems with Ultra160 SCSI devices using Ultra160 SCSI protocol.**

If the system is configured with an LSI Logic host adapter that supports Ultra160 SCSI and an Ultra160 SCSI device is on the SCSI bus, intermittent problems and possible system crashes can occur if the SCSI bus cable and terminators do not conform to the Ultra160 SCSI specification.

- To disable Ultra160 SCSI support for all devices, use the SDMS 4.XX PCI SCSI BIOS Configuration Utility (press `Ctrl-C` when the SDMS PCI BIOS banner appears during the system boot process).

- If the system operates properly without Ultra160 SCSI enabled, it is highly likely that the SCSI bus cable and terminators are not configured correctly for Ultra160 SCSI. See the LSI Logic host adapter user's guide for information on Ultra160 SCSI cabling requirements.

**At Ultra160 speed (160 Mbytes/s) system hangs, has long boot time, or SCSI device not available.**

Some older SCSI devices do not tolerate Domain Validation operations. At system boot time, Domain Validation is performed to test the data integrity of the SCSI bus between the host adapter and each target device. With some older SCSI devices, these operations can cause the device to stop responding to SCSI commands.

Disable Domain Validation, either for a specific SCSI target or all adapters controlled by the driver, by following these steps:

- Step 1. To disable Domain Validation for a specific SCSI target, use the SDMS 4.XX PCI SCSI BIOS Configuration Utility to set the Sync Rate to 0 (async) and the Data Width to 8.

This target will run in async/narrow mode and no Domain Validation operations will be performed on it.

- Step 2. To disable Domain Validation for all host adapters controlled by this driver, use the `SYMNO_DV.REG` file (supplied with the SDMS driver files). Either double click on the file in Windows Explorer or My Computer or type `REGEDIT SYMNO_DV.REG` at the command prompt.

This inserts a registry entry that disables Domain Validation operations. You must reboot your system for this change to take effect.

- Step 3. To re-enable the Domain Validation feature, use the file `SYM_DOMV.REG` and perform one of the update methods described in the preceding paragraph.

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## 5.6 Using SDMS ASPI for Windows 2000

SDMS ASPI for Windows 2000 is a software support package based on the "ASPI for Win32" version 2.3 specification. Refer to this specification

for additional information. The ASPI software provides a mechanism used by Windows applications as an interface to access SCSI adapters and peripherals.

### 5.6.1 Features

The Windows 2000 ASPI software supports these features:

- Information about SCSI adapters
- Information about SCSI devices
- Ability to issue SCSI I/O requests
- Multithreaded and multitasking operations
- 32-bit Windows applications

### 5.6.2 Description

Windows 2000 ASPI meets the Advanced SCSI Programming Interface (ASPI) version 2.3 specification. All Windows applications use this interface to gain access to system SCSI devices. Applications using this interface can retrieve information about installed SCSI adapters and the SCSI peripherals attached to the adapters. Applications using the ASPI interface can issue SCSI I/O requests to the devices.

Typical of these type of applications are utility programs that investigate and explore SCSI devices, or applications such as CD-R mastering software and scanner applications.

Note that Windows 2000 ASPI is one method to use for gaining access to SCSI devices; the other method would be to use SCSI pass-through commands.

Windows 2000 ASPI is comprised of two modules:

1. a user mode DLL, and
2. a kernel mode device driver

Applications, using ASPI only, interface with the user mode DLL. The DLL passes commands and requests to the kernel mode device driver, which in turn interfaces with the Windows 2000 operating system for execution of the request. Note that nonadministrator users can now open the kernel mode driver.

A current version of Windows 2000 ASPI can be downloaded from the LSI Logic Web Site (<http://www.lsillogic.com>). After you are connected to this Web site, place your cursor on the Get Drivers option in the menu bar. Click on the Drivers selection. Choose the Utilities for SCSI and click on the Go button. Follow the instructions on subsequent screens to download Windows 2000 ASPI.

### 5.6.3 Installing Windows 2000 ASPI

To install Windows 2000 ASPI for x86 platforms, execute the InstallShield setup program.

To install the Windows 2000 ASPI software, you execute an InstallShield setup program. If you obtained the software from the LSI Logic Web site, it is within a self-extracting zip file. Expand the zip file to install the software into a directory on your hard disk drive or to a diskette, and then run `SETUP.EXE`.

If you obtained the software from the SDMS Software Device Drivers and Utilities CD-ROM, run the `SETUP.EXE` program directly from:

```
{CD-ROM Drive Letter}:\UTILITY\WINDOWS\W2KASPI
```

The setup program installs the Windows 2000 ASPI files into the proper directories as well as making the appropriate registry entries. After installing the software, you must reboot the computer. There are no command line options with the Windows 2000 ASPI software.

---

## 5.7 Using SCSI Tools for Windows 2000

SDMS SCSI Tools for Windows 2000 is a software support utility for x86 platforms. It provides a mechanism for examining host adapters and SCSI devices within the Windows 2000 environment.

### 5.7.1 Features

The SCSI Tools for Windows 2000 support these features:

- Examination of SCSI device parameters
- Power management
- Disk cache management

## 5.7.2 Installing SCSI Tools for Windows 2000

If your system already has SDMS ASPI for Windows 2000, follow the instructions for running the InstallShield setup program. Otherwise, the SDMS ASPI utility must be installed first before installing this SCSI Tools package. Refer to [Section 5.6, “Using SDMS ASPI for Windows 2000.”](#)

To install the SCSI Tools for Windows 2000 software, you execute an InstallShield setup program. If you obtained the software from the LSI Logic web site, it is in the form of a self-extracting zip file. Expand the zip file to install the software into a directory on your hard disk drive, or to a diskette and then run `SETUP.EXE`. Note that the installer must have Windows NT 4.0 Administrator capabilities for running the `SETUP` program.

If you obtained the software from the SDMS Software Device Drivers and Utilities CD-ROM, run the `SETUP.EXE` program directly from:

```
{CD-ROM Drive Letter}:\UTILITY\WINDOWS\SYMTOOLS\I386
```

The setup program installs the SCSI Tools files into the proper directories as well as making the appropriate registry entries. After installing the software, you must reboot the computer.



# Chapter 6

## DOS Device Driver Installation

---

This chapter describes the device drivers for the DOS operating systems. It provides installation instructions for these drivers along with utility information. This chapter includes these topics:

- [Section 6.1, "Introduction," page 6-1](#)
  - [Section 6.2, "Using the DOS Installation Utility," page 6-3](#)
  - [Section 6.3, "About the ASPI8XX.SYS Driver," page 6-5](#)
  - [Section 6.4, "About the SYMDISK.SYS Driver," page 6-12](#)
  - [Section 6.5, "About the SYMCD.SYS Driver," page 6-18](#)
  - [Section 6.6, "Additional DOS Utilities," page 6-23](#)
- 

### 6.1 Introduction

In SDMS 4.0, the SCSI BIOS for the LSI Logic family of PCI to SCSI chips is capable of mapping SCSI hard disk drives behind any non-SCSI hard disk drives (for example, IDE) within the same system. A driverless solution allows connection of up to 24 hard drives (SCSI and non-SCSI) under DOS 5.0 and above.

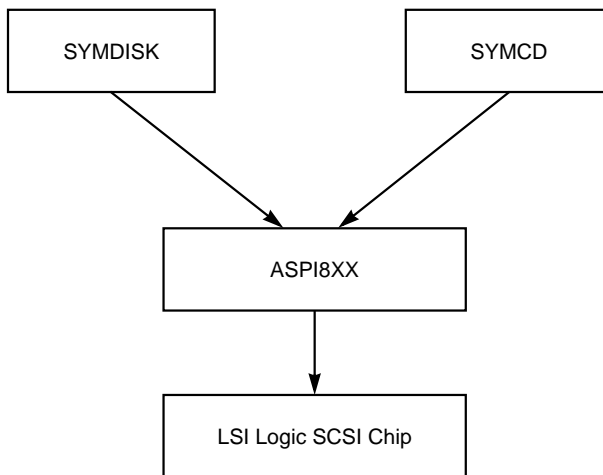
The SCSI BIOS also supports full Virtual DMA Services (VDS), including features such as scatter/gather. To gain maximum performance, disable any double buffer option provided by disk caching software (such as the Microsoft SMARTDRV.EXE program) for all drives handled through SDMS.

#### 6.1.1 When You Need to Load Drivers

To connect peripherals other than hard disk drives, you must load the appropriate driver. Some of these drivers work together, and some are capable of direct communication with an LSI Logic PCI to SCSI controller.

Figure 6.1 illustrates how SDMS DOS drivers communicate.

**Figure 6.1 How SDMS DOS Drivers Communicate**



#### **6.1.1.1 ASPI8XX.SYS**

This device driver is an Advanced SCSI Programming Interface (ASPI) manager. It provides standard ASPI compatibility between the SCSI host adapter hardware and ASPI compatible applications. See [Section 6.3, “About the ASPI8XX.SYS Driver,” page 6-5](#) for more detailed information.

#### **6.1.1.2 SYMDISK.SYS**

This device driver is for non-INT13h SCSI disk drives and removable media devices, and it works through the ASPI manager. See [Section 6.4, “About the SYMDISK.SYS Driver,” page 6-12](#) for more detailed information.

#### **6.1.1.3 SYMCD.SYS**

This device driver is for CD-ROM drives, and it works through the ASPI manager. See [Section 6.5, “About the SYMCD.SYS Driver,” page 6-18](#) for more detailed information.

You may also download the current DOS drivers from the LSI Logic web site at: <http://www.lsillogic.com>. After you are connected to this web site, place your cursor on the Get Drivers option in the menu bar.



Click on the Drivers selection. Choose the DOS operating system for SCSI from the list. Click on the Go button. Follow the instructions on subsequent screens to download the drivers.

## 6.1.2 LSI Logic Devices Supported

All LSI Logic devices and host adapters have undergone a name change. They have transitioned from a SYM prefix to an LSI prefix. No name changes have occurred for the SDMS DOS drivers.

The `ASPI8XX.SYS`, `SYMDISK.SYS`, and `SYMCD.SYS` drivers support the following devices and their associated LSI Logic host adapters:

- LSI53C810, LSI53C810A, LSI53C810AE (LSI8100S, LSI8100ASP, LSI20810)
- LSI53C815 (LSI815XS, LSI8150SP)
- LSI53C825, LSI53C825A (LSI8250S, LSI8251S, LSI8251D, LSI8250ASP, LSI8251ASP, LSI8251AD)
- LSI53C860, LSI53C860AE (LSI8600SP, LSI20860)
- LSI53C875, LSI53C875E (LSI8750SP, LSI8751SP, LSI8751SPE, LSI8751D)
- LSI53C876 (LSI22801, LSI22802)
- LSI53C885
- LSI53C895 (LSI8951U, LSI8952U)
- LSI53C895A (LSI8953U)
- LSI53C896 (LSI22910, LSI21002, LSI22902)
- LSI53C1000 (LSI20160, LSI20160L)
- LSI53C1010 (LSI22915A, LSI21040, LSI22903, LSI21003, ITI6200U3LP)

---

## 6.2 Using the DOS Installation Utility

The SDMS DOS Installation Utility provides a quick and easy method for performing either a default or custom installation of the SCSI device drivers in a DOS/Windows environment. It works with any system using an SDMS supported LSI Logic SCSI chip. The DOS Installation Utility

identifies the system, scans the SCSI bus, and properly installs the required SCSI device drivers.

The SDMS Software Device Drivers and Utilities CD-ROM contains the DOS device drivers along with the DOS Installation Utility.

To install the DOS Drivers using this utility, follow these steps:

Step 1. Copy the contents from this directory on the SDMS CD-ROM

`{CD-ROM DRIVE LETTER}:\DRIVERS\DOS`

to the root of a diskette.

Step 2. Reboot your system.

Step 3. Insert the newly created diskette into your floppy drive (A: or B:), and type at a DOS prompt:

`INSTALL`

Step 4. Press Enter.

Step 5. Follow the directions presented on the screen.

When performing a custom installation, an understanding of the information presented in the following sections for manual installation may prove useful.

## 6.2.1 Troubleshooting

Here is a potential problem and a suggested solution:

If a menuing system exists in the `CONFIG.SYS` file and multiple menu selections are available that already include some of the SDMS drivers, the system only updates the first menu selection found that already contains our drivers rather than all of them. However, if SDMS drivers are not present, it puts the new drivers in the common area and creates a common menu item one, if it does not exist.

A workaround regarding menuing in the `CONFIG.SYS` file is to ensure the install program puts the drivers where you want them. By default they are put in the common area. However, if some of the SDMS drivers are already present, the install program may incorrectly guess where the new ones should be put.

---

## 6.3 About the ASPI8XX.SYS Driver

This section describes the characteristics of the ASPI8XX.SYS driver and provides installation instructions.

### 6.3.1 Features

The ASPI8XX.SYS driver supports these features:

- ASPI applications
- Allows up to eight host adapters
- Release of initialization code for smaller run time size
- Works with or without SDMS 4.XX Boot ROM (LSI Logic no longer supports the SDMS 3.XX Boot ROM)
- Synchronous negotiation
- Wide SCSI
- Target Initiated Negotiation (TIN)
- Full VDS support, including scatter/gather
- Disconnect/Reselect
- Adapter exclusion
- Shared interrupts
- Single-threaded I/O
- DMI NVS (can read device configuration information from NVS when NVRAM on the host adapter is not present.)
- LSI Logic usage of PCI Subsystem ID to control various features and configuration settings.
- Booting from a CD-ROM
- A 66 MHz PCI bus
- Up to Ultra160 SCSI (160 Mbytes/s when using Wide SCSI) including: Parallel Protocol Request (PPR), Double Transition (DT) data transfers, Cyclic Redundancy Check (CRC)

## 6.3.2 Description

The `ASPI8XX.SYS` device driver is an ASPI manager that provides an interface to popular ASPI applications. This driver is required when you want to use `SYMDISK.SYS` or `SYMCD.SYS` or whenever you want to run an ASPI application.

This interface replaces an SDMS BIOS (if present), and fully supports all devices supported by the BIOS. If an SDMS BIOS is not present, only an ASPI interface is provided.

## 6.3.3 Installing the ASPI8XX.SYS Driver

To install the `ASPI8XX.SYS` driver, follow these steps:

Step 1. Copy the `ASPI8XX.SYS` driver to the boot disk.

The SDMS Software Device Drivers and Utilities CD-ROM contains the `ASPI8XX.SYS` driver in this directory:

```
{CD-ROM Drive Letter}:\DRIVERS\DOS
```

Step 2. Add this line to the system's `CONFIG.SYS` file:

```
DEVICE=C:[path]ASPI8XX.SYS.
```

This line must appear before any line loading other SDMS drivers (such as, `SYMCD.SYS` and/or `SYMDISK.SYS`), or any other ASPI compliant driver/application.

## 6.3.4 Using Command Line Options

The `ASPI8XX.SYS` device driver has several configurable features that are set by using switches on the command line in the `CONFIG.SYS` file. Using these command line options overrides the settings in the SCSI BIOS Configuration Utility.

[Table 6.1](#) lists the command line options. No spaces are allowed within a single command line option, but spaces are required between different command line options.

In the following descriptions, `path` refers to the adapter number (boot order designation), and `id` refers to the SCSI ID. The following conventions are also used:

- [ ] items in brackets are optional
- \* means repeat item 0 or more times

**Table 6.1 ASPI8XX Command Line Options**

| Option Name | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| /NORST      | <p>Prevents a SCSI bus reset during loading of <code>ASPI8XX.SYS</code>.</p> <p>Activate this option by modifying the line in the <code>CONFIG.SYS</code> file that loads <code>ASPI8XX.SYS</code> to look like this:</p> <pre>DEVICE=C:[PATH]ASP8XX.SYS /NORST</pre>                                                                                                                                                                                                                                                                                                         |
| /ASK        | <p>Prompts at system bootup about loading the <code>ASPI8XX.SYS</code> driver.</p> <p>Activate this option by modifying the line in the <code>CONFIG.SYS</code> file that loads <code>ASPI8XX.SYS</code> to look like this:</p> <pre>DEVICE=C:[PATH]ASPI8XX.SYS /ASK</pre>                                                                                                                                                                                                                                                                                                    |
| /WIDTH      | <p>Defines the maximum data width negotiated with a device. This option can be used with host adapters capable of 16-bit data transfers. Valid settings are 8 or 16.</p> <p>Syntax: <code>/WIDTH=n&lt;path&gt;[:id]&gt;[,n&lt;path[:id]&gt;]*</code></p> <p>If the first host adapter (boot order designation = 0) is a 16-bit adapter, and you wish to force 8-bit transfers to a device at SCSI ID 2, the line in the <code>CONFIG.SYS</code> file that loads <code>ASPI8XX.SYS</code> should look like this:</p> <pre>DEVICE=C:[PATH]ASPI8XX.SYS /WIDTH=8&lt;0:2&gt;</pre> |

**Table 6.1 ASPI8XX Command Line Options (Cont.)**

| Option Name                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| /DISCONNECT<br>or<br>/DC   | <p>Allows a device to disconnect. SCSI devices have the ability to disconnect from the bus during an I/O transfer. If a particular host adapter has parity checking disabled, all devices attached to it must have disconnects disabled, since parity is required during the reselection phase.</p> <p>Syntax: /DISCONNECT=n&lt;path[:id]&gt;[,n&lt;path[:id]&gt;]*</p> <p>Valid options are ON (allow disconnects) or OFF (do not allow disconnects). The default value for all devices is ON.</p> <p>To disable disconnects on the first host adapter (boot order designation = 0) at SCSI ID 2, the line in the CONFIG.SYS files that loads ASPI8XX.SYS should look like this:</p> <p>DEVICE=C:[PATH]ASPI8XX.SYS /DISCONNECT=OFF&lt;0:2&gt;</p>                                                                                                                                                |
| /SYNC_RATE<br>or<br>/SR    | <p>Sets the maximum synchronous transfer rate (in megatransfers per second) to negotiate with a particular device. The allowable values are 0, 5, 10, 20, 40, and 80 providing the host adapter is capable of the specified speed. Specify 0 to turn off synchronous transfers for a particular device.</p> <p>Syntax: /SYNCH_RATE=n&lt;path[:id]&gt;[,n&lt;path[:id]&gt;]*</p> <p>To turn off synchronous transfers to the device attached to the first host adapter (boot order designation = 0) at SCSI ID 3, the line in the CONFIG.SYS file that loads ASPI8XX.SYS should look like this:</p> <p>DEVICE=C:[PATH]ASPI8XX.SYS /SYNCH_RATE=0&lt;0:3&gt;</p> <p><b>Note:</b> When executing synchronous transfers using an 8-bit SCSI bus, Mbytes/s = megatransfers per second. Also, when doing synchronous transfers using a 16-bit SCSI bus, Mbytes/s = 2 times megatransfers per second.</p> |
| /SYNCH_OFFSET<br>or<br>/SO | <p>Sets the maximum synchronous offset in bytes used to negotiate with a particular device. The maximum allowable values are 0, 8, 16, 31, and 62 provided the host adapter is capable of the specified offset. Specify 0 (zero) to turn off synchronous transfers for a particular device. The default value is the highest offset supported by your host adapter.</p> <p>Syntax: /SYNCH_OFFSET=n&lt;path[:id]&gt;[,n&lt;path[:id]&gt;]*</p> <p>To turn off synchronous transfers to the device attached to the first host adapter (boot order designation = 0) at SCSI ID 3, the line in the CONFIG.SYS file that loads ASPI8XX.SYS should look like this:</p> <p>DEVICE=C:[PATH]ASPI8XX.SYS /SYNCH_OFFSET=0&lt;0:3&gt;</p>                                                                                                                                                                     |

**Table 6.1 ASPI8XX Command Line Options (Cont.)**

| Option Name         | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| /PARITY<br>or<br>/P | <p>Tells the host adapter to disable the SCSI bus data integrity checking feature known as parity. Some SCSI devices do not generate parity. Valid options are <b>ON</b> (check parity), which is the default value, or <b>OFF</b> (do not check parity).</p> <p>Syntax: /PARITY=n&lt;path[ ,path]*&gt;[n&lt;path[ ,path]*&gt;]*</p> <p>To turn off parity checking on the first host adapter (boot order designation = 0), the line in the <code>CONFIG.SYS</code> file that loads <code>ASPI8XX.SYS</code> should look like this:</p> <pre>DEVICE=C:[PATH]ASPI8XX.SYS /PARITY=OFF&lt;0&gt;</pre> <p><b>Warning:</b> When disabling parity checking, you <i>must</i> also disable disconnects for that adapter since you cannot disable parity checking for reselection. If a device does not generate parity, and it disconnects, the I/O will never complete.</p>                                                                                                            |
| /EXCLUDE or<br>/X   | <p>Excludes support for an adapter that does not currently have BIOS support. Do not exclude an adapter that is supported (included) by the BIOS when booting the system. This option has three required parameters that identify the specific adapter you want to exclude:</p> <ul style="list-style-type: none"> <li>• PCI Device ID</li> <li>• PCI Bus Number</li> <li>• PCI Device/Function Number</li> </ul> <p>To obtain these parameters, boot the system using the <code>/VERBOSE</code> command line option (explained later).</p> <p>The monitor displays the parameters for the adapter or path you wish to exclude.</p> <p>Syntax: /EXCLUDE&lt;a:b:c&gt;[ ,&lt;a;b;c&gt;]*</p> <p>If the adapter to exclude has PCI Device ID 3, PCI Bus Number 0, and PCI Device/Function Number 68, then the line in the <code>CONFIG.SYS</code> file that loads <code>ASPI8XX.SYS</code> should look like this:</p> <pre>DEVICE=C:[PATH]ASPI8XX.SYS /EXCLUDE&lt;3:0:68&gt;</pre> |

**Table 6.1     ASPI8XX Command Line Options (Cont.)**

| Option Name          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| /HOST_ID<br>or<br>ID | <p>Alters the SCSI ID for a host adapter (8-bit adapter where the SCSI IDs are [0:7]; 16-bit adapter where the SCSI IDs are [0:15]. It is suggested that IDs [8:15] not be used for your adapter). This option does not allow anyone to select a SCSI ID already in use.</p> <p>If the host adapter allows connection of both 8-bit and wide devices to the same bus, and the adapter number is changed to an ID greater than 7, then the 8-bit SCSI devices are not able to reselect the initiator. You are not allowed to change the SCSI ID of any adapter currently supported by the BIOS.</p> <p>Syntax: /HOST_ID=n&lt;path&gt;[ ,n&lt;path&gt;]*</p> <p>To change the SCSI ID of the second host adapter (path = 1) to ID=6 (providing that adapter is not controlled by the BIOS), the line in the CONFIG.SYS file that loads ASPI8XX.SYS should look like this:</p> <pre>DEVICE=C:[PATH]ASPI8XX.SYS /HOST_ID=6&lt;1&gt;</pre>    |
| /TIMEOUT<br>or<br>/T | <p>Uses a timeout mechanism to detect certain errors. When the driver issues a command to a SCSI device, a timer is started. If the timer expires before the command completes, the driver assumes something has gone wrong and takes steps to recover.</p> <p>If the device is BIOS controlled, the default for this option is 10 seconds. If the device is not BIOS controlled, the default is 0. Also, NVM settings can alter these defaults. The maximum setting is 0, which is no timeout. The range of allowable values is 0–65535 seconds.</p> <p>Syntax: /TIMEOUT=n&lt;path[:id]&gt;[ ,n&lt;path[:id]&gt;]*</p> <p>If you have a particularly slow device (with SCSI ID 3) on the first host adapter (boot order designation = 0), you can extend the timeout for this device to 60 seconds, by adding in the CONFIG.SYS file that loads ASPI8XX.SYS this line:</p> <pre>DEVICE=C:[PATH]ASPI8XX.SYS /TIMEOUT=60&lt;0:3&gt;</pre> |



**Table 6.1 ASPI8XX Command Line Options (Cont.)**

| Option Name          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| /VERBOSE<br>or<br>/V | <p>Causes more detailed information to appear on the monitor, after the ASPI8XX.SYS driver is initialized, during a system boot. For example, the following information may be displayed (all on one line) after using the /VERBOSE or /V option:<br/>53C875 Rev 3 at PCI ID 15, Bus 0, Dev/Func 70h, CMD=0117h, SCRIPTS=FFFFBE000h</p> <p>This option is useful when multiple adapters are present in the system, and the PCI Device ID, the PCI Bus number, and the PCI Device/Function number for each adapter needs to be known. This information is required to use the /EXCLUDE option already described in this section.</p> <p>Syntax: /VERBOSE</p> <p>To see more detailed adapter information displayed when you boot, the line in the CONFIG.SYS file that loads ASPI8XX.SYS should look like this:</p> <p>DEVICE=C:[PATH]ASPI8XX.SYS /VERBOSE</p> |

## 6.3.5 Troubleshooting

Some potential problems and their suggested solutions are:

### **System locks up at boot time.**

- Check for conflicts with other ASPI managers.
- Check for correct loading sequence in the CONFIG.SYS file.
- Reboot the system.

### **The device driver does not recognize one of the nonboot SCSI peripherals (system may lock up).**

- Make sure the drivers were installed in the correct sequence.
- Make sure the drivers' entries in the CONFIG.SYS file have the correct path to the drivers.
- Power down all units in the system.
- Make sure all SCSI devices have unique ID numbers.
- Make sure both ends of the SCSI bus are terminated.
- Check all cable and power connections.
- Reboot the system.

---

## 6.4 About the SYMDISK.SYS Driver

This section describes the characteristics of the SYMDISK.SYS driver and provides installation instructions.

### 6.4.1 Features

The SYMDISK.SYS driver supports these features:

- Removable media devices
- Magneto Optical (MO) devices
- Non-512-byte sectors (1024, 2048, 4096)
- Multiple Logical Unit Numbers (LUN)
- OS/2 floppy format for MO and hard disks
- Multiple host adapters when adapter has not been controlled by the SCSI BIOS (no INT13h devices)
- Reserving drive letters for installed devices without media present in the device (see /UNITS under command line options)
- Adding drive letters
- Power management (to spindown drives)
- Allows up to eight host adapters

### 6.4.2 Description

The SYMDISK.SYS driver allows you to connect drives with non-512-byte sectors, and to connect removable drives if you want to change the media. Use this driver also to obtain drive letters for devices (adapters) that are not supported by the BIOS.

The SYMDISK.SYS driver communicates through ASPI8XX.SYS. To use the SYMDISK.SYS driver, you must also load ASPI8XX.SYS.

### 6.4.3 Installing the SYMDISK.SYS Driver

To install the SYMDISK.SYS driver, follow these steps:

Step 1. Copy the SYMDISK.SYS driver to the boot disk.

The SDMS Software Device Drivers and Utilities CD-ROM contains the SYMDISK.SYS driver in this directory:

{CD-ROM Drive Letter}:\DRIVERS\DOS

The ASPI8XX.SYS driver is also required.

Step 2. Add the lines shown below to the CONFIG.SYS file. List the drivers in this sequence:

DEVICE=C:[PATH]ASPI8XX.SYS

DEVICE=C:[PATH]SYMDISK.SYS

### 6.4.4 Using Command Line Options

The SYMDISK.SYS device driver has several embedded functions that are accessed by using switches on the command line. [Table 6.2](#) lists the command line options. No spaces are allowed in a single command line option, but spaces are required between different command line options.

In the following descriptions, *path* refers to the adapter number (boot order designation), and *id* refers to the SCSI ID. The following conventions are also used:

[ ] items in brackets are optional

\* items in brackets followed by an \* means repeat 0 or more times

| choose one of the given items

**Table 6.2 SYMDISK.SYS Command Line Options**

| Option Name | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| /ASK        | <p>Prompts you at system bootup whether to load SYMDISK.SYS or not. To use this option, the line in the CONFIG.SYS file that loads SYMDISK.SYS should look like this:</p> <pre>DEVICE=C:[PATH]SYMDISK.SYS /ASK</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| /EXCLUDE    | <p>Allows you to exclude a path:id:lun combination from being scanned or controlled by SYMDISK.SYS. The path parameter is mandatory with all ids and luns for that path excluded by default if just the path is specified. To use this option, the line in the CONFIG.SYS file that loads SYMDISK.SYS should look like this:</p> <pre>DEVICE=C:[PATH]SYMDISK.SYS /EXCLUDE=path[:id[:lun]][,path[:id[:lun]]]*</pre> <p>For example, if path 0, id 2, and lun 0 are designated, then the command line should look like this:</p> <pre>DEVICE=C:[PATH]SYMDISK.SYS /EXCLUDE=0:2:0</pre> <p><b>Note:</b> A limit of 24 path:id:lun combinations is allowed.</p> |

**Table 6.2 SYMDISK.SYS Command Line Options (Cont.)**

| Option Name | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| /UNITS      | <p>Allows the use of removable media, such as cartridge hard drives, each of which might have a different number of partitions. If media with more than one partition are used, set this option to the maximum number of partitions on any one media.</p> <p>LSI Logic recommends that you use this option when using removable media with more than one partition.</p> <p>To use this option, the line in the CONFIG.SYS file that loads SYMDISK.SYS should look like this (all on one line):</p> <pre>DEVICE=C:[PATH]SYMDISK.SYS /UNITS=path:id:lun:num_units [,path:id:lun:num_units]*</pre> <p>For example, if a removable media drive is at SCSI ID 2 on the first host adapter and you need to reserve three partitions, the command line should look like this:</p> <pre>DEVICE=C:[PATH]SYMDISK.SYS /UNITS=0:2:0:3</pre> <p>When SYMDISK.SYS initializes, it defaults to either:</p> <p>One drive letter for a removable media device with no media present.<br/>-or-<br/>The number of partitions found on the media in the removable media device.</p> <p>The full <code>path</code>, <code>id</code>, <code>lun</code>, and <code>num_units</code> values are required for this option. Also, 24 devices is the standard limit of devices.</p> |
| /SSIZE      | <p>Allows you to change the default sector size. The SYMDISK.SYS device driver defaults to the largest sector size found during boot, handling all different sector sizes found. In the case of removable media, SYMDISK.SYS assumes a 2048-byte sector size when no media is present. This option overcomes this limitation. To use this option, the line in the CONFIG.SYS file that loads SYMDISK.SYS should look like this:</p> <pre>DEVICE=C:[PATH]SYMDISK.SYS /SSIZE=512 1024 2048 4096</pre> <p>For example, if a removable media drive is used that has a sector size of 2048-bytes, the command line should look like this:</p> <pre>DEVICE=C:[PATH]SYMDISK.SYS /SSIZE=2048</pre> <p>If SYMDISK.SYS comes across a sector size larger than the one specified in this option, or if it finds a sector larger than the default, it refuses to read/write to that media. This driver reports an invalid media error to DOS.</p>                                                                                                                                                                                                                                                                                                                    |

**Table 6.2 SYMDISK.SYS Command Line Options (Cont.)**

| Option Name | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| /SPINDOWN   | <p>Use this power management feature to automatically spindown a disk when the disk is not accessed for a specified amount of time. The default spindown time is 15 minutes. You can specify a new spindown time in hours and minutes (hh:mm) with a minimum time of 1 minute.</p> <p>To use this option, the line in the CONFIG.SYS file that loads SYMDISK.SYS should look like this (all on one line):</p> <pre>DEVICE=C:[PATH]SYMDISK.SYS /SPINDOWN=hh:mm&lt;path[:id[:lun]]&gt;[ ,hh:mm&lt;path[:id[:lun]]&gt;]</pre> <p>For example, to spindown a device on path 0, id 2, and lun 0, after one hour and five minutes of inactivity, the command line should look like this:</p> <pre>DEVICE=C:[PATH]SYMDISK.SYS /SPINDOWN=1:5&lt;0:2:0&gt;</pre> <p>To spindown all devices after the default time-out of 15 minutes, the command line should look like this:</p> <pre>DEVICE=C:[PATH]SYMDISK.SYS /SPINDOWN=&lt;&gt;</pre> <p>The &lt;&gt; are required when you specify a path:id:lun in this option.</p> |

## 6.4.5 Troubleshooting

Some potential problems and their suggested solutions are:

**The computer locks up and will not complete booting from a non-SCSI hard disk drive.**

Refer to the drive manufacturer's user manual.

**The computer locks up and will not complete booting from a SCSI hard disk drive.**

If the SCSI BIOS is seen during boot, a banner similar to the following appears:

```
LSI Logic Corp. Symbios SDMS (TM) v4.0 PCI SCSI BIOS, PCI  
Rev. 2.0, 2.1 Copyright 1995-2001 LSI Logic Corp.
```

1. Is the SCSI BIOS seen during boot?

**YES** Go to [2.](#)

**NO** Power down all units in the system.

Remove all SCSI cables.

Boot system.

Is the SCSI BIOS seen during boot?

**YES** Power down all units in the systems.

Reconnect and check all cable and power connections.

Boot system.

**NO** Power down all units in the system.

Reset the host bus adapter.

Check CMOS setup.

Boot system.

Go to [1.](#)

2. Does the SCSI BIOS see the bootable SCSI drive?

When the computer boots, SDMS scans the SCSI bus. Devices found on the SCSI bus are identified as in the following lines:

| HA | ID | LUN | VENDOR    | PRODUCT   | REV  |
|----|----|-----|-----------|-----------|------|
| 0  | 2  | 0   | SEAGATE   | ST31230N  | 0060 |
| 0  | 7  | 0   | LSI Logic | LSI53C815 | 0003 |

**YES** Go to [3.](#)

**NO** Power down all units in the system.

Make sure the hard drives have different ID numbers (boot drive should have the lowest ID).

Make sure both ends of the SCSI bus are terminated.

Check all cable and power connections.

Check CMOS setup.

Boot system.

Go to [1.](#)

3. If booting is still unsuccessful, follow the solution to the next problem.

**The device driver does not recognize one of the nonboot SCSI peripherals (system may lock up).**

- Make sure the drivers were installed in the correct sequence.
- Make sure the drivers' entries in the `CONFIG.SYS` file have the correct path to the drivers.
- Power down all units in the system.
- Make sure the hard drives have different ID numbers (boot drive should have lowest ID).
- Make sure both ends of the SCSI bus are terminated. Termination should only be at the ends of the bus.
- Check all cable and power connections.
- Boot the system.

---

## 6.5 About the `SYMCD.SYS` Driver

This section describes the characteristics of the `SYMCD.SYS` driver and provides installation instructions:

### 6.5.1 Features

The `SYMCD.SYS` driver supports these features:

- Compatible with the Microsoft CD-ROM Extension 2.21 and above
- Multisession Photo CD support
- Up to eight host adapters

### 6.5.2 Description

The `SYMCD.SYS` device driver is needed whenever a CD-ROM device is connected on the SCSI bus. You must load it in conjunction with the Microsoft CD-ROM Extension 2.21 or above (`MSCDEX.EXE`).

The `SYMCD.SYS` driver communicates through `ASPI8XX.SYS`. To use the `SYMCD.SYS` driver, you must also load `ASPI8XX.SYS`.



### 6.5.3 Installing the SYMCD.SYS Driver

To install the SYMCD.SYS driver, follow these steps:

Step 1. Copy the SYMCD.SYS driver to the boot disk.

The SDMS Software Device Drivers and Utilities CD-ROM contains the SYMCD.SYS driver in this directory:

```
{CD-ROM Drive Letter}:\DRIVERS\DOS
```

Step 2. Add SYMCD.SYS to the CONFIG.SYS file.

It goes in after ASPI8XX.SYS and SYMDISK.SYS (if this driver is also being used), in this order:

```
DEVICE=C:[PATH]ASPI8XX.SYS
DEVICE=C:[PATH]SYMDISK.SYS
DEVICE=C:[PATH]SYMCD.SYS /D:NAME
```

**Note:** The /D: is not a drive letter designation; it indicates the name to be assigned to the CD-ROM. You must include the NAME, which can use any combination of up to eight characters. This is the same NAME to be used in conjunction with MSCDEX.EXE (see next page).

Step 3. Add the MS-DOS LASTDRIVE command to the CONFIG.SYS file to ensure that sufficient drive letters are available to identify all devices connected to the SCSI bus:

```
LASTDRIVE=<drive letter>
```

where <drive letter> specifies a drive letter in the range C through Z. The letter assigned to LASTDRIVE represents the last valid drive MS-DOS is able to recognize and also represents the maximum number of drives available. For example, LASTDRIVE=K allows access to eleven (11) logical drives. For further details about LASTDRIVE, consult the MS-DOS manual.

Step 4. Execute the Microsoft CD-ROM Extension (MSCDEX.EXE) from the AUTOEXEC.BAT file in order to access the drive, unless the CD-ROM access software specifies otherwise. Add the following line to the AUTOEXEC.BAT file:

```
[PATH]MSCDEX /D:NAME
```

For example, if:

```
DEVICE=C:[PATH]SYMCD.SYS /D:MY_CD
```

is in the CONFIG.SYS file, then:

```
[PATH]MSCDEX /D:MY_CD
```

should exist in the AUTOEXEC.BAT file. The /D: switches must match.

- Step 5. Check installation instructions for the CD-ROM drive itself for other parameters necessary to include with MSCDEX.

When MSCDEX is loaded during the AUTOEXEC.BAT file execution, a message appears and shows the drive letter assignment to the CD-ROM drive. For example:

```
DRIVE E = DRIVER MY_CD UNIT 0
```

This informs you that the CD-ROM drive is recognized and ready for use.

## 6.5.4 Using Command Line Options

The SYMCD.SYS device driver has several embedded functions available that are accessed by using switches on the command line. [Table 6.3](#) lists the command line options. No spaces are allowed in a single command line option, but spaces are required between different command line options.

In the following descriptions, `path` refers to the adapter number (boot order designation). The following convention is also used:

[ ] items in brackets are optional

**Table 6.3 SYMCD.SYS Command Line Options**

| Option Name | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| /ASK        | Prompts you at initialization time whether to load SYMCD.SYS or not. For example, the line in the CONFIG.SYS file that loads SYMCD.SYS would look like this:<br><br>DEVICE=C:[PATH]SYMCD.SYS /D:MY_CD /ASK                                                                                                                                                                                                                                                                                                                      |
| /UPTOLUN    | Changes the default for multiple LUNs per Target ID on the SCSI bus. The current default is to scan all LUNs. CD-ROM changers that use multiple LUNs work by default.<br><br>To turn off scanning all LUNs on a SCSI bus, choose /UPTOLUN=0. This saves some time during boot.                                                                                                                                                                                                                                                  |
| /NOBCD      | Supports the Trantor Music Box CD audio application. Using this option prevents the track numbers from being converted to BCD (Binary Coded Decimal). If this option is used with CD audio applications such as Adaptec's cd-player, Corel's cd-audio, or Future Domain's cd-audio, track numbers >16 are not reported correctly because these applications require binary track numbers.<br><br>For example, the line in the CONFIG.SYS file that loads SYMCD.SYS would look like this:<br><br>DEVICE=C:[PATH]SYMCD.SYS /NOBCD |

## 6.5.5 Troubleshooting

Some potential problems and their suggested solutions are:

### **The CD-ROM drive is not seen at boot time, or the system locks up.**

- Make sure the required drivers are installed and in the correct sequence.
- Make sure the drivers' entries in the CONFIG.SYS file have the correct path to the driver.
- Make sure MSCDEX.EXE, in the AUTOEXEC.BAT, has the same drive name as the CD-ROM driver in the CONFIG.SYS file.
- Make sure there is no ID or drive letter designation conflict.
- Power down all units in the system.
- Check the cable and power connections.
- Make sure the SCSI bus is properly terminated.

- Make sure sufficient drive letters are specified (through the MS-DOS `lastdrive=` command) to include the CD-ROM. A CD-ROM that uses multiple disks requires a letter for each disk.

## 6.5.6 Assigning Drive Letters

This section provides important additional information for DOS users. Please note that the MS-DOS operating system assigns drive letters to primary partitions first. After the primary partitions have been assigned drive letters, the logical partitions are assigned drive letters. Do not assume that the drive letter designations will follow consecutively from device to device within a PC system.

### An Example:

A system is configured with an IDE hard disk as the boot drive, a SCSI hard disk, and a CD-ROM drive. The IDE drive has three partitions: one primary and two logical. The SCSI hard disk has two partitions: one primary and one logical. The SCSI hard disk is assigned ID 1, and the CD-ROM is ID 4. The distribution of the drive letters is:

- A:** 3 1/2" floppy drive
- B:** 5 1/4" floppy drive
- C:** IDE primary partition
- D:** SCSI primary partition
- E:** IDE first logical partition
- F:** IDE second logical partition
- G:** SCSI logical partition
- H:** CD-ROM

---

## 6.6 Additional DOS Utilities

This section provides information concerning four utilities and includes these topics:

- [Section 6.6.1, “Using the Low-Level Format Utility,” page 6-23](#)
- [Section 6.6.2, “Using the DOS Configuration Utility,” page 6-26](#)
- [Section 6.6.3, “Using the DOS Verify Utility,” page 6-28](#)
- [Section 6.6.4, “Host Adapter Flash Utility,” page 6-29](#)

### 6.6.1 Using the Low-Level Format Utility

The SDMS Software Device Driver and Utilities CD-ROM contains the SCSI Low-level Format Utility (`ASPIFMT.EXE`) in this directory:

```
{CD-ROM DRIVE LETTER}:\UTILITY\DOS
```

#### 6.6.1.1 Features

The SCSI Low-level Utility supports these features:

- Works with any ASPI-compatible host adapter
- Provides a GUI
- Multiple adapter/drive selection
- Multiple LUNs
- Wide (16-bit) SCSI
- Provides automatic error retry
- Provides on-screen display of time elapsed

#### 6.6.1.2 Description

This utility allows you to low-level format SCSI hard disk drives that are connected to LSI Logic PCI to SCSI host adapters. It provides a friendly GUI, and help is available for any decision screen by pressing F1 or selecting Help in the window.

Important: The `ASPIFMT` utility requires at least a VGA compatible monitor to display this utility.

To run this utility, three files are required:

- `ASPIFMT.EXE`,
- `ASPIINF.DAT`, and
- `ASPI8XX.SYS` (you may use another ASPI manager).

LSI Logic recommends that you place these files on a DOS bootable diskette, and run the executable file from this diskette rather than from a hard disk drive. This minimizes the possibility of interfering with the system.

### 6.6.1.3 Running the SDMS SCSI Low-Level Format Utility

To run the SDMS Format Utility, follow these steps:

Step 1. Create a DOS bootable diskette.

Step 2. Add these DOS files to the diskette:

Step 3. `FDISK.EXE`  
`FORMAT.COM`

Since the hard drive remains unusable after a low-level format until you execute the `DOS FDISK` and `FORMAT` command procedures, the `CONFIG.SYS` file on this bootable diskette must also contain these DOS files.

Step 4. Add the ASPI files from the SDMS Software Device Driver and Utilities CD-ROM and found in this directory:

```
{CD-ROM DRIVE LETTER}: \UTILITY\DOS  
ASPIFMT.EXE  
ASPIINF.DAT
```

Step 5. Run `INSTALL.EXE` to perform a default or custom installation of the SCSI DOS device drivers.

Locate this program on the SDMS Software Device Driver and Utilities CD-ROM in this directory:

```
{CD-ROM DRIVE LETTER}: \UTILITY\DOS
```

Please note that `SYMDISK.SYS` is required only if you are formatting removable media drivers.

```
ASPI8XX.SYS  
SYMDISK.SYS
```

Note: Refer to [Section 6.2, "Using the DOS Installation Utility,"](#)  
[page 6-3](#) for further details about creating these drivers.

Step 6. Also create a CONFIG.SYS file to place on this bootable diskette with the single line:

```
DEVICE=A:\ASPI8XX.SYS
```

If you need SYMDISK.SYS, include this line:

```
DEVICE=A:\SYMDISK.SYS
```

Step 7. Boot from this diskette and at the DOS prompt type:

```
ASPIFMT
```

and press Enter.

The recommended minimum memory requirement for this utility is 2 Mbytes. You need at least 500 Kbytes of conventional DOS memory, and the remainder in extended memory.

When you run the format utility, it scans the SCSI bus for all hard disk and removable media drives. Then, it generates a display showing the devices found. You may select devices from this display for the utility to format.

It can take from several minutes to several hours, depending on the size of the drive, to complete the format. If the format procedure is aborted for any reason, the drive remains unusable until an entire format cycle is completed.

Caution: Use extreme caution when selecting a drive for formatting. The format process completely removes all information on a drive. Only 512-sector size is supported.

#### 6.6.1.4 Troubleshooting

Some potential problems and their suggested solutions are:

**Format does not complete and system is frozen.**

- Check to see if the drive still has power.
- The only way to terminate the program is to reboot. If the format did not complete, the drive remains unusable until a low-level format is completed.

**The utility screens are unreadable.**

Check that your graphics card and your monitor match. For example, an SVGA card combined with a VGA monitor may not display the screens accurately.

**Older MO drives may give an “Unknown error” status code if the media is not present. This may cause the ASPIFMT to incorrectly identify the problem.**

If an unknown status code is received for an MO drive, check to see if the media are present.

### 6.6.2 Using the DOS Configuration Utility

The SDMS Software Device Drivers and Utilities CD-ROM contains the DOS Configuration Utility (CONFIG.EXE) in this directory:

```
{CD-ROM DRIVE LETTER}:\UTILITY\DOS
```

#### 6.6.2.1 Features

The configuration utility supports these features:

- Configures all DOS drivers
- Works for all LSI Logic LSI53C8XX PCI host adapters
- Provides a SCSI bus view showing all LSI53C8XX cards and attached peripherals
- Provides a GUI and online Help



### 6.6.2.2 Description

This utility provides a user-friendly way to configure any of the DOS-based drivers for the `CONFIG.SYS` file. It assumes the LSI Logic SCSI drivers are already installed. The SDMS ASPI driver, `ASPI8XX.SYS`, must be present and loaded for this utility to run. Online help is available at each step for each screen you encounter. You may press F1 at any time for a list of all the help available.

### 6.6.2.3 Running the DOS Configuration Utility

To run this utility, several files are required:

- `CONFIG.EXE`
- `CONFIG.DAT`
- `8BITBUS.PCX`
- `16BITBUS.PCX`
- `ADAPTERS.PCX`
- `LUNVIEW.PCX`
- `TILE.PCX`
- `VIEWIT.PCX`
- `ASPI8XX.SYS`

If `ASPI8XX.SYS` already exists on the system and the driver line points to it in the `CONFIG.SYS` file, you do not need it in the same directory as `CONFIG.EXE`. It is included here in case the installation of the drivers has not yet taken place. If this is the case, add the following line to the `CONFIG.SYS` file:

```
DEVICE=[path]ASPI8XX.SYS
```

Then, reboot for it to take effect. The path specified in the above line is your choice (`C:\LSILogic` is recommended), and `ASPI8XX.SYS` must be copied to that location.

If you wish to configure the `SYMDISK.SYS` or `SYMCD.SYS` DOS drivers, they also require installation prior to running the SCSI BIOS Configuration Utility. To do a full installation of all the DOS drivers, run the DOS Installation Utility.

The recommended minimum memory requirement for this utility is 2 Mbytes. You need at least 500 Kbytes of conventional DOS memory, and the remainder in extended memory.

#### 6.6.2.4 Troubleshooting

A possible problem with its suggested solution is:

**The utility screens are unreadable.**

Check that your graphics card and your monitor match. For example, an SVGA card combined with a VGA monitor may not display the screens accurately.

#### 6.6.3 Using the DOS Verify Utility

The SDMS Software Device Drivers and Utilities CD-ROM contains the DOS Verify Utility (SYMDIAG.EXE and Z\_VER.DAT) files in this directory

{CD-ROM Drive Letter}:\UTILITY\DOS

The ASPI8XX.SYS file is also required.

##### 6.6.3.1 Features

The SCSI DOS Verify Utility supports these features:

- Provides a system check for our SDMS 4.0 software
- Detects any vendor's adapters and ASPI managers
- Shows detailed device information found on these adapters
- Provides a GUI and online Help

##### 6.6.3.2 Description

This utility troubleshoots the system by systematically testing and checking various hardware and software components. No changes or side effects occur to the system as a result of running this utility. The first screen displays a Help button. Click on the Help button for a detailed explanation about what tests and checks are performed on the system.

A majority of the information received by this utility is by using ASPI commands. Therefore, this utility is most helpful if an ASPI manager is

loaded at the time it is run. Although some limited information can be found without one, an error is reported if it does not find an ASPI manager. Note that any vendor's ASPI manager suffices.

### 6.6.3.3 Running the DOS Verify Utility

To run this utility, three files are required:

- SYMDIAG.EXE
- Z\_VER.DAT
- ASPI8XX.SYS (if not installed already in the CONFIG.SYS file)

If ASPI8XX.SYS already exists on the system and the driver line points to it in the CONFIG.SYS file, you do not need it in the same directory as SYMDIAG.EXE. It is included here in case an install of the drivers has not yet taken place. If this is the case, add the following line to the CONFIG.SYS file:

```
DEVICE=[path]ASPI8XX.SYS
```

Then, reboot the system for it to take effect. The path specified in the above line is your choice (C:\LSILogic is recommended) and ASPI8XX.SYS must be copied to that location.

The recommended minimum memory requirement for this utility is 2 Mbytes. You need at least 500 Kbytes of conventional DOS memory, and the remainder in extended memory.

### 6.6.3.4 Troubleshooting

A potential problem with its suggested solution is:

#### **The utility screens are unreadable.**

Check that your graphics card and your monitor match. For example, an SVGA card combined with a VGA monitor may not display the screens accurately.

## 6.6.4 Host Adapter Flash Utility

The SDMS Software Device Drivers and Utilities CD-ROM contains the SDMS Flash Utility (FLASH8X5.EXE) in this directory:

{CD-ROM Drive Letter}:\DRIVERS\BIOS

#### 6.6.4.1 Features

The main feature supports host adapter selection for updating with a specific BIOS image.

#### 6.6.4.2 Description

This utility allows you to update the LSI Logic PCI SCSI BIOS on a host adapter based on a LSI53C815, LSI53C825, LSI53C825A, LSI53C875, LSI53C876, LSI53C885, LSI53C895, LSI53C895A, LSIC53C896, LSI53C1000, and LSI53C1010 SCSI chip. LSI Logic releases new versions of the SCSI BIOS periodically. Your host adapter must have a flash ROM on board to use this utility.

You *must* place this utility on a DOS bootable diskette and execute it from this diskette. Do not run `FLASH8X5` from a drive connected to the host adapter you are updating. Power down any hard disk drives attached to the host adapter that you are updating.

Using DOS 5.0 or higher, create a bootable diskette by formatting it with the `/s` option (for example, `format A: /s`). Do not install any memory managers or SCSI drivers on the diskette. A minimum of 200 Kbytes of conventional memory is needed to execute the Flash Utility. Add the DOS mouse driver to `AUTOEXEC.BAT` for mouse control of the utility, if desired.

**Note:** Some systems contain a specific PCI bus design, known as a Peer Bus implementation. This design provides an expanded PCI bus capacity by means of a secondary PCI bus. This implementation may cause issues with this Flash utility's ability to correctly identify LSI53C8XX or LSI53C1XXX boards installed on this secondary PCI bus. For example, an error could occur or the system could hang after executing this Flash utility.

If your system contains a Peer Bus implementation, the only two alternatives available that will correct these issues are:

Step 1. Reboot the computer.

Step 2. Type `FLASH8X5/q` at the prompt to invoke an optional mode of identifying LSI53C8XX or

LSI53C1XXX boards in a secondary PCI bus environment.

or

Step 1. Turn the machine off.

Step 2. Move the LSI Logic host adapter boards to be flashed over to the primary PCI bus.

To run the flash utility with a standard PCI bus implementation, follow these steps:

Step 1. Insert the diskette into drive A:.

Step 2. Boot the system to the DOS prompt A:\>.

Step 3. Type `FLASH8X5` and press Enter.

The first screen displayed indicates what files are necessary to upgrade and general instructions to upgrade.

Step 4. Press Enter to continue to the next window.

The Main menu for the Flash Utility appears and displays these six choices:

1. Update current SCSI EEPROM
2. Backup current SCSI EEPROM
3. View board summary
4. Exit to DOS
5. Reboot
6. About Flash8x5

LSI Logic recommends that you view the board summary (option 3) and perform a backup (option 2) prior to updating the flash. The view identifies the SCSI controller, its Device ID, the Flash ROM, and the current BIOS version. The backup stores the old BIOS image currently residing in the flash ROM to the diskette. In the event that there are problems with the new image, you can get back to the original one.

To update the current SCSI BIOS, follow these steps:

Step 1. Choose option 1 to give you a summary of boards.

Step 2. Press the space bar to mark/select at least one, even if there is only one to choose from.

Step 3. Press Enter.

A new window appears asking for the file name of the BIOS to upgrade.

Step 4. Type the filename at the A:\ prompt and press Enter

or

Press F2 to view the available files on the diskette. If you press F2, the available files should be: the BIOS file just backed up and 8XX BIOS image files. Highlight the 8XX BIOS image file (\*.ROM) and press Enter.

The utility displays the filename and notifies you when the file is successfully read.

Step 5. Press Enter to continue.

The system prompts you whether or not to overwrite the BIOS that is currently flashed in.

Step 6. Select Y to upgrade.

This erases and updates the flash ROM.

The system displays the card information and verifies that the new BIOS is flashed.

Step 7. Press any key to get back to the Main menu.

Step 8. Choose option 5 to reboot.

Step 9. Remove the diskette if you want to boot from the hard drive.

To verify the new BIOS installation, watch carefully during boot and look at the third line of the SDMS banner when it is displayed.

or

Rerun the Flash utility from the bootable diskette and choose the View option to see the current BIOS version.

Note: Due to smaller flash ROMs on some host adapters, it may not be possible to upgrade earlier host adapters with newer versions of the BIOS. The flash ROM size can be determined by the part's description displayed on the Summary of Boards Installed screen in the flash chip column. Flash ROM part numbers and corresponding sizes are shown below.

Flash ROM part numbers and corresponding sizes are:

- 256/256A – 32 Kbyte capacity
- 512 – 64 Kbyte capacity
- 101/010 – 128 Kbyte capacity
- 201/020 – 256 Kbyte capacity

Host adapters supported are:

- LSI8150SP
- LSI8251AD
- LSI8250ASP, LSI8251ASP
- LSI8750SP, LSI8751D
- LSI8751SPE, LSI8751SP
- LSI8951U, LSI8952U, LSI8953U
- LSI22801, LSI22802
- LSI22910, LSI21002
- LSI22915A, LSI21040
- LSI22902, LSI22903
- LSI20160, LSI20160L





# Chapter 7

## OS/2 Device Driver Installation

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This chapter describes the device drivers for the OS/2 operating system. It provides installation instructions for new and existing system installations along with command line information. This chapter includes these topics:

- [Section 7.1, "Introduction," page 7-1](#)
  - [Section 7.2, "Using the SDMS OS/2 Drivers," page 7-5](#)
  - [Section 7.3, "Installing Drivers for OS/2," page 7-5](#)
  - [Section 7.4, "Using Command Line Options," page 7-9](#)
  - [Section 7.5, "Troubleshooting," page 7-17](#)
- 

### 7.1 Introduction

The OS/2 operating system version 4.0 or later provides an integrated platform featuring the Presentation Manager graphical windowing interface that allows multiple applications to be viewed at the same time. Multitasking is also supported, enabling several different programs to run at the same time in different windows. Presentation Manager allows you to switch between programs, start other programs, and maintain files and directories.

This version of OS/2 requires an x86 or higher microprocessor. Other hardware requirements include a minimum of 8 Mbytes of RAM and a minimum hard disk drive size of 90 Mbytes. SDMS 4.0 provides the necessary SCSI device drivers for OS/2, which are `SYM8XX.ADD` and `SYM_HI.ADD`. LSI Logic recommends reviewing the OS/2 manual prior to proceeding.

## 7.1.1 Features

The SDMS device drivers for OS/2 support these features:

- Synchronous negotiation (including Fast SCSI, Ultra SCSI, Ultra2 SCSI)
- Ultra160 data transfers (for LSI53C1000 and LSI53C1010 chips only)
- Parallel Protocol Request (PPR) (for LSI53C1000 and LSI53C1010 chips only)
- Double Transition data transmission (for LSI53C1000 and LSI53C1010)
- Wide SCSI (Single-Ended (SE) and differential)
- Disconnect/Reselect
- Scatter/Gather
- Tagged command queuing
- SE, High Voltage Differential, and LVD termination
- Target Initiated Negotiation (TIN)
- Allows up to eight host adapters
- NVRAM and NVS configuration storage
- Alternate Cylinder Head Section (CHS) mapping algorithm
- Command line `/EXCLUDE` option to block use of a specified adapter
- Higher performance by requiring only one interrupt per I/O
- Flexible GPIO pin definition using a table in the manufacturing data area of NVM

## 7.1.2 LSI Logic Devices Supported

All LSI Logic devices and host adapters have undergone a name change. They have transitioned from a SYM prefix to an LSI prefix. No name changes have occurred for the SDMS OS/2 ADD drivers.

The `SYM8XX.ADD` driver supports the following devices and their associated LSI Logic host adapters:

- LSI53C810, LSI53C810A, LSI53C810AE (LSI8100S, LSI8100ASP, LSI20810)
- LSI53C815 (LSI815XS, LSI8150SP)
- LSI53C825, LSI53C825A (LSI8250S, LSI8251S, LSI8251D, LSI8250ASP, LSI8251ASP, LSI8251AD)
- LSI53C860, LSI53C860AE (LSI8600SP, LSI20860)
- LSI53C875, LSI53C875E (LSI8750SP, LSI8751SP, LSI8751SPE, LSI8751D)
- LSI53C876 (LSI22801, LSI22802)
- LSI53C885
- LSI53C895 (LSI8951U, LSI8952U)
- LSI53C895A (LSI8953U)

The `SYM_HI.ADD` driver supports the following devices and their associated LSI Logic host adapters:

- LSI53C895A (LSI8953U)
- LSI53C896 (LSI22910, LSI21002, LSI22902)
- LSI53C1000 (LSI20160, LSI20160L)
- LSI53C1010 (LSI22915A, LSI21040, LSI22903, LSI21003, ITI6200U3LP)

**Note:** Both the `SYM8XX.ADD` and `SYM_HI.ADD` drivers support the LSI53C895A chip. If both drivers have been installed, whichever driver appears first in the `CONFIG.SYS` file will control the LSI53C895A chip. Refer to [Section 7.3.2.1, “Driver Order in the CONFIG.SYS File,”](#) page 7-8 to understand the importance of driver order.

### 7.1.3 Description

Although the LSI Logic SCSI controller's firmware can access the SCSI hard disk drives attached to the computer independently, the SCSI device drivers `SYM8XX.ADD` and `SYM_HI.ADD` act as an enhanced interface between the computer system and the SCSI BIOS firmware. Use of the device drivers increases the abilities of the SCSI controller firmware and fully utilizes the advancements and improvements of Pentium-based and higher microprocessors.

The device drivers are also necessary to support the use of SCSI tape drives and CD-ROM drives with an OS/2 system. The `SYM8XX.ADD` and `SYM_HI.ADD` device drivers are compliant with the IBM OS/2 ADD (Adapter Device Driver) specification. Additionally, the device drivers work with third party applications that comply with the same specification.

Both the `SYM8XX.ADD` and `SYM_HI.ADD` drivers allow up to eight host adapters to be present in your system. The first four host adapters are accessed in the order you specify using the SCSI BIOS Configuration Utility. Some members of the LSI Logic family of host adapters provide this utility.

Refer to the *PCI Storage Device Management System SDMS 4.0 User's Guide* for the availability and use of the SCSI BIOS Configuration Utility. You can access the remaining host adapters based on their physical position in your system. Refer to your system documentation for further information.

---

## 7.2 Using the SDMS OS/2 Drivers

The SDMS Software Device Drivers and Utilities CD-ROM contains the `SYM8XX.ADD` and `SYM_HI.ADD` drivers and their associated files in this directory:

```
{CD-ROM DRIVE LETTER}:\DRIVERS\OS2
```

You must prepare an SDMS Driver Diskette before proceeding with the installation instructions.

### 7.2.1 Preparing an SDMS Driver Diskette

Copy these OS/2 drivers and their associated files to the root directory of a clean diskette to install both or one of the device drivers.

- Device drivers `SYM8XX.ADD` and `SYM_HI.ADD`,
- Text files `SYM8XX.DDP` and `SYM_HI.DDP`, and
- Executable files `SYM8XXPC.EXE` and `SYM_HIPC.EXE`,
- Text files for OS/2 driver installation instructions and licensing agreement.

When the device driver installation utility under OS/2 is activated, it looks for all files with the DDP extension. The DDP files contain the necessary information to install the SCSI device driver. The EXE files contain a utility that verifies an appropriate adapter is present.

You may also download current OS/2 drivers from the LSI Logic Web site at: <http://www.lsilogic.com>. After you are connected to this Web site, place your cursor on the Get Drivers option in the menu bar. Click on the Drivers selection. Choose the OS/2 operating system for SCSI and click on the Go button. Follow the instructions on subsequent screens to download the drivers.

---

## 7.3 Installing Drivers for OS/2

The installation instructions are specific and accurate for the SDMS OS/2 `SYM8XX.ADD` and `SYM_HI.ADD` drivers. These sections contain the installation instructions for OS/2:

- [Section 7.3.1, “Installing SYM8XX.ADD/SYM\\_HI.ADD During New System Installations,” page 7-6](#)
- [Section 7.3.2, “Updating SYM8XX.ADD/SYM\\_HI.ADD for Existing System Installations,” page 7-7](#)

**Note:** If you previously installed OS2CAM.ADD (a previous version of the SYM8XX.ADD driver), delete OS2CAM.ADD and the corresponding BASEDEV= statement in the CONFIG.SYS file after you complete the installation procedures.

If you previously installed SYM8XX.ADD and/or SYM\_HI.ADD in a directory other than \OS2\BOOT, move SYM8XX.ADD and/or SYM\_HI.ADD to \OS2\BOOT, where the new versions of these drivers can replace the old versions.

In both instances, the system will continue to boot using the previous drivers until these steps are taken.

### 7.3.1 Installing SYM8XX.ADD/SYM\_HI.ADD During New System Installations

Your system configuration determines which installation instructions are appropriate for you.

If neither your boot drive nor SCSI CD-ROM is connected to an LSI Logic host adapter, install OS/2 and then add the drivers. Refer to the OS/2 Installation Guide for installing the operating system. Follow the steps in [Section 7.3.2, “Updating SYM8XX.ADD/SYM\\_HI.ADD for Existing System Installations,” page 7-7](#) to add the drivers.

or

If your boot drive or SCSI CD-ROM is attached to an LSI Logic host adapter, follow these steps:

- Step 1. Make copies of the diskettes used for installation that are included with the CD-ROM version of OS/2.
- Step 2. Determine the appropriate driver(s) for installation by locating the host adapter(s) to which the CD-ROM is attached in [Section 7.1.2, “LSI Logic Devices Supported.”](#)
- Step 3. Copy the indicated driver(s) from the SDMS OS/2 driver diskette to the copy of Diskette 1.

In order to do so, you must delete files on Diskette 1 to provide space. Consult the `README.1ST` file on the Device Driver Pak. It contains a list of files that may not be deleted. Follow the instructions provided in the `README.1ST` file. Once space is made available on Diskette 1, copy the appropriate SDMS device driver onto this diskette.

When ADD drivers are deleted from Diskette 1, make certain to delete or remark out the corresponding `BASEDEV=` statement in the `CONFIG.SYS` file. Otherwise, error messages will show up during installation.

- Step 4. Edit the `CONFIG.SYS` file on the copy of Diskette 1 by adding one of the following lines at the end of the file:

```
BASEDEV=SYM8XX.ADD /V
```

or

```
BASEDEV=SYM_HI.ADD /V
```

If installing both drivers, make sure that the `BASEDEV=` lines for the drivers appear in the `CONFIG.SYS` file in the order in which the drivers must load. Refer to [Section 7.3.2.1, "Driver Order in the CONFIG.SYS File," page 7-8](#) to understand the importance of driver order.

- Step 5. Follow the directions in the `README.1ST` file for adding the following line to the `CONFIG.SYS` file:

```
SET COPYFROMFLOPPY=1
```

This allows the SDMS driver to be copied from the installation diskette to the system's boot drive.

- Step 6. Place the copy of Installation Diskette in the A: drive and reboot the computer.
- Step 7. Proceed with the OS/2 installation process as documented in the OS/2 Installation Guide.

## 7.3.2 Updating SYM8XX.ADD/SYM\_HI.ADD for Existing System Installations

This section provides instructions for existing system installations. Apply these instructions when you have to:

- Add drivers for newly installed LSI Logic host adapters, or

- Update drivers for existing LSI Logic host adapters

To add or update SDMS OS/2 drivers, follow these steps:

- Step 1. Open the System Setup folder located within the OS/2 System folder at the OS/2 Desktop.
- Step 2. Open the Install/Remove folder and then double click on the Device Driver Install icon.
- Step 3. Insert the diskette containing the SDMS device driver(s) in the source drive.

The system will find all DDP files on the diskette and automatically install the corresponding drivers.

Verify that the installation was successful by following steps 4 through 7.

- Step 4. Open the Utilities folder located within the Programs folder on the OS/2 Desktop.
- Step 5. Double click on the OS/2 System Editor to start the editor.
- Step 6. Open the CONFIG.SYS file in the root directory and find the line(s):

```
BASEDEV=SYM8XX.ADD /V
```

and/or

```
BASEDEV=SYM_HI.ADD /V
```

If installing both drivers, make sure that the BASEDEV= lines for the drivers appear in the CONFIG.SYS file in the order in which the drivers must load. Refer to the [Section 7.3.2.1, "Driver Order in the CONFIG.SYS File,"](#) in this document to understand the importance of driver order.

- Step 7. Check the appropriate drivers are in the \OS2\BOOT directory on the boot drive.

### 7.3.2.1 Driver Order in the CONFIG.SYS File

Because of the way OS/2 assigns drive letters, the order in which drivers appear in the CONFIG.SYS file is important. The drivers must appear in the order in which the drive letters are to be assigned. In particular:



1. OS/2 will install the `BASEDEV=` line at the beginning of the target system's `CONFIG.SYS` file regardless of where the line is located in that file on Diskette 1. You may need to rearrange the order in which drivers appear in the `CONFIG.SYS` file for the target system.
2. The driver for the host adapter to which the boot device is attached must appear before all other `BASEDEV=` drivers in the `CONFIG.SYS` file.
3. If you are installing both SDMS drivers and a host adapter containing the LSI53C895A chip, the driver that will control the host adapter will be the driver that appears first in the `CONFIG.SYS` file. If one of the two SDMS drivers is controlling the boot drive, that driver will also control the LSI53C895A chip, since it must appear first in order for the boot drive to be recognized.

Refer to the OS/2 documentation to fully understand this requirement.

---

## 7.4 Using Command Line Options

Your host adapter has a default configuration that consists of optimal values for operation. You may decide to alter these default values if there is a conflict between device settings or if you need to optimize system performance.

Some values may be changed using the SCSI BIOS Configuration Utility provided with some members of the LSI Logic family of host adapters. Refer to your *PCI Storage Device Management System SDMS 4.0 User's Guide* for the availability and use of the SCSI BIOS Configuration Utility. In addition, the SDMS OS/2 device drivers have several embedded functions that can be accessed by using switches on the command line in the `CONFIG.SYS` file.

Values are applied in the following order:

- Manufacturer's settings
- SCSI BIOS Configuration Utility changes
- Command line options

For the `SYM8XX.ADD` driver: When applying new values using the command line options, changes in synchronous and wide negotiations may only decrease speed or reduce width. Any changes that attempt to increase speed or width are ignored.

For the `SYM_HI.ADD` driver: When applying new values using the command line options, all changes in synchronous and wide negotiations are accepted.

The options available using command line switches are described later. The `SYM8XX.ADD` driver is used in all examples; `SYM_HI.ADD` may be substituted for `SYM8XX.ADD` with identical results.

The `hba` represents the logical number of a host adapter as displayed by the `Verbose` option in the column headed `HBA`. This is not the SCSI ID of the host adapter. Use an `hba` value with no `:id` following it to indicate all devices on an adapter.

The `id` represents a SCSI target ID on the indicated adapter. To indicate all devices on a host adapter, do not use the SCSI ID of the host adapter for the `id` value. Instead, use the `hba` value as indicated in the preceding paragraph.

The following conventions are also used:

[ ] indicates optional information

\* indicates the pattern enclosed in the [ ] may be repeated

Table 7.1 lists the command line options and their descriptions.

**Table 7.1 OS/2 Command Line Options**

| Option Name          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| /VERBOSE<br>or<br>/V | <p>Enables display of a banner, version number, and SCSI bus information during start up of the system. This option appears on the command line by default.</p> <p>Syntax: /VERBOSE</p> <p>To see more detailed information displayed when you boot, the line in the CONFIG.SYS file that loads SYM8XX.ADD should look like this:</p> <p>BASEDEV=SYM8XX.ADD /VERBOSE</p> <p>or</p> <p>BASEDEV=SYM8XX.ADD /V</p> <p>To disable this feature, remove this switch from the command line.</p> |
| /!DM                 | <p>Disables use of the IBM-supplied DASD manager (OS2DASD.DMD) for the devices listed. The DASD manager supports direct access devices such as hard drives.</p> <p>Syntax: /!DM&lt;hba[:id]&gt;[,&lt;hba[:id]&gt;]*</p> <p>To disable OS2DASD.DMD for devices on host adapter 0 at target IDs 3 and 5, the line in CONFIG.SYS that loads SYM8XX.ADD should look like this:</p> <p>BASEDEV=SYM8XX.ADD /!DM&lt;0:3&gt;,&lt;0:5&gt;</p>                                                      |
| /!SM                 | <p>Disables use of the IBM-supplied SCSI manager (OS2SCSI.DMD) for the devices listed. The SCSI manager supports SCSI tape drives.</p> <p>Syntax: /!SM&lt;hba[:id]&gt;[,&lt;hba[:id]&gt;]*</p> <p>To disable OS2SCSI.DMD for devices on host adapter 0 at target IDs 3 and 5, the line in CONFIG.SYS that loads SYM8XX.ADD should look like this:</p> <p>BASEDEV=SYM8XX.ADD /!SM&lt;0:3&gt;,&lt;0:5&gt;</p>                                                                               |

**Table 7.1 OS/2 Command Line Options (Cont.)**

| Option Name          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| /EXCLUDE<br>or<br>/X | <p>Disables a host adapter so that it is not seen by the SDMS OS/2 device drivers. This allows a host adapter to be ignored without physically removing the board from the system. This may be necessary if the adapter in question is causing a resource conflict.</p> <p><b>Note:</b> If you exclude the adapter to which the boot device is attached, then you will not be able to boot.</p> <p>Syntax: /EXCLUDE&lt;chip:bus:dev/func&gt;[ , &lt;chip:bus:dev/func&gt;]*<br/>where:</p> <p><b>chip</b> is a unique identifier that indicates the LSI Logic board type. The Verbose option displays a table with this value appearing in the CHIP column.</p> <p><b>bus</b> represents the PCI bus number into which the adapter is plugged. The Verbose option displays a table with this value appearing in the BUS column.</p> <p><b>dev/func</b> is the number derived by combining the PCI device and function numbers and functions as a unique board identifier in conjunction with the PCI bus. The Verbose option displays a table with this hexadecimal value appearing in the DEV/FUNC column. It may contain an A, B, C, D, E, or F as part of its value.</p> <p>To exclude a host adapter with chip type F, PCI bus number 0 and dev/func number A0, the line in the CONFIG.SYS file that loads SYM8XX.ADD should look like this:</p> <p>BASEDEV=SYM8XX.ADD / EXCLUDE&lt;F:0:A0&gt;</p> <p>or</p> <p>BASEDEV=SYM8XX.ADD /X&lt;F:0:A0&gt;</p> |

**Table 7.1 OS/2 Command Line Options (Cont.)**

| Option Name                           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <div>/SYNCH_RATE<br/>or<br/>/SR</div> | <p>Sets the maximum synchronous transfer rate (in Mbyte transfers per second) to negotiate with a particular device. The allowable values for this setting are 0, 5, 10, 20, 40, and 80 Mbyte transfers per second, if the adapter is capable of the specified speed.</p> <p>All host adapters in the LSI Logic family support at least 10 Mbyte transfers per second; some support 20, 40, or 80 Mbyte transfers per second. To turn off synchronous transfers for a particular device, specify 0 (zero).</p> <p>The value set by this option only defines the maximum transfer rate negotiated. The actual rate also depends on the device's capability. The default value is the fastest transfer rate that is supported by a particular host adapter.</p> <p><b>Note:</b> The maximum synchronous transfer rates effectively double when the adapter and device permit wide transfers (see the <a href="#">WIDTH</a> option). For example, a synchronous transfer rate setting of 40 Mbyte transfers per second actually produces a transfer rate of 80 Mbyte transfers per second if the adapter and device both allow and are set to perform wide transfers.</p> <p>Syntax: /SYNCH_RATE = n&lt;hba[:id]&gt;[,n&lt;hba[:id]&gt;]*<br/>where: <b>n</b> = 0, 5, 10, 20, 40, or 80.</p> <p>To turn off synchronous transfers to ID 3 on host adapter 0, the line in the CONFIG.SYS file that loads SYM8XX.ADD should look like this:</p> <pre>BASEDEV=SYM8XX.ADD /SYNCH_RATE=0&lt;0:3&gt;</pre> <p>To set synchronous transfers to 10 Mbyte transfers per second on all devices on adapter 1, the line in the CONFIG.SYS file that loads SYM8XX.ADD should look like this:</p> <pre>BASEDEV=SYM8XX.ADD /SR=10&lt;1&gt;</pre> |

**Table 7.1 OS/2 Command Line Options (Cont.)**

| Option Name                         | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>/SYNCH_OFFSET<br/>or<br/>/SO</p> | <p>Sets the maximum synchronous offset to negotiate with a particular device. The allowable values for this setting are 0 to the maximum synchronous offset supported by the specified adapter. The LSI Logic controller chips support offsets up to 62. Refer to your host adapter user's guide for information on the maximum offset supported by your host adapter. If 0 (zero) is specified for the synchronous offset value, then synchronous transfers are turned off for any specified device.</p> <p>The value set by this option only defines the maximum offset that is negotiated. The resulting rate also depends on the device capability. The default value is the maximum offset that is supported by a particular host adapter.</p> <p>Syntax: /SYNCH_OFFSET = n&lt;hba[:id]&gt;[,n&lt;hba[:id]&gt;]*<br/>where: <b>n</b> = 0 is the maximum synchronous offset for the adapter.</p> <p>To change the synchronous offset to 6 for ID 3 on host adapter 0, the line in the CONFIG.SYS file that loads SYM8XX.ADD should look like this:</p> <p>BASEDEV=SYM8XX.ADD /SYNCH_OFFSET=6&lt;0:3&gt;</p> <p>or</p> <p>BASEDEV=SYM8XX.ADD /SO=6&lt;0:3&gt;</p> |
| <p>/TIMEOUT<br/>or<br/>/T</p>       | <p>Sets a timeout value to detect certain errors. When the driver issues a command to a SCSI device, a timer is started. If the timer expires before the command completes, the driver assumes that something has gone wrong with the device, and takes steps to recover. The default value for this is 10 seconds. If you set the value to be less than the system has allocated for a particular device, your value is ignored. To turn off the timeout mechanism for a particular device, set the value to 0 (zero).</p> <p>Syntax: /TIMEOUT = n&lt;hba[:id]&gt;[,n&lt;hba[:id]&gt;]*<br/>where: <b>n</b> = timeout value in seconds for device, n = (0..65535), 0 = infinite.</p> <p>To extend the timeout to 60 seconds on a particularly slow device at ID 3 on host adapter 0, the line in the CONFIG.SYS file that loads SYM8XX.ADD should look like this:</p> <p>BASEDEV=SYM8XX.ADD /TIMEOUT=60&lt;0:3&gt;</p> <p>or</p> <p>BASEDEV=SYM8XX.ADD /T=60&lt;0:3&gt;</p>                                                                                                                                                                                         |

**Table 7.1 OS/2 Command Line Options (Cont.)**

| Option Name              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| /DISCONNECT<br>or<br>/DC | <p>Allows (or does not allow) a device to disconnect during an I/O transfer. SCSI devices have the ability to disconnect from the bus during an I/O transfer. If a particular adapter has parity checking disabled, then you must use this option to disable disconnects for all devices on that adapter that do not generate parity. Refer to the /PARITY option for more information.</p> <p>Syntax: /DISCONNECT = n&lt;hba[:id]&gt;[,n&lt;hba[:id]&gt;]*</p> <p>where: <b>n</b> = ON is the default value for all devices, which allows disconnects and OFF does not allow disconnects.</p> <p>To disable disconnects on the device at ID 2 on host adapter 0, the line in the CONFIG.SYS file that loads SYM8XX.ADD should look like this:</p> <p>BASEDEV=SYM8XX.ADD /DISCONNECT=OFF&lt;0:2&gt;</p> <p>or</p> <p>BASEDEV=SYM8XX.ADD /DC=OFF&lt;0:2&gt;</p>                                                                                                                                                                                                                                                                                                                                                                                                   |
| /PARITY<br>or<br>/P      | <p>Allows enabling or disabling SCSI bus data integrity checking, known as parity. Use this option to disable parity checking. The LSI Logic chips are capable of enabling or disabling parity. Some non-SCSI compliant devices sold as SCSI devices do not generate parity. The LSI Logic chips always generate parity (for outputs), but may optionally check the parity (for inputs).</p> <p><b>Note:</b> When disabling parity checking, you must disable disconnects for any device that does not generate parity, as the LSI Logic chips cannot disable parity checking for that device during the reselection phase. If a device does not generate parity and it disconnects, the I/O never completes. Refer to the /DISCONNECT option for more information about disabling disconnects for a device.</p> <p>Syntax: /PARITY = n&lt;hba[,hba]*&gt;[,n&lt;hba[,hba]*&gt;]*</p> <p>where: <b>n</b> = ON is the default value for all devices, which enables parity checking. OFF disables parity checking.</p> <p>To turn off parity checking on host adapter number 0, the line in the CONFIG.SYS file that loads SYM8XX.ADD should look like this:</p> <p>BASEDEV=SYM8XX.ADD /PARITY=OFF&lt;0&gt;</p> <p>or</p> <p>BASEDEV=SYM8XX.ADD /P=OFF&lt;0&gt;</p> |

**Table 7.1 OS/2 Command Line Options (Cont.)**

| Option Name                 | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>/QTAG<br/>or<br/>/QT</p> | <p>Allows more than one outstanding command per SCSI device. Some non-SCSI compliant devices sold as SCSI devices do not allow queue tags, in which case queue tagging needs to be disabled. The value given in the command line is the depth of the queue for queue tags for the device(s) indicated. To disable queue tag support, a value of 0 or 1 should be given.</p> <p>Syntax: /QTAG = n&lt;hba[:id]&gt;[,n&lt;hba[:id]&gt;]*<br/>where: <b>n</b> = the number of queue tags allowed for a device (0..256).</p> <p>Two examples illustrate how to use this option:</p> <p>To turn off queue tagging for ID 3 on host adapter number 0, the line in the CONFIG.SYS file that loads SYM8XX.ADD should look like this:</p> <pre>BASEDEV=SYM8XX.ADD /QTAG=0&lt;0:3&gt;</pre> <p>To set the queue depth to 5 for all devices on host adapter number 2, the line in the CONFIG.SYS file that loads SYM8XX.ADD should look like this:</p> <pre>BASEDEV=SYM8XX.ADD /QT=5&lt;2&gt;</pre> |
| <p>/WIDTH<br/>or<br/>/W</p> | <p>Determines the value given in the command line option for the size of data transfers. Devices attached to a SCSI bus are narrow or wide devices. Narrow devices transfer data one byte (or 8-bits) at a time. Wide devices transfer two bytes (or 16-bits) at a time.</p> <p>Syntax: /WIDTH = n&lt;hba[:id]&gt;[,n&lt;hba[:id]&gt;]*<br/>where: <b>n</b> = 8 or 16.</p> <p>Two examples illustrate how to use this option:</p> <p>To have the device at ID 3 on host adapter number 0 treated as a narrow device, the line in the CONFIG.SYS file that loads SYM8XX.ADD should look like this:</p> <pre>BASEDEV=SYM8XX.ADD /WIDTH=8&lt;0:3&gt;</pre> <p>To have all devices on host adapter number 2 treated as 8-bit devices, the line in the CONFIG.SYS file that loads SYM8XX.ADD should look like this:</p> <pre>BASEDEV=SYM8XX.ADD /W=8&lt;2&gt;</pre>                                                                                                                          |



---

## 7.5 Troubleshooting

Some potential problems and their suggested solutions are:

### **You cannot access the SCSI device(s).**

- Make sure the SCSI device driver is installed properly.
- Make sure each device has power.
- Verify that the appropriate `BASEDEV=` line (`BASEDEV=SYM8XX.ADD /V` or `BASEDEV=SYM_HI.ADD /V`) exists in the `CONFIG.SYS` file.
- Check the ordering of `BASEDEV=` entries in the `CONFIG.SYS` file to be sure that the boot device is loaded first.
- Verify that the correct driver is in the appropriate directory (`\OS2\BOOT`).
- Check the cable connections and the host adapter installation.
- Verify that the adapter is not turned off in the SCSI BIOS Configuration Utility and that the adapter is not excluded using the `/EXCLUDE` command line option.

### **The computer hangs or locks up when booting and the SCSI devices attached are not seen by the computer system.**

- Make sure that all the SCSI devices are configured at different ID numbers. If booting the system from a device on the SCSI bus, the boot drive must have the lowest ID or the highest ID. This depends on the scan order option selected in the SCSI BIOS Configuration Utility.
- Make sure both, but only, the ends of the SCSI bus are terminated.
- Make sure the device driver is listed in the `CONFIG.SYS` file and loads when the system boots.

### **The device driver does not see one of the SCSI devices.**

- Make sure the SCSI devices have different ID numbers.
- Make sure both, but only, the ends of the SCSI bus are terminated.
- Check the cable and power connections.
- Check the ordering of BASEDEV= entries in the CONFIG.SYS file to be sure that the boot device is loaded first.
- Verify that the adapter is not turned off in the SCSI BIOS Configuration Utility and that the adapter is not excluded using the /EXCLUDE command line option.
- Reboot the computer.

### **OS/2 attempts to install to or boot from an IDE drive instead of the SCSI drive.**

The system BIOS finds the IDE drive before it finds the SCSI drive, and therefore uses the IDE drive as the boot device.

- Check that the appropriate BASEDEV= line (BASEDEV=SYM8XX.ADD /V or BASEDEV=SYM\_HI.ADD /V) appears first in the CONFIG.SYS file.
- Disable the IDE drive in the CMOS setup.
- On some hardware platforms, the IDE drive must be physically disconnected before installing to a SCSI drive.

### **System is booting from a hard drive and the following message appears at bootup:**

OS/2 is unable to operate your hard disk or diskette drive.  
The system is stopped. Correct the preceding error and  
restart the system.

This problem occurs when the system is booting from a hard drive attached to an IDE bus, a SCSI disk is attached to the LSI Logic host adapter, and the SDMS BASEDEV= line (BASEDEV= SYM8XX.ADD /V or BASEDEV= SYM\_HI.ADD /V) appears in the CONFIG.SYS file before the IDE device driver statement.

or

This problem occurs when the system is booting from a hard drive attached to the LSI Logic adapter, an IDE drive is in the system, and the

IDE BASEDEV= line appears in the CONFIG.SYS file before the SDMS BASEDEV= line (BASEDEV= SYM8XX.ADD /V or BASEDEV= SYM\_HI.ADD /V).

To resolve both types of problems, follow these steps:

1. Boot the system using the floppy drive and installation diskettes to the F3=Command Prompt screen. Use the TEDIT.EXE editor to edit the CONFIG.SYS file. Move the BASEDEV= statements to be in the appropriate order for the system's configuration.
2. Restart your system.

**During normal operation, either the system locks up, multiple bus resets occur or one of the following messages appears:**

The <drive letter>: device is not ready.

or

The <drive letter>: device is not functioning.

or

A program in this session encountered a problem and cannot continue.

- If possible, replace the cables connecting the problem device. Some cables cannot handle the synchronous transfer rate negotiated by the driver and device.

If you cannot tell which device is experiencing difficulties, change the cabling for each device separately to see if the problem is resolved.

- Reduce the synchronous transfer rate for the problem device. It may have indicated during initialization that it can communicate at a synchronous transfer rate that it does not actually support. If available, use the SCSI BIOS Configuration Utility provided with some members of the LSI Logic family of host adapters to reduce the synchronous transfer rate. Refer to the *PCI Storage Device Management System SDMS 4.0 User's Guide* for the availability and use of the SCSI BIOS Configuration Utility. If the SCSI BIOS Configuration Utility is not provided with your host adapter, use the command line option `/SYNCH_RATE` as described in the Command Line Options section above.

If you cannot tell which device is experiencing difficulties, reduce the synchronous transfer rate for each device separately to see if the problem is resolved.

- Disable disconnects for the problem device. Communication between the driver and the device may not be accurate if the device is allowed to disconnect from the bus during an I/O transfer. If available, use the SCSI BIOS Configuration Utility provided with some members of the LSI Logic family of host adapters to disable disconnects. Refer to the *PCI Storage Device Management System SDMS 4.0 User's Guide* for the availability and use of the SCSI BIOS Configuration Utility. If the SCSI BIOS Configuration Utility is not provided with your host adapter, use the command line option **/DISCONNECT** as described in the Command Line Options section above.

If you cannot tell which device is experiencing difficulties, disable disconnects for each device separately to see if the problem is resolved.

- Back up your data and perform a low-level format on the problem device. You may be attempting to read from or write to a bad sector on your device.

Note: Low-level formatting will completely and irreversibly erase all data on the device. It will default the drive to a 512-byte sector size even if the drive had previously been formatted with another sector size.

# Chapter 8

## SCO OpenServer 5

### Device Driver

### Installation

---

This chapter describes the device driver for the SCO UNIX OpenServer 5 operating system. It provides installation instructions for new and existing system installations and includes these topics:

- [Section 8.1, "Introduction," page 8-1](#)
  - [Section 8.2, "Building an SDMS 4.0 BTLD PCI Diskette," page 8-4](#)
  - [Section 8.3, "Installing the SDMS BTLD Driver," page 8-6](#)
  - [Section 8.4, "Troubleshooting," page 8-17](#)
- 

## 8.1 Introduction

SCO OpenServer 5 is the first UNIX operating system licensed for IBM-compatible microcomputers. The integrated communications, file system, international application support, and documentation create an ideal platform for those requiring a full-featured, UNIX-based operating system. SCO OpenServer takes full advantage of the capabilities of the 80386 and above microprocessors.

To connect SCSI devices to one or more host adapters, you must place the proper host adapter driver in the SCO OpenServer kernel. The SDMS Boot Time Loadable Driver (BTLD) diskette contains one package:

`slha` contains the driver for SCO OpenServer 5 Releases

You must link-edit the proper driver into the SCO OpenServer kernel. The kernel must reside on the boot drive: either an internal, non-SCSI hard drive (for example, IDE), or a SCSI hard drive attached to host adapter 0 with SCSI ID 0 and LUN 0. The BTLD permits an easy installation of the SCO OpenServer 5 operating systems with the software provided by The Santa Cruz Operation (SCO).

SCO OpenServer 5 provides only one installation diskette, which is labeled Boot Disk. This diskette and the SDMS BTLD driver diskette that you create along with other software media are used during a SCO OpenServer 5 installation.

The `slha` driver allows SCO OpenServer 5 operating systems to interface with SCSI devices connected to the LSI Logic family of chipsets and/or LSI Logic host adapter cards. The current BTLD driver supports the Ultra160 LSI53C1000 and LSI53C1010 chipsets and Ultra160 host adapter boards.

The following sections provide instructions for configuring the SCO OpenServer 5 kernel with the SDMS driver, installing SCO OpenServer 5 onto a hard drive, and adding SCSI peripheral devices. These instructions assume that you are familiar with UNIX system administration.

[Figure 8.1](#) illustrates the interface between the BTLD driver and the operating system.

**Figure 8.1 SDMS Installation Tools**



## 8.1.1 Features

The SDMS BTLD driver supports these features:

- Easy UNIX installation on a hard disk with the SDMS BTLD diskette
- Ultra160 Data Transfers (for LSI53C1000 and LSI53C1010)
- Ultra160 Domain Validation
- Wide and synchronous negotiation (including Fast SCSI, Ultra SCSI, Ultra2 SCSI)
- Parallel Protocol Request (PPR) negotiation to SCSI-3 devices for Ultra160 Double Transition (DT) data transmission
- Multiple host adapters
- Disconnect/Reselect

- Multiple and noncontiguous Logical Unit Numbers (LUNs)
- Dynamic interrupt mapping
- Scatter/Gather
- Wide SCSI (Single-Ended and Differential)
- SCSI pass-through functionality
- Tagged command queuing
- Multiprocessor support
- Target Initiated Negotiation (TIN)
- Automatic drive spinup
- NVRAM and NVS configuration data areas
- Termination control using NVRAM and NVS settings
- RAID up to 1024 byte block sizes

## 8.1.2 LSI Logic Devices Supported

All LSI Logic devices and host adapters have undergone a name change. They have transitioned from a SYM prefix to an LSI prefix. No name changes have occurred for the SDMS SCO OpenServer 5 driver. The BTLD driver supports the following devices and their associated LSI Logic host adapters:

- LSI53C810, LSI53C810A, LSI53C810AE (LSI8100S, LSI8100ASP, LSI20810)
- LSI53C815 (LSI815XS, LSI8150SP)
- LSI53C825, LSI53C825A (LSI8250S, LSI8251S, LSI8251D, LSI8250ASP, LSI8251ASP, LSI8251AD)
- LSI53C860, LSI53C860AE (LSI8600SP, LSI20860)
- LSI53C875, LSI53C875E (LSI8750SP, LSI8751SP, LSI8751SPE, LSI8751D)
- LSI53C876 (LSI22801, LSI22802)
- LSI53C885
- LSI53C895 (LSI8951U, LSI8952U)
- LSI53C896 (LSI22910, LSI21002, LSI22902)
- LSI53C895A (LSI8953U)

- LSI53C1000 (LSI20160, LSI20160L)
- LSI53C1010 (LSI21003, LSI21040, LSI22915A, LSI22903, ITI6200U3LP)

### 8.1.3 Description

UNIX installation on a SCSI system requires creation of a SCO OpenServer 5 kernel that contains the SCSI driver to support SCSI devices. The two possible installation procedures are:

- Installing UNIX and the proper SDMS BTLD driver for the first time on a SCSI boot drive.
- Loading or updating the proper SDMS BTLD driver on a boot drive.

Read the important information below *before* beginning any installation procedure.

- This driver supports all releases of SCO OpenServer 5 (Releases 5.0.2, 5.0.4, and 5.05).
- The diskette contains package `slha`, which is used for all SCO OpenServer 5 Releases.
- Within the text instructions for adding SCSI Disk Drives, Tape Drives, and CD-ROM drives, the system prompts you to check whether the driver is the default value or to enter the exact driver name. The package name and the driver name are `slha`.

---

## 8.2 Building an SDMS 4.0 BTLD PCI Diskette

The SDMS Software Device Drivers and Utilities CD-ROM contains the `sco.dd` image file for SCO OpenServer operating systems in this directory:

```
{UNIX CDROM path}/drivers/unixes/opnservr
```

To create a BTLD driver diskette to use with SCO OpenServer installations, copy the raw `dd` image file onto a 1.44 Mbyte diskette. Refer to the instructions below for UNIX System and DOS System Users.



## 8.2.1 For UNIX System Users

To create the BTLD driver diskette, follow these steps:

Step 1. Insert a 3.5-inch diskette into the floppy drive.

Step 2. At the UNIX prompt, type:

```
dd if=<path>/sco.dd of=/dev/fd0
```

The <path> is the location of the dd image file.

This command will dd the image to the BTLD driver diskette.

Step 3. Label the diskette "BTLD Driver Diskette."

## 8.2.2 For DOS and Windows System Users

Under this section, you may copy the sco.DD image file to a formatted, blank diskette using the fdimage.exe utility.

Usage: fdimage [-dqsv] [-f size] [-r count] file drive

[Table 8.1](#) describes the information selection options associated with this executable program.

**Table 8.1 FDIMAGE Information Selection Options**

| Options  | Description                                                                                                   |
|----------|---------------------------------------------------------------------------------------------------------------|
| -d       | Debug mode                                                                                                    |
| -f size  | Specify the floppy diskette format by capacity; for example, 160K, 180K, 320K, 360K, 720K, 1.2M, 1.44M, 2.88M |
| -q       | Quick mode: do not format the disk                                                                            |
| -r count | Retry count for format/write operations                                                                       |
| -s       | Single-sector I/O                                                                                             |
| -v       | Verbose                                                                                                       |

The SDMS Software Device Drivers and Utilities CD-ROM provides the FDIMAGE.EXE utility in this directory:

```
{DOS CD-ROM Letter}:\DRIVERS\UNIXES\FDIMAGE.EXE
```

To copy the raw `dd` image, follow these steps:

Step 1. Locate the `SCO.DD` image on the SDMS CD-ROM at:

`{DOS CD-ROM Letter}:\DRIVERS\UNIXES\OPNSERVER`

Step 2. Insert a formatted 3.5-inch (1.44 Mbyte) diskette into your A: floppy drive.

Step 3. At the command prompt, type:

```
fdimage -qv sco.dd A:
```

**Note:** This command works when running MS-DOS, Windows 9x, Windows Me, Windows NT, or Windows 2000. If you are running antivirus software, LSI Logic recommends that you temporarily disable it when running the `fdimage` program. Otherwise, the `fdimage` program may not be able to get exclusive access to your floppy drive, which it requires to write the image to a diskette.

Step 4. Label this diskette "BTLD Driver Diskette."

Step 5. Use the BTLD driver diskette for SCO OpenServer 5 installations to:

load the driver during the installation of the operating system,  
or

access the devices on the SCSI bus after a SCO OpenServer 5 installation.

You may also download the current SCO OpenServer 5 driver from the LSI Logic Web site at: <http://www.lsillogic.com>. After you are connected to this web site, place your cursor on the Get Drivers option in the menu bar. Click on the Drivers selection. Choose the SCO OpenServer 5 operating systems for SCSI and click on the Go button. Follow the instructions on subsequent screens to download the drivers.

---

## 8.3 Installing the SDMS BTLD Driver

This section provides installation instructions for new and existing systems and solutions to potential problems that may be encountered.

To install the SDMS BTLD driver onto a new SCO OpenServer installation, follow the new system procedure. To install the SDMS BTLD driver on the non-SCSI boot drive, follow the existing system procedure. LSI Logic recommends that you complete either installation in one session. You should have sufficient time (possibly over an hour) available to complete this without interruption.

### 8.3.1 New System Installation

This procedure installs SCO OpenServer onto a hard disk drive. This installation is necessary to build a new UNIX kernel that includes the SDMS BTLD driver. During installation, you are given the option of retaining current partitions on the root hard disk. For instance, a DOS partition or a user UNIX partition may already be established on the drive. For more details on UNIX installation, refer to the *SCO OpenServer Handbook*.

You must link the SDMS BTLD driver into the UNIX kernel during installation. To install the BTLD driver, follow these steps:

Step 1. Insert the SCO OpenServer 5 installation diskette and reboot the system.

For all SCO OpenServer 5 releases, this diskette is labeled Boot Disk.

Step 2. Type at the prompt:

```
link
```

Press Enter.

Step 3. At the next prompt type:

```
slha
```

Do not remove the diskette and press Enter.

The system prompts to insert the proper diskettes.

Step 4. Insert either the proper installation diskette(s) or the SDMS BTLD driver diskette and press Enter.

If the system prompts you to enter a routine:

Please enter which routine (0-40) to replace '?' to list, 'a' to add "slhainit" at the end [default], 'n' to do nothing, or 'q' to quit.

Enter the indicated routine number that precedes this message.

Then the system may prompt with another inquiry:

Please enter which routine (0-2) to replace '?' to list, 'a' to add "slhapoll" at the end [default], 'n' to do nothing, or 'q' to quit.

- Step 5. Enter the indicated routine number that precedes this message.
- Step 6. Continue the installation according to the SCO OpenServer documentation.
- Step 7. To install SCSI device support, continue from [Section 8.3.2.1, "Adding a SCSI Disk Drive,"](#) page 8-10 within the instructions for existing system installations.

Note: The SCO OpenServer 5 operating system automatically creates a file `unix.safe` during installation. If you need to return to this initial UNIX kernel due to problems with subsequent installation procedures, type `unix.safe` at the boot prompt.

## 8.3.2 Existing System Installation

This procedure assumes SCO OpenServer 5 is already installed on a hard disk drive. This installation is necessary to build a new UNIX kernel that includes the proper LSI Logic host adapter driver. The basic steps for accomplishing this task are outlined below. For more details on UNIX installation, refer to the *SCO OpenServer System Administrator's Reference Manual*.

Follow this procedure to install the SDMS BTLD driver on the non-SCSI boot drive. Also, use this procedure to replace a previously installed SDMS driver on a SCSI drive. Some of the SCSI devices supported include tape drives, CD-ROM drives, and SCSI hard disk drives used as secondary storage.

LSI Logic recommends that you complete the entire installation in one session. You should have sufficient time (possibly over an hour) available to complete this without interruption.

Note: The SCO OpenServer system automatically creates a `unix.safe` file during installation. If you need to return to

this initial UNIX kernel due to problems with installation procedures, type `unix.safe` at the boot prompt.

- Step 1. Insert the SDMS BTLD diskette into the drive to install the SDMS driver and type:

```
installpkg
```

Press Enter.

A system prompt appears to insert the requested diskette.

- Step 2. Press Enter.

The system prompts you for the name of the package.

- Step 3. Type at the prompt:

```
slha
```

Press Enter to continue.

If a driver is already present from a previous installation, a system prompt inquires about replacing it.

- Step 4. Reply `y` for yes.

- Step 5. Relink the kernel after the install package (`installpkg`) has completed by typing:

```
/etc/conf/cf.d/link_unix
```

at the command prompt.

The system executes the command and then prompts for a response to:

1. Do you want this kernel to boot by default (y/n)?

Type: `y`

Press Enter.

Then the system backs up the old kernel.

2. Do you want the kernel environment rebuilt (y/n)?

Type: `y`

Press Enter.

- Step 6. Reboot the system to activate the new kernel by typing at the command prompt:

```
reboot
```

Press Enter.

### 8.3.2.1 Adding a SCSI Disk Drive

If you are not adding a SCSI disk drive to this system, go to [Section 8.3.2.2, "Adding a SCSI Tape Drive."](#)

Step 1. To add a SCSI disk drive, type at the command prompt:

```
mkdev hd
```

Press Enter.

The system prompts for the identifier of the host adapter that supports this device.

Step 2. Press Enter if the default is correct. If it is incorrect, type:

```
slha
```

Press Enter.

The system prompts for the host adapter that supports the disk drive.

Step 3. Type the correct host adapter number and press Enter.

If an additional LSI Logic host adapter is being added to the SCO OpenServer kernel, the system *may* prompt if you want to update the link-kit (add another host adapter).

Type `y` and press Enter if you entered the host adapter number correctly:

or

Type `n` and press Enter if you entered the host adapter number incorrectly. The system then prompts for the host adapter identifier of the preceding step.

The system prompts for the SCSI bus number of the disk drive. LSI Logic host adapters support one bus per adapter.

Step 4. Press Enter to get the default bus number of zero or type zero (0) and press Enter. Note that dual channel devices appear as two host adapters.

The system prompts for the Target ID of the disk drive.

Step 5. Type the SCSI ID number of the disk drive and press Enter.

If the ID entered is in the range 8–15, a prompt requests verification that the device you are adding is a wide (16-bit) device, as only wide devices may have IDs greater than 7.

Step 6. Type *y* and press Enter if the device is wide.

or

Type *n* and press Enter if an ID greater than 7 is incorrectly entered for a narrow (8-bit) device.

The Target ID prompt is then reissued so you can enter the correct Target ID. The system prompts for the Logical Unit Number (LUN) of the disk drive.

Step 7. Type the desired LUN and press Enter, or press Enter for the default value of zero.

The system prompts you to update the SCSI Configuration file.

Step 8. Type *y* and press Enter if the displayed values are correct.

or

Type *n* if the values are incorrect, and return to [Section 8.3.2.1, “Adding a SCSI Disk Drive,” page 8-10](#).

A system prompt appears to create a new kernel.

Step 9. Type *y* if you are adding only one device or this is the last device to be added.

or

Type *n* if additional devices are to be added later.

Step 10. Go to [Section 8.3.2.4, “Rebuilding the Kernel,” page 8-15](#), if you replied *y*; return to [Section 8.3.2.1, “Adding a SCSI Disk Drive,” page 8-10](#) if you replied *n*.

### 8.3.2.2 Adding a SCSI Tape Drive

If you are not adding a SCSI tape drive to this system, go to [Section 8.3.2.3, “Adding a SCSI CD-ROM Drive,” page 8-13](#).

Step 1. To add a SCSI tape drive, type at the command prompt:

```
mkdev tape
```

Press Enter.

The Tape Drive Configuration Program menu appears.

- Step 2. Select option 1 to install a tape drive, and press Enter.  
The Tape Drive Installation menu appears.
- Step 3. Select option 1 to install a SCSI tape drive, and press Enter.  
The system prompts for the identifier of the host adapter that supports this device.
- Step 4. Press Enter if the default is correct. If the default is not correct, type:  
`slha`  
Press Enter.  
The system prompts for the host adapter that supports the tape drive.
- Step 5. Type the correct host adapter number, and press Enter.  
If an additional LSI Logic host adapter is being added to the SCO OpenServer kernel, the system *may* prompt if you want to update the link-kit (add another host adapter).  
Type `y` and press Enter if you entered the host adapter number correctly;  
or  
Type `n` and press Enter, if you entered the host adapter number incorrectly. The system then prompts for the host adapter identifier of the preceding step.  
The system prompts for the SCSI bus number of the tape drive.  
LSI Logic host adapters support one bus per adapter.
- Step 6. Press Enter to get the default of zero or type 0 (zero) and press Enter.  
Note that dual channel devices appear as two host adapters.  
The system prompts for the SCSI ID of the tape drive.
- Step 7. Type the SCSI ID number of the tape drive and press Enter.  
The system prompts for the LUN of the tape drive.
- Step 8. Type 0 (zero) and press Enter.  
The system then prompts to update the SCSI Configuration file.
- Step 9. Type `y` and press Enter.  
The system prompts for a "Vendor Identification" string.



- Step 10. Type the desired string or press Enter to use the default value.  
The system prompts for a "SCSI version."
- Step 11. Type the desired version or press Enter to use the default value.  
The system prompts for a "Response Data Format."
- Step 12. Type the desired format or press Enter to use the default value.  
The system displays the tape drive types that are supported.
- Step 13. Type the number of the tape drive type that matches the tape drive that is being installed and press Enter.  
The system displays a list of links to the installed tape and the current boot string.
- Step 14. Type the desired string, "rm" to remove the string, or "q" to quit and press Enter.  
The system displays the SCSI on Enhanced Tape Drive Configuration menu.
- Step 15. Type q and press Enter to terminate this menu.  
The system displays the Tape Drive Configuration Program menu.
- Step 16. Type q and press Enter to terminate this menu.  
The system prompts to create a new kernel.
- Step 17. Type y if this is the last device to be added.  
or  
Type n if additional devices are to be added later.
- Step 18. Go to [Section 8.3.2.4, "Rebuilding the Kernel,"](#) if you replied y; return to [Section 8.3.2.1, "Adding a SCSI Disk Drive,"](#) [page 8-10](#) if you replied n.

### 8.3.2.3 Adding a SCSI CD-ROM Drive

If you are not adding a SCSI CD-ROM drive to this system, go to [Section 8.3.2.4, "Rebuilding the Kernel,"](#) [page 8-15](#).

- Step 1. To add a SCSI CD-ROM drive, type at the command prompt:
- ```
mkdev cdrom
```
- Press Enter.

- The CD-ROM Configuration Program menu appears.
- Step 2. Select option 1 to install a CD-ROM drive and press Enter.
- The system prompts to configure the CD-ROM Drive.
- Step 3. Type `y` and press Enter.
- The system prompts for the identifier of the host adapter that supports this device.
- Step 4. If the default is correct, press Enter. If it is incorrect, type:
- `slha`
- Press Enter.
- The system prompts for the host adapter that supports the CD-ROM drive.
- Step 5. Type the correct host adapter number and press Enter.
- If an additional host adapter is being added to the SCO OpenServer kernel, the system *may* prompt if you want to update the link-kit (add another host adapter).
- Type `y` and press Enter if you entered the host adapter number correctly;
- or
- Type `n` and press Enter, if you entered the host adapter number incorrectly. The system then prompts for the host adapter identifier of the preceding step.
- The system prompts for the SCSI bus number of the CD-ROM. LSI Logic host adapters support one bus per adapter.
- Step 6. Press Enter to get the default of zero (0) or type 0.
- The system prompts for the SCSI ID of the CD-ROM drive.
- Step 7. Type the SCSI ID number, and press Enter.
- The system prompts for the LUN of the CD-ROM drive.
- Step 8. Type the desired LUN and press Enter, or press Enter for the default value of zero.
- The system prompts to update the SCSI Configuration file.
- Step 9. Type `y` and press Enter.

A system prompt appears to configure a CD-ROM or tape installation device.

Step 10. Unless this is desired, type `n` and press Enter.

A system prompt appears to add a High-Sierra file system.

Step 11. Type `y` and press Enter.

The system displays the High Sierra/ISO9600 file system Configuration Program menu.

Step 12. Select option 1 to add High-Sierra and press Enter.

The system updates the SCSI Configuration file and returns to the CD-ROM Configuration Program menu.

Step 13. Type `q` and press Enter to terminate the CD-ROM Configuration Program menu.

A system prompt appears to create a new kernel.

Step 14. Type `y` if only one device or this is the last device;

or

Type `n` if additional devices are to be added later.

Step 15. Go to [Section 8.3.2.4, "Rebuilding the Kernel,"](#) if you replied `y`; return to [Section 8.3.2.1, "Adding a SCSI Disk Drive,"](#) [page 8-10](#) if you replied `n`.

#### 8.3.2.4 Rebuilding the Kernel

Step 1. To rebuild the kernel, type at the command prompt:

```
/etc/conf/cf.d/link_unix
```

Step 2. The system displays a message and then prompts for responses:

1. Do you want this kernel to boot by default (y/n)?

Type: `y`

Press Enter.

The system backs up the old kernel.

2. Do you want the kernel environment rebuilt (y/n)?

Type: `y`

Press Enter.

Step 3. Reboot the system to activate the new kernel by typing at the command prompt:

```
reboot
```

Press Enter.

Step 4. After the system reboots and the prompt appears, press Enter and the new kernel loads by default.

Step 5. Log in as usual.

These conditions should exist after a successful installation:

- The directory `etc/conf/sdevice.d` should contain a file named `slha`. This file contains the `sdevice` entries.
- The directory `etc/conf/cf.d` contains the files `sdevice`, `mdevice`, and `mcscli`. Files `sdev.hdr` and `mdev.hdr` describe the values of the possible field entries in the files `sdevice` and `mdevice`, respectively.
  - The `sdevice` file should contain an `slha` entry for each LSI Logic host adapter configured in the system.
  - The second field in the `sdevice` file should read “Y.”
  - A `slha` entry should appear in the `mdevice` file.
  - A `slha` entry for each configured SCSI device should appear in the `mcscli` file.
- Directory `/etc/conf/pack.d/slha` should exist and contain the files `Driver.o` and `space.c`.

---

## 8.4 Troubleshooting

Some potential problems and their suggested solutions are:

### **Loading SCO UNIX to an IDE hard drive.**

You only need to *link* if you have a SCSI device attached to an LSI Logic host adapter. Follow the instructions in the SCO UNIX Installation documentation. Once the installation has completed, go to Step 1 in [Section 8.3.2, “Existing System Installation,”](#) and use the `installpkg` to install your SDMS driver.

### **A SCSI device is not found.**

- Reboot and press `Ctrl-C` to view the SCSI BIOS Configuration Utility.
- Verify the device is on the correct host adapter and ID.
- If the device is not shown, then it is probably turned off or a cabling problem exists.

### **UNIX system behaves unreliably after a configuration change.**

Whenever the hardware or software configuration is altered, you must rebuild the kernel. Go to the directory `/etc/conf/cf.d` and type:

```
./link_unix
```

to rebuild the kernel.

### **An error message occurs during the rebuild of the kernel.**

- Reinstall the proper SDMS driver using the `installpkg` utility. Remember to relink the kernel.
- Reboot the system.

**The root disk is not found or the partitioning of the disk fails.**

If your boot drive is a SCSI disk, use the SCSI BIOS Configuration Utility to check the disk is assigned to SCSI ID 0 (zero) and is configured to host adapter 0 (zero), LUN 0 (zero).

**A SCSI tape drive is not seen during installation.**

Use the SCSI BIOS Configuration Utility to check the tape drive is assigned to SCSI ID 2, and it is configured to host adapter 0 (zero), LUN 0 (zero).

Also, verify the ID of the tape drive does not conflict with any other SCSI device ID.

**A SCSI CD-ROM drive is not seen during installation.**

Use the SCSI BIOS Configuration Utility to check the CD-ROM drive SCSI ID is set to 5, and it is configured to host adapter 0 (zero), LUN 0 (zero). Also, verify the ID of the CD-ROM drive does not conflict with any other SCSI device ID.

# Chapter 9

## UnixWare 7 Device Driver Installation

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This chapter describes the device driver for the UnixWare operating system. It provides installation instructions for new and existing system installations and includes these topics:

- [Section 9.1, "Introduction," page 9-1](#)
  - [Section 9.2, "Building the C8XX Driver Diskette," page 9-3](#)
  - [Section 9.3, "Installing the C8XX Driver for Unixware," page 9-5](#)
  - [Section 9.4, "Troubleshooting," page 9-8](#)
- 

### 9.1 Introduction

UnixWare 7 extends the UNIX SVR4.2 operating system. UnixWare 7 features include a GUI, networking, application compatibility, multitasking capability, and multiuser capability. Additionally, UnixWare 7 provides multiprocessor support.

The SDMS C8XX driver allows SCO UnixWare operating systems to interface with SCSI devices connected to an LSI Logic chipset and/or LSI Logic host adapter cards.

#### 9.1.1 Features

The C8XX device driver supports these features:

- Ultra160 data transfers (for LSI53C1000 and LSI53C1010)
- Domain Validation
- Parallel Protocol Request (PPR) negotiation to SCSI-3 devices for Ultra160 double transition data transmission
- Easy installation using UnixWare tools

- Wide negotiation and synchronous negotiation (including Fast SCSI, Ultra SCSI, Ultra2 SCSI)
- Multiple host adapters
- Disconnect/Reselect
- Multiple and noncontiguous LUN support
- Dynamic interrupt mapping
- Scatter/Gather
- Wide SCSI
- SCSI pass-through functionality
- Tagged command queuing
- Multiprocessor support
- Target Initiated Negotiation (TIN)
- NVRAM and NVS Configuration data areas
- Termination control by using NVRAM settings

## 9.1.2 LSI Logic Devices Supported

All LSI Logic devices and host adapters have undergone a name change. They have transitioned from a SYM prefix to an LSI prefix. No name changes have occurred for the SDMS UnixWare driver.

The C8XX driver supports the following devices and their associated LSI Logic host adapters:

- LSI53C810, LSI53C810A, LSI53C810AE (LSI8100S, LSI8100ASP, LSI20810)
- LSI53C815 (LSI815XS, LSI8150SP)
- LSI53C825, LSI53C825A (LSI8250S, LSI8251S, LSI8251D, LSI8250ASP, LSI8251ASP, LSI8251AD)
- LSI53C860, LSI53C860AE (LSI8600SP, LSI20860)
- LSI53C875, LSI53C875E (LSI8750SP, LSI8751SP, LSI8751SPE, LSI8751D)
- LSI53C876 (LSI22801, LSI22802)
- LSI53C885



- LSI53C895 (LSI8951U, LSI8952U)
- LSI53C895A (LSI8953U)
- LSI53C896 (LSI22910, LSI21002, LSI22902)
- LSI53C1000 (LSI20160, LSI20160L)
- LSI53C1010 (LSI22915A, LSI21040, LSI22903, LSI21003, ITI6200U3LP)

### 9.1.3 Description

The SDMS C8XX driver allows SCO UnixWare operating systems to interface with SCSI devices connected to the LSI Logic family of chipsets and/or LSI Logic associated host adapter boards.

[Section 9.3, “Installing the C8XX Driver for Unixware,”](#) describes the procedures to install a new installation or update an existing installation of UnixWare with the C8XX driver. You must first create a C8XX driver diskette for installation purposes.

---

## 9.2 Building the C8XX Driver Diskette

The SDMS Software Device Drivers and Utilities CD-ROM contains the `dd` image file for SCO UnixWare operating systems. The location of this `unixware.dd` image file is in the UnixWare 7 directory.

```
{UNIX CD-ROM path}/drivers/unixes/unixware/uw7
```

To create a C8XX driver diskette to use with UnixWare installations, copy the raw `dd` image file onto a 1.44 Mbyte diskette. The driver diskette must be built. Refer to the instructions below for UNIX System and DOS System Users.

### 9.2.1 For UNIX System Users

Step 1. Insert a 3.5-inch diskette into the floppy drive.

At the UNIX prompt, type:

```
dd if=<path>/unixware.dd of=/dev/fd0
```

The `<path>` represents the location of the `dd` image file.

This command will `dd` the image to the C8XX driver diskette.

- Step 2. Remove the C8XX driver diskette for UnixWare installations as instructed later in this chapter.
- Step 3. Label this diskette PCI SCSI SCO UnixWare Driver Diskette for use during the installation process.

## 9.2.2 For DOS and Windows System Users

Under this section, DOS system users may copy the `UNIXWARE.DD` image file onto a formatted, blank diskette using the `FDIMAGE.EXE` utility.

Usage: `fdimage [-dqsv] [-f size] [-r count] file drive`

[Table 9.1](#) describes the information selection options associated with this executable program.

**Table 9.1 FDIMAGE Information Selection Options**

Options	Description
-d	Debug mode
-f size	Specify the floppy diskette format by capacity; for example, 160K, 180K, 320K, 360K, 720K, 1.2M, 1.44M, 2.88M
-q	Quick mode: do not format the disk
-r count	Retry count for format/write operations
-s	Single-sector I/O
-v	Verbose

The SDMS Software Device Drivers and Utilities CD-ROM provides the `FDIMAGE.EXE` utility in this directory:

```
{DOS CD-ROM LETTER}:\DRIVERS\UNIXES\FDIMAGE.EXE
```

To copy the raw `dd` image, follow these steps:

- Step 1. Locate the `UNIXWARE.DD` image on the SDMS CD-ROM at:

```
{DOS CD-ROM Letter}:\DRIVERS\UNIXES\UNIXWARE\UW7
```

- Step 2. Insert a formatted 3.5-inch (1.44 Mbyte) diskette into your A: floppy drive.

- Step 3. At the command prompt, type:

```
fdimage -qv unixware.dd A:
```

**Note:** This command works when running MS-DOS, Windows 9x, Windows Me, Windows NT, or Windows 2000. If you are running antivirus software, LSI Logic recommends that you temporarily disable it when running the fdimage program. Otherwise, the fdimage program may not be able to get exclusive access to your floppy drive, which it requires to write the image to a diskette.

Step 4. Label this diskette PCI SCSI SCO UnixWare Driver Diskette for use during the installation process.

Use this diskette for UnixWare installations to:

load the driver during the installation of the operating system,

or

access the devices on the SCSI bus after a UnixWare installation.

You may also download the current SCO UnixWare driver from the LSI Logic Web site at: <http://www.lsillogic.com>. After you are connected to this Web site, place your cursor on the Get Drivers option in the menu bar. Click on the Drivers selection. Choose the UnixWare operating system for SCSI and click on the Go button. Follow the instructions on subsequent screens to download the drivers.

[Section 9.3.1, "New System Installation," page 9-5](#) and [Section 9.3.2, "Existing System Installation," page 9-6](#) provide the installation procedures.

---

## 9.3 Installing the C8XX Driver for Unixware

This section provides the procedures to install the SDMS C8XX driver during a new system installation of UnixWare 7, and to update a previously installed UnixWare 7 operating system with the SDMS C8XX driver.

### 9.3.1 New System Installation

Follow the instructions in the UnixWare Installation Handbook along with these steps:

- Step 1. Boot the computer using the Install diskette(s) delivered with the UnixWare Operating System distribution package. UnixWare 7 provides two diskettes.
- Step 2. Follow the instructions on the screen.
- Step 3. Insert the PCI SCSI SCO UnixWare driver diskette when prompted to insert the host adapter diskette and press Enter.
- To install other host adapter drivers, insert the host adapter diskette provided with the UnixWare 7 distribution package and press Enter. If there are no other host adapter drivers to install, continue the installation.
- Note: During the installation, if the driver does not find a hard disk on which to install the operating system, it aborts the process.
- The system loads the required drivers, such as C8XX, and indicates when they are loaded.
- At the end of the installation you will see a prompt to reinsert the driver diskette.
- Step 4. Insert the PCI SCSI SCO UnixWare driver diskette and press Enter.
- The kernel is rebuilt, and the system gets ready to boot from the SCSI disk drive.
- Step 5. Remove the PCI SCSI SCO UnixWare driver diskette when prompted to do so and reboot the system.

## 9.3.2 Existing System Installation

This section provides instructions for adding or updating the C8XX package.

### 9.3.2.1 Adding or Updating the C8XX Package

Before you install the C8XX driver, make a backup copy of the existing kernel:

Step 1. Log on as root.

Step 2. At the shell prompt, type:

```
cp /stand/unix /stand/unix.safe
```

Use this copy of the old kernel to reboot the system if the driver installation fails. Refer to [Section 9.4, “Troubleshooting,”](#) for more information.

Step 3. Insert the PCI SCSI SCO UnixWare driver diskette once the old kernel is saved.

Step 4. Load the driver using the `pkgadd` command by typing:

```
pkgadd -d diskette1
```

Step 5. Select `C8XX` and press Enter.

The `C8XX` driver gets loaded on the system.

The system prompts you again to load the driver even if loading was successful.

Step 6. Type `q` (quit) and press Enter.

Step 7. Verify that the driver is now loaded successfully by typing:

```
pkginfo c8xx
```

The package information should look like this:

```
system c8xx Symbios IHV HBA
```

After the `C8XX` package is loaded, a message may appear that indicates a system reboot is necessary. It sets a system flag to automatically rebuild the kernel upon the next system boot.

Step 8. Reboot your system by typing the command:

```
init 6
```

During the boot process, the driver scans the SCSI bus and lists the devices found on it. If the kernel panics during boot, then reboot the system with the saved copy of the old kernel. Booting from the saved copy of the kernel is described in the [Section 9.4, “Troubleshooting,”](#) below. If the reboot is successful, the system is ready to use.

---

## 9.4 Troubleshooting

A potential problem and its suggested solution is listed below:

### **Driver installation fails.**

To utilize the `unix.safe` kernel file that was created before installing the C8XX host adapter driver, follow these steps:

- Step 1. Replace the system UNIX with the backup copy you created before attempting to install the C8XX host adapter driver. To perform this task, reboot the system.
- Step 2. Wait for the UnixWare 7 Logo screen to appear, then press the space bar key to begin an interactive boot session.

Type at the prompt:

```
boot unix.safe
```

The operating system logo reappears. The system starts booting from the UNIX kernel you specified above.

# Chapter 10

## Solaris Device Driver Installation

---

This chapter describes the `symhisl` driver for the Solaris 7 and Solaris 8 operating systems. It provides installation instructions for new and existing systems and includes these topics:

- [Section 10.1, “Introduction,” page 10-1](#)
- [Section 10.2, “Building the SYMHISL Driver Update Diskette,” page 10-4](#)
- [Section 10.3, “Installing the SDMS Solaris Driver,” page 10-6](#)
- [Section 10.4, “Troubleshooting,” page 10-12](#)

---

### 10.1 Introduction

Solaris 7 and Solaris 8 for x86 platforms are operating systems designed to run on single or multiple processors. These operating systems provide a command line interface environment and a graphical environment that incorporates many high level features. Refer to the Sun Microsystems, Inc. web site, [www.sun.com/docs](http://www.sun.com/docs), for Solaris 7 or Solaris 8 documentation for a more detailed explanation.

The `symhisl` driver allows the Solaris operation to interface with SCSI devices connected to LSI Logic LSI53C895A, LSI53C896, LSI53C1000, and LSI53C1010 SCSI controller chips. A list of features associated with this driver along with its description are described below. The procedures to install the `symhisl` driver during a new installation of Solaris or to update the driver with an existing installation of Solaris are also included.

After the image has been copied to a 3.5-inch diskette, label the ITU diskette “SYMHISL Driver Update.” For new system installations, go to [Section 10.3.1, “New System Installation,”](#) and proceed to [Step 2.](#)

## 10.1.1 Features

The SDMS `symhisl` driver for Solaris supports these features:

- Ultra160 Data Transfers (for LSI53C1000 and LSI53C1010)
- Ultra160 Domain Validation
- Ultra160 Double Transition (DT) data transmissions
- Synchronous negotiation (including Fast SCSI, Ultra SCSI, Ultra2 SCSI)
- Multiple host adapters
- Disconnect/Reselect
- Multiple and noncontiguous LUN support
- Scatter/Gather
- Wide devices
- Tagged command queuing
- Multiprocessors
- Hot swapping of SCSI devices (for Solaris 8 only)

## 10.1.2 LSI Logic Devices Supported

All LSI Logic devices and host adapters have undergone a name change. They have transitioned from a SYM prefix to an LSI prefix. No name changes have occurred for the SDMS Solaris 7 or Solaris 8 driver.

The `symhisl` driver is a Solaris 7 and Solaris 8 32-bit version driver and supports the following devices and their associated LSI Logic host adapters:

- LSI53C895A (LSI8953U)
- LSI53C896 (LSI22910, LSI21002, LSI22902)
- LSI53C1000 (LSI20160, LSI20160L)
- LSI53C1010 (LSI22915A, LSI21040, LSI22903, LSI21003, ITI6200U3LP)



### 10.1.3 Description

The `symhisl` driver conforms to Sun Microsystems SCSI specifications for device drivers. This driver allows connection of SCSI devices including disk drives, CD-ROMs, and tape drives for PCI-based machines. To support a new SCSI device, the Solaris 7 and Solaris 8 x86 architectures require that the device complies to the SCSI standard.

Note that there are different versions for the Solaris 7 and Solaris 8 driver, which are located on the SDMS Software Device Drivers and Utilities CD-ROM. The directory structure is:

```
{UNIX CD-ROM path}/drivers/unixes/solaris/solaris7
```

or

```
{UNIX CD-ROM path}/drivers/unixes/solaris/solaris8
```

Solaris 7: The SDMS `symhisl` driver software has been tested on Solaris 7 Update 8/99 and later. Older versions have not been tested. Older versions are known to require a patch version of the DCA diskette in order to install this driver. Please refer to the Sun web site for more information about this patch. LSI Logic assumes no responsibility or liability when you attempt to use the Solaris 7 `symhisl` driver software with older versions of Solaris that LSI Logic has not tested.

Solaris 8: The SDMS `symhisl` driver software has been tested on Solaris 8 FCS. This software will not run on Solaris 7. LSI Logic assumes no responsibility or liability when a user attempts to use this software with older versions of Solaris that LSI Logic has not tested.

---

## 10.2 Building the SYMHISL Driver Update Diskette

Before proceeding to the installation instructions, create an ITU diskette for Solaris installations. Do this by copying the raw DD image file onto a 1.44 Mbyte diskette. The SDMS Software Device Drivers and Utilities CD-ROM contains the `symitu.dd` image file in this directory. Follow this UNIX CD-ROM path after you have the CD-ROM mounted:

```
/drivers/unixes/solaris/solaris7
```

or

```
/drivers/unixes/solaris/solaris8
```

Open the folder in the Solaris 7 or Solaris 8 subdirectory to locate the correct `SYMITU.DD` image file. Building the driver update diskette is dependent upon the operating system that you are using. Refer to the instructions for UNIX System and DOS System users for more information.

### 10.2.1 For UNIX System Users

Create the SDMS SYMHISL Driver Update diskette and use it during installation of the operating system. This driver supports the LSI53C896, LSI53C895A, LSI53C1000, and/or LSI53C1010 controllers. If you are accessing the SDMS Software Device Drivers and Utilities CD-ROM from UNIX, follow these steps:

Step 1. Use the `symitu.dd` image file provided in the install package.

Step 2. Insert a new, blank diskette and type the following commands:

```
#volcheck -v  
#dd if=<path>/symitu.dd of=/vol/dev/aliases/floppy0  
bs=36k  
#eject floppy
```

Step 3. Label this diskette "SYMHISL Driver Update Diskette."

Step 4. Use this diskette when the system prompts you to insert the ITU diskette.

## 10.2.2 For DOS System Users

Under this section, DOS system users may copy the `symitu.dd` image file onto a formatted, blank diskette using the `FDIMAGE.EXE` utility.

Usage: `fdimage [-dqsv] [-f size] [-r count] file drive`

Table 10.1 describes the information selection options associated with this executable program.

**Table 10.1 FDIMAGE Information Selection Options**

Options	Description
-d	Debug mode
-f size	Specify the floppy diskette format by capacity; for example, 160K, 180K, 320K, 360K, 720K, 1.2M, 1.44M, 2.88M
-q	Quick mode: do not format the disk
-r count	Retry count for format/write operations
-s	Single-sector I/O
-v	Verbose

The `FDIMAGE.EXE` utility is available on the SDMS Software Device Drivers and Utilities CD-ROM in each of these directories:

`{DOS CD-ROM Letter}:\DRIVERS\UNIXES\SOLARIS\SOLARIS7`

or

`{DOS CD-ROM Letter}:\DRIVERS\UNIXES\SOLARIS\SOLARIS8`

To create the SYMHISL Driver Update diskette, follow these steps:

Step 1. Copy the raw `dd` image onto a 1.44 Mbyte diskette. Locate the `symitu.dd` image from the appropriate directory:

`{DOS CD-ROM Letter}:\DRIVERS\UNIXES\SOLARIS\SOLARIS7`

or

`{DOS CD-ROM Letter}:\DRIVERS\UNIXES\SOLARIS\SOLARIS8`

Step 2. Insert a formatted 3.5-inch (1.44 Mbyte) diskette into your A: floppy drive.

Step 3. At the command prompt, type:

```
fdimage -qv symitu.dd A:
```

**Note:** This command works when running MS-DOS, Windows 9x, Windows Me, Windows NT, or Windows 2000. If you are running antivirus software, LSI Logic recommends that you temporarily disable it when running the fdimage program. Otherwise, the fdimage program may not be able to get exclusive access to your floppy drive, which it requires to write the image to a diskette.

Step 4. Label this diskette "SYMHISL Driver Update Diskette."

Step 5. Use this diskette for Solaris installations.

You may also download the current Solaris 7 or Solaris 8 driver from the LSI Logic Web site at: <http://www.lsillogic.com>. After you are connected to this Web site, place your cursor on the Get Drivers option in the menu bar. Click on the Drivers selection. Choose the Solaris 7 or Solaris 8 operating system for SCSI and click on the Go button. Follow the instructions on subsequent screens to download the drivers.

---

## 10.3 Installing the SDMS Solaris Driver

This section provides installation instructions for new and existing systems. The SYMHISL Driver Update Diskette can be used in one of two ways:

- To use new drivers to install or upgrade the Solaris operating environment on a machine with new hardware.
- or
- To add new drivers to support new hardware on an already installed and booted system.

### 10.3.1 New System Installation

Please read the following information carefully before proceeding with the Solaris 7 or Solaris 8 installation:

- You can only install Solaris 7 using the Solaris Device Configuration Assistant Diskette as the boot diskette.
- You have the option of installing Solaris 8 from a bootable CD-ROM labeled Software 1 of 2 or a bootable Solaris Device Configuration Assistant diskette.

These installation steps refer to the Solaris Device Configuration Assistant Diskette for both operating systems. If you decide to install Solaris 8 from the bootable CD-ROM, ignore the information about reinserting and/or removing the Solaris Device Configuration Assistant Diskette. Use the appropriate Solaris Device Configuration Assistant Diskette for your release of Solaris 7 or Solaris 8 as the boot diskette.

Step 1. Insert the Solaris Device Configuration Assistant Diskette into your machine's diskette drive. Also insert the Solaris Installation CD-ROM; or for network installation, verify with your system administrator that the Solaris Network Installation image is available on your network.

Step 2. Turn on your machine.

Step 3. When the Solaris Device Configuration Assistant screen appears, choose F4\_Add Driver.

Then, the Install Driver Update screen appears.

Step 4. Remove the Solaris Device Configuration Assistant Diskette from the diskette drive and insert the first Solaris Driver ITU diskette you want.

Step 5. Press F2\_Continue.

The Loading Supplemental Driver Software screen appears, along with a progress bar that shows the percentage of drivers that have been extracted from the diskette appears. Drivers are read into memory and survive long enough for the system to successfully boot to its installation program.

Step 6. Remove the Solaris Driver ITU diskette from the floppy drive and insert the next Solaris Driver ITU diskette you want, if any, for other devices. If applicable, continue with Step 7; otherwise, proceed to Step 9.

Step 7. Press F2\_Continue.

The Loading Driver Update Software screen appears, along with a progress bar that shows the percentage of drivers that have been extracted from the diskette. Drivers are read into memory and survive long enough for the system to successfully boot to its installation program. When all the new drivers on the diskette have been processed, the Continue Driver Update Installation screen appears.

- Step 8. Repeat Step 4 through Step 7 until all the Solaris Driver ITU diskettes you want are installed.
- Step 9. Remove the Solaris Driver ITU diskette from the diskette drive when all the drivers are processed, and reinsert the Solaris Device Configuration Assistant Diskette.
- Step 10. Press F4\_Done when you have finished adding supplemental drivers.

The Identified Device Drivers screen appears with a list of all device drivers. For example, you would see at least symhisl-Device Driver.

Important: Do not remove the Solaris Device Configuration Assistant Diskette from the diskette drive until you see the following message displayed in a dialog box (the message actually appears in Step 16).

"If you want to bypass the device configuration and boot screens when the system reboots, eject the Device Configuration Assistant/Boot diskette now."

- Step 11. Press F2\_Continue.

The Solaris Device Configuration Assistant screen appears.

- Step 12. Press F2\_Continue.

The Bus Enumeration screen appears.

The Scanning Devices screen is then displayed. System devices are scanned. When scanning is complete, the Identified Devices screen appears.

- Step 13. Press F2\_Continue.

The message `Loading driver...` appears followed by messages about the drivers that are required to boot your system. After a few seconds, the Boot Solaris screen appears.

Step 14. Select the device controller attached to the device that contains your install medium.

Step 15. Press F2\_Continue.

Drivers for the device controller that you selected are displayed. Your system boots to run the install program. The install program starts and your machine begins booting the complete Solaris 7 or Solaris 8 operating environment.

Step 16. Proceed to configure your system when prompted to do so. After configuring your system, click on the Begin Installation button. The message indicated earlier appears now:

“If you want to bypass the device configuration and boot screens when the system reboots, eject the Device Configuration Assistant/Boot diskette now.”

Step 17. Remove the Solaris Device Configuration Assistant Diskette.

Some time later, the following messages appear and prompt you to insert each of the Solaris Driver ITU diskette(s) required to install into your machine:

Installing unbundled device driver support

Extracting driver list from tree..

<ITU diskette name> driver-name...

Please insert the Driver Update diskette labeled  
<ITU diskette name>

Press <ENTER> when ready.

Step 18. Reinsert the SYMHISL Driver ITU diskette that you inserted earlier into the diskette drive.

Step 19. Press Enter.

Packages and/or patches that contain the new drivers are installed from the diskette onto your machine. Messages about each installation appear accordingly.

**Solaris 7:** Two messages appear and prompt:

Do you want to create a new instance of this package [y, n, ?, q]

Type n for No and press Enter.

Do you want to overwrite this installed instance [y, n, ?, q]

Type **y** for Yes to overwrite the old driver, and press Enter.

**Solaris 8:** This message appears and prompts:

Do you want to create a new instance of this package [y, n, ?, q]

Type **y** for Yes and press Enter.

Insert the SYMHISL ITU diskette into the floppy drive.

- Step 20. Remove the Driver ITU diskette from the diskette drive if drivers on other Solaris Driver ITU diskettes are required. The system will prompt you with this message:

If you have additional Update diskettes to install (such as video), please insert diskette now.

Additional Update diskettes to install? [y/n]

- Step 21. Type **y** for Yes if applicable.

- Step 22. Repeat this process until all drivers you need are installed.

When you type **n** for No and press Enter, this message appears:

**Solaris 7:** Installation of <SYMhisl> was successful.

**Solaris 7:** The system continues with the installation process. Go to step 23.

**Solaris 8:** Installation of <SYMhisl> was successful.

**Solaris 8:** The system automatically reboots at this point.

- Step 23. When the Solaris 7 installation has completed, the message `Installation complete` appears.

- Step 24. Remove the diskette from the floppy drive.

The system automatically reboots.

When the Solaris operating environment is finished booting and running, the new devices whose drivers that you installed are available for use. To verify the version number for the Solaris 7 or Solaris 8 `symhis1` driver, type at the prompt:

```
# modinfo | grep sym
```

After entering this command, the system will display the version number.



## 10.3.2 Existing System Installation

Before adding new or updated drivers, the newly supported hardware devices should be installed and configured according to the instructions in the corresponding Device Reference Page, if any. See the Device Reference Manual for Solaris (Intel Platform Edition).

When the Solaris Intel Platform Edition software is already installed, the simplest way to add new or updated drivers is to install the Driver ITU diskettes as patches on your system. For more information about managing diskettes and drives, see the System Administration Guide.

To add new or updated drivers, follow these steps:

Step 1. Go to the root directory.

Step 2. To see if the Volume Management software is running on the machine that you are updating, type at the command prompt:

```
#ps -ef | grep vold
```

Step 3. To temporarily stop Volume Management if it is running, type this command at the system prompt:

```
# /etc/init.d/volmgt stop
```

Step 4. Insert the Solaris Driver ITU diskette into the diskette drive.

Step 5. Mount the SYMHISL ITU diskette at the `/mnt` mount point:

```
#mount -F pcfs /dev/diskette /mnt
```

You must mount the Solaris Driver ITU diskette at this point in the file structure to update your system successfully.

Step 6. **Solaris 7:** Execute the install script on the diskette:

```
# /mnt/DU/sol_27/i86pc/Tools/install.sh -i
```

or

**Solaris 8:** Execute the install script on the diskette:

```
# /mnt/DU/sol_28/i86pc/Tools/install.sh -i
```

The `install.sh` script searches for all new or updated drivers on the diskette. When a new or updated driver is found, this prompt appears:

```
Unconditionally installing ITUs <ITU driver names>
```

```
Do you want to create a new instance of this package [y,  
n, ?, q]
```

Step 7. Type **n** for No.

If you specify yes, then this message appears:

```
Do you want to overwrite this installed instance?
```

Step 8. Type **y** for Yes to overwrite the old driver.

Step 9. Unmount the diskette when the installation has completed and the `install.sh` script exits by typing at the command prompt:

```
# cd  
# umount /mnt
```

Step 10. Remove the Solaris Driver ITU diskette from the diskette drive.

Step 11. Reboot your machine by typing at the command prompt:

```
# touch /reconfigure  
# reboot
```

Step 12. If you have not already done so, turn off your system, add the new hardware, and turn on your system again.

Step 13. At the `<<Current Boot Parameters >>` prompt, type:

```
b -r  
  
to force reconfiguration of the machine.
```

When the Solaris operating environment is finished booting and running, the new devices whose drivers that you installed are available for use. To verify the version number for the Solaris 7 or Solaris 8 `symhisl` driver, type at the prompt:

```
# modinfo | grep sym
```

After entering this command, the system will display the version number.

---

## 10.4 Troubleshooting

The Solaris operating system may display some informational or potential error messages that may be preceded by a warning message. In the message descriptions below, the `SYMHISL<n>` signifies that `<n>` can be replaced by a number assigned to it by the operating system. That value

helps to identify the SCSI bus that is reporting the error. The <s> and <x> marks are placeholders for strings and numbers that the system will display.

`SYMHISL<n>`: This hardware not supported by this driver

The `symhis1` driver has been told to control an LSI53C895A, LSI53C896, LSI53C1000, or LSI53C1010 controller. If the hardware is made by a manufacturer other than LSI Logic Corporation, this adapter requires a special driver provided by that manufacturer. Please contact the manufacturer for assistance. If the hardware is an older LSI Logic host adapter board, contact Technical Support at 719-533-7230 and talk with a technician.

`SYMHISL<n>`: Failed to map device registers

The `symhis1` driver was unable to access the hardware registers necessary for operation. The operating system did not properly configure the PCI device.

`SYMHISL<n>`: NVS error, failed to restore value of 'reg' property

The `symhis1` driver was able to access the resources needed to determine NVS configuration but was not able to return the system to its prior state. Further configuration errors may occur.

`SYMHISL<n>`: NVS error, failed to map system memory. NVS data cannot be used.

`SYMHISL<n>`: NVS error, failed to update 'reg' property. NVS data cannot be used.

`SYMHISL<n>`: NVS error, failed to allocate memory. NVS data cannot be used.

`SYMHISL<n>`: NVS error, unable to find 'reg' property. NVS data cannot be used.

For each of the above errors, the `symhis1` driver was not able to access NVS configuration data to see if it exists. On some systems, this will not be a problem. On other systems however, NVS data contains the configuration information for this adapter and the `symhis1` driver is not able to use that configuration. This may cause you to manually configure the driver using the `symhis1.conf` configuration file. Please refer to the man page `driver.conf` (4), which is the standard reference on how to

edit the `symhisl.conf` file. The instructions for editing `symhisl.conf` can also be found in the path `/kernel/drv/symhisl.conf`.

`SYMHISL<n>`: Hardware not properly enabled by system,  
`cmd=xxxxh`

The system has not properly enabled the configuration resources that the `symhisl` driver needs in order to use this hardware. The `cmd=xxxxh` value needs to be reported to technical support.

`SYMHISL<n>`: Unsupported 64-bit register address. Please load 64-bit version of kernel and driver

This version of the `symhisl` driver does not support physical addresses using 64-bit values. Contact LSI Logic Technical Support at 719-533-7230 to determine if a new driver is available to support 64-bit version.

`SYMHISL<n>`: The host adapter id in the `.conf` file is being ignored because the SCSI BIOS Configuration Utility will override it.

The `symhisl.conf` file has a line (`scsi-initiator-id=x`) that changes the host adapter SCSI ID. That line is being ignored because the SCSI BIOS Configuration Utility has set the SCSI ID. Please use the SCSI BIOS Configuration Utility to change the SCSI ID.

`SYMHISL<n>`: Ignored invalid `scsi-initiator-id` value = `x`

The `symhisl.conf` file has an invalid `scsi-initiator-id` value as displayed in the error message. The allowable values are in the range 0..15.

`SYMHISL<n>`: `<s>` property value is too large. Using maximum value of `<x>`.

A property value in the `symhisl.conf` file is greater than the maximum allowed value. The driver will use the value `<x>` instead.

`SYMHISL<n>`: `<s>` property value is too small. Using default value of `<x>`.

A property value in the `symhisl.conf` file is less than the minimum allowed value. The driver will use the value `<x>` instead.

`SYMHISL<n>`: Could not allocate memory to read configuration data.

The `symhisl` driver was unable to allocate memory required to process the configuration data. This means that the configuration was not properly determined. To fix this you may need to manually configure the driver using the `symhisl.conf` file.

`SYMHISL<n>`: Failure reading NVM configuration data

The `symhisl` driver was unable to read the configuration data supplied by the SCSI BIOS Configuration Utility. This means that the configuration was not properly determined. To fix this you may need to manually configure the driver using the `symhisl.conf` file.

`SYMHISL<n>`: Failure reading NVM manufacturing data

The `symhisl` driver was unable to read the configuration data supplied by the manufacturer. This means that the adapter configuration may be incorrect and unknown errors may occur. Contact your manufacturer for a replacement adapter.

`SYMHISL<n>`: The boot ROM configuration utility has SCAM enabled but this driver is not capable of SCAM. Please disable SCAM in the boot ROM.

Some older versions of the SDMS boot ROM are capable of using the SCAM protocol to assign SCSI IDs. The `symhisl` driver is not capable of using SCAM. In order to properly configure your system, disable SCAM using the SCSI BIOS Configuration Utility.

`SYMHISL<n>`: Configuration data is corrupt and will be ignored

The configuration data provided by the SCSI BIOS Configuration Utility has been determined to be corrupted. Run the SCSI BIOS Configuration Utility to correct this error.

`SYMHISL<n>`: Unknown synchronous value in NVM data = `<x>`

The `symhisl` driver needs to be updated to understand this new synchronous configuration data value. Until the driver is updated, synchronous mode will be disabled.

`SYMHISL<n>`: Unknown width value in NVM data = `<x>`

The `symhisl` driver needs to be updated to understand this new wide configuration data value. Until the driver is updated, wide mode will be disabled.

SYMHISL<n>: Manufacturing data is corrupt and will be ignored

The manufacturer configuration data has been found to be corrupt. Contact your manufacturer for a new adapter.

SYMHISL<n>: Unknown synchronous value in NVM data = x

The `symhis1` driver needs to be updated to understand this new synchronous configuration data value. Until the driver is updated, synchronous mode will be disabled.

SYMHISL<n>: Unknown width value in NVM data = x

The `symhis1` driver needs to be updated to understand this new wide configuration data value. Until the driver is updated, wide mode will be disabled.

SYMHISL<n>: Unable to make reset notification callbacks

The `symhis1` driver was unable to notify the target device driver of a SCSI bus reset. The target driver may start to malfunction because of this issue.

SYMHISL<n>: Disabling queue tags for target ID x

The `symhis1` driver has determined that the specified target is no longer responding to queue tagged I/O in a proper manner and has disabled queue tags for that device. This usually means that the specified device does not support queue tags. To disable this message, disable queue tags for the given device using the SCSI BIOS Configuration Utility.

SYMHISL<n>: Device (ID=x, LUN=x) not supported

A Solaris target driver attempted to initialize a device whose SCSI target ID was out of the support range or whose LUN was not zero. This warning is most likely triggered by illegal entries in the target driver's conf. file.

SYMHISL<n>: `ddi_dma_sync()` failed for data buffer. Data corruption may occur.

SYMHISL<n>: `ddi_dma_sync()` failed for I/O data at <xxxxxxx>. Data corruption may occur.

SYMHISL<n>: `ddi_dma_sync()` failed for Adapter data. Data corruption may occur.

A call to the operating systems's `ddi_dma_sync` function failed. As a result, the system data caches may not be properly synchronized with system main memory. This may result in data corruption or failure of the `symhis1` driver to function properly.

`SYMHISL<n>: ddi_dma_numwin() failed`

`SYMHISL<n>: ddi_dma_getwin() failed`

`SYMHISL<n>: ddi_dma_alloc_handle: <xx>h unknown/impossible`

`SYMHISL<n>: ddi_dma_buf_bind_handle: DDI_DMA_INUSE  
impossible`

`SYMHISL<n>: ddi_dma_buf_bind_handle:<xx>h unknown/impossible`

`SYMHISL<n>: ddi_dma_unbind_handle: failed`

The operating system failed to respond to the named routine in a known manner. This is a fatal error that is not recoverable. Report this error to technical support.

`SYMHISL<n>: Device in a slave-only slot and is unusable`

`SYMHISL<n>: Hi-level interrupts not supported`

The adapter is in a slot that cannot be used with this driver. Try moving the adapter to a different PCI slot.

`SYMHISL<n>: Failed to attach. This adapter will not be installed.`

Because of the previous error, this adapter could not be “attached” to the I/O subsystem and will not be accessible. See the previous error message and solve that problem.

`SYMHISL<n>: Failed to allocate memory`

The `symhis1` driver was unable to allocate the memory needed during initialization. You may have run out of available memory.

`SYMHISL<n>: Unbind failed!`

The driver had a problem when attempting to unload itself. This is a fatal error.

`SYMHISL<n>: Unable to obtain soft state structure`

The `symhisl` driver was unable to initialize a required data structure and therefore did not load. Please call technical support.

`SYMHISL<n>`: Failed to attach interrupt handler

The `symhisl` driver was unable to initialize the interrupt handler as required. Please call technical support.

`SYMHISL<n>`: The adapter is malfunctioning

`SYMHISL<n>`: The adapter is malfunctioning, of an unknown type, or a revision that is not supported.

The `symhisl` driver is not able to communicate with the hardware. You may need to update your driver or your hardware.

`SYMHISL<n>`: Failed to create DMI minor node

The `symhisl` driver was unable to create a device node for the driver's DMI interface. If you are not using the DMI, then you may safely ignore this message.

`SYMHISL<n>`: Could not attach to the SCSI subsystem

The driver was unable to communicate with the SCSI device driver that is part of the operating system. You may need to update your driver.



# Chapter 11

## Linux Device Driver Installation

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This chapter provides device drivers information for the Linux operating system. It provides installation instructions and includes these topics:

- [Section 11.1, “Introduction,” page 11-1](#)
- [Section 11.2, “Installing Your Linux Driver,” page 11-4](#)
- [Section 11.3, “Troubleshooting,” page 11-9](#)

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### 11.1 Introduction

The Linux drivers are free software and are supported in source form. These drivers are distributed in the hope that they will be useful, but without any warranty and without even the implied warranty of merchantability or fitness for a particular purpose. You can redistribute them and/or modify them under the terms of version 2 or later of the GNU Public License as published by the Free Software Foundation. You should have received a copy of this license with your Linux kernel source tree (`/usr/src/linux/COPYING`). For detailed information on the GNU Public License, contact the Free Software Foundation, Inc. at 59 Temple Place, Suite 330, Boston, MA 02111-1307 or contact their web site at: <http://www.gnu.org/copyleft/gpl.html>.

The official Linux kernel currently bundles three drivers that support the LSI Logic family of PCI SCSI chips: 53C7, 8XX; NCR53C8XX; SYM53C8XX. The latter two drivers are based off the same code base and are maintained. LSI Logic recommends that you install the SYM53C8XX driver if your controllers are supported by it. If you are not sure, configure the kernel to load both the SYM53C8XX and NCR53C8XX drivers (either built into the kernel or as modules). The kernel will then select an appropriate driver for each of your LSI53C8XX or LSI53C1XXX controllers. The SYM53C8XX driver will install first and then the NCR53C8XX driver will install and support all remaining LSI53C8XX or LSI53C1XXX devices.

Details on the drivers can be found on your system in the file:

`/usr/src/linux/driver/scsi/README.ncr53c8xx`

Current Linux drivers can be downloaded by anonymous ftp from:

`ftp://ftp.lsil.com/HostAdapterDrivers/linux/`

Instructions on how to do so are contained in the next two sections.

### 11.1.1 Features

The SYM53C8XX driver supports:

- SCRIPTS™ Load/Store command
- Phase Mismatch from SCRIPTS (for chips that support this feature)
- Parallel Protocol Request (PPR) negotiation
- Ultra160 Data Transfers (for LSI53C1000 and LSI53C1010)

The SYM53C8XX and NCR53C8XX drivers support:

- Integrity Checking (Domain Validation for 2.2.X Kernels)
- Handling one interrupt per I/O
- Synchronous negotiation (including Fast SCSI, Ultra SCSI, Ultra2 SCSI)
- Wide negotiation
- Disconnect/Reselect
- Tagged command queuing
- Scatter/Gather
- Shared interrupts
- SCSI parity checking
- Master parity checking
- LSI Logic and Tekram formatted NVRAM
- Allowing memory-mapped or normal I/O user configurations
- Command line options to override default configuration
- Allowing drivers to be built into kernel or built as a module
- Allowing installation of both drivers simultaneously

## 11.1.2 LSI Logic Devices Supported

All LSI Logic devices and host adapters have undergone a name change. They have transitioned from a SYM prefix to an LSI prefix. No name changes have occurred for the SDMS Linux drivers.

The SYM53C8XX and NCR53C8XX drivers support the host adapter based on the LSI53C8XX and LSI53C1XXX family of chips. [Table 11.1](#) lists the LSI Logic family of supported chips.

**Table 11.1 LSI Logic Family of Chips Supported**

Devices	On Board SDMS BIOS	Wide	SCSI Standard	Max Sync	NCR53C8XX	SYM53C8XX
LSI53C810	N	N	FAST10	10 Mbytes/s	Y	N
LSI53C810A	N	N	FAST10	10 Mbytes/s	Y	Y
LSI53C815	Y	N	FAST10	10 Mbytes/s	Y	N
LSI53C825	Y	Y	FAST10	20 Mbytes/s	Y	N
LSI53C825A	Y	Y	FAST10	20 Mbytes/s	Y	Y
LSI53C860	N	N	FAST20	20 Mbytes/s	Y	Y
LSI53C875	Y	Y	FAST20	40 Mbytes/s	Y	Y
LSI53C876	Y	Y	FAST20	40 Mbytes/s	Y	Y
LSI53C895	Y	Y	FAST40	80 Mbytes/s	Y	Y
LSI53C895A	Y	Y	FAST40	80 Mbytes/s	Y	Y
LSI53C896	Y	Y	FAST40	80 Mbytes/s	Y	Y
LSI53C897	Y	Y	FAST40	80 Mbytes/s	Y	Y
LSI53C1000	Y	Y	FAST80	160 Mbytes/s	N	Y
LSI53C1010 <sup>1</sup>	Y	Y	FAST80	160 Mbytes/s	N	Y

1. 33 MHz and 66 MHz.

Details on the drivers can be found on your system in the file:

`/usr/src/linux/driver/scsi/README.ncr53c8xx`

You may also download the current Linux driver from the LSI Logic Web site at: <http://www.lsilogic.com>. After you are connected to this

Web site, place your cursor on the Get Drivers option in the menu bar. Click on the Drivers selection. Choose the Linux operating system for SCSI and click on the Go button. Follow the instructions on subsequent screens to download the drivers.

### 11.1.3 Description

The `SYM53C8XX` driver takes full advantage of the features of the latest LSI53C8XX or LSI53C1XXX family of chips, although support for some of the earliest chips is no longer available. The differences between the two drivers are:

- The `SYM53C8XX` driver supports only those NCR/SYM/LSI/53C8XX chips that perform Load/Store instructions. Additionally, it supports the Ultra160 LSI53C1000 and LSI53C1010 chips, uses 8 Kbyte on-chip RAM, and handles phase mismatches in SCRIPTS for the LSI53C895, LSI53C895A, LSI53C896, LSI53C897, LSI53C1000, and LSI53C1010 chips.
- The `NCR53C8XX` driver supports the entire NCR/SYM/LSI/53C8XX family of chips excluding the latest Ultra160 LSI53C1000 and LSI53C1010 chips released by LSI Logic. Note that this driver supports the earliest chips from National Cash Register (NCR), such as the NCR53C810 revision 1.

### 11.1.4 Upgrading your Linux Driver During Installation

It is possible to upgrade to the latest driver during installation of Red Hat 7.0 and 7.1. Driver update disks for these releases of Linux may be obtained either from the SDMS Software Device Drivers and Utilities CD-ROM or by anonymous ftp from:

`ftp://ftp.lsil.com/HostAdapterDrivers/linux/DriverUpdateDisks`

---

## 11.2 Installing Your Linux Driver

After installing the Linux operating system, you must patch the driver and other kernel files to upgrade to `SYM53C8XX` version 1.60 (`NCR53C8XX` version 3.30). To patch the driver and other kernel files, follow these steps:

Step 1. Obtain and install the kernel source.

The kernel source may be obtained through anonymous ftp from: <ftp.us.kernel.org/pub>.

Be sure to use binary mode to download the kernel file. For this example, the bz2 compressed kernel was downloaded and stored under `/root/Kernels`.

Step 2. Uncompress and install the kernel by typing at the prompt (each command on one line):

```
#cd /usr/src
#rm linux
#bunzip2 -c /root/Kernels/linux-2.2.13.tar.bz2 | tar
xvf -
```

**Note:** `bunzip2` is not installed by default with Red Hat 6.1 version.

Step 3. Reset the soft links and type at the prompt:

```
#mv linux linux-2.2.13
#ln -s linux-2.2.13 linux
#cd linux/include
#ln -s asm-<platform> asm
```

Step 4. Obtain the driver source or patches.

**FOR the driver source:**

1. Obtain the latest version of the driver that is stored in full-source format:

`<driver version>-all_kernels.tar.gz`

either from the SDMS Software Device Drivers and Utilities CD-ROM at (all on one line):

`{CD-ROM Mount Point} drivers/unixes/linux  
/c8xx-driver`

or

by anonymous ftp from:

`ftp://ftp.lsil.com/HostAdapterDrivers/linux`

2. When using ftp, download the tarball for the driver version of interest by typing these instructions:

```
ftp> cd 8xx-driver
ftp> binary
ftp> get <driver version>-all_kernels.tar.gz
ftp> quit
```

3. Extract the patch files from the tarball (all on one line):

```
#tar xzvf <driver version>-all_kernels.
tar.gz
```

4. Read the Install.txt file for further instructions.

### **FOR the driver patches:**

Note: Patches are available for kernel versions 2.2.5, 2.2.12, Red Hat 6.1 kernel (2.2.12-20), 2.2.13, 2.2.14, Red Hat 6.2 kernel (2.2.14-5), 2.2.15, 2.2.16 and 2.2.17. Support for the LSI53C1000 and LSI53C1010 is bundled in 2.4.18.

1. Obtain patches for driver versions that are stored in tarball format:

```
<driver version>-2.2.13.tar.gz
```

from either the SDMS Software Device Drivers and Utilities CD-ROM from this directory:

```
{CD-ROM Mount Point} drivers/unixes/linux/
c8xx-driver
```

or

by anonymous ftp from:

```
ftp://ftp.lsil.com/HostAdapterDrivers/linux
```

2. For FTP, download the tarball for the kernel of interest by typing these instructions:

```
ftp> cd 8xx-driver
ftp> binary
ftp> get <driver version>-2.2.13.tar.gz
ftp> quit
```

3. Extract the patch files from the tarball:

```
#tar xzvf <driver versions>2.2.13.tar.gz
```

The newly created directory 2.2.13 will contain:

`readme-2.2.13.ftp` - A listing of the driver version versus patch number.

`script-2.2.13` - A shell script that can be executed to apply the patches in the correct order.

files in the format (all on one line) - `patch-ncr53C8xx-s<setno>-d<patches>-<extension>-<kernelversion>.gz`

These files are generated with `diff -u` and compressed using `gzip`. Typically, all patches are applied in order beginning with the lowest set and patch number. Some patches have an additional extension of `dri` or `sys` to indicate that they are patches to the driver files or the system files. Patches with the same set and patch number but different extension (`dri` or `sys`) may be applied in any order.

4. Apply the driver patches by editing the script file and replace `<your patch directory>` with the full path to the patches. Type each command all on one line. For example, if the full path to your patches is:

```
/home/myself/kernelpatches/2.2.13
```

then the script becomes:

```
echo "Patching ncr53c8xx/sym53c8xx to versions  
3.3b and 1.6b - kernel 2.2.13"
```

```
cd /usr/src
```

```
ln -s /home/myself/kernelpatches/2.2.13 source
```

```
gzip -d <source/patch-53c8xx-s01-d00-2.2.13.gz |  
patch -p0
```

```
gzip -d <source/patch-53c8xx-s01-d01-dri-  
2.2.13.gz | patch -p0
```

```
gzip -d <source/patch-53c8xx-s01-d01-sys-  
2.2.13.gz | patch -p0
```

```
gzip -d <source/patch-53c8xx-s01-d02-dri-  
2.2.13.gz | patch -p0
```

```
gzip -d <source/patch-53c8xx-s01-d02-sys-
2.2.13.gz | patch -p0

gzip -d <source/patch-53c8xx-s01-d03-dri-
2.2.13.gz | patch -p0

gzip -d <source/patch-53c8xx-s01-d03-sys-
2.2.13.gz | patch -p0

rm source
```

5. Execute the script by typing at the prompt:

```
#./script-2.2.13
```

Note 1: The script must have execute permission. If it does not, set the permission by typing at the prompt:

```
#chmod +x script-2.2.13
```

Note 2: If you uncompress the patch files to examine the content, you can still apply the patch either by recompressing with gzip or by replacing "gzip -d <" with "cat" in the script file.

#### Step 5. Reconfigure and rebuild the kernel.

1. Rebuild the kernel in the usual way for your platform. LSI Logic strongly recommends that you make an emergency boot diskette prior to rebuilding the kernel. See your system documentation or use the online documentation (`$man mkbootdisk`) for more information.
2. To rebuild the kernel on an I386 platform, type at the prompt:

```
#cd /usr/src/linux

#make mrproper          (to reset to default state)

#make xconfig           (or: #make menuconfig)
```

At this point, enable the Joliet file system for CD-ROMs under the Filesystems option. Then continue, typing each command all on one line:

```
#make dep

#make clean

#make bzImage (for an Alpha platform: #make boot)

#make modules
```



```
#make modules_install
#cd /boot
#rm System.map vmlinuz module-info
#cp /usr/src/linux/System.map System.map-
<kernel version>
#ln -s System.map-<kernel version>
System.map
#cp /usr/src/linux/arch/i386/boot/bzImage
vmlinuz-<kernel version>
#ln -s vmlinuz-<kernel version> vmlinuz
```

**Warning:** If you modify the previous kernel and are using `lilo`, you must update and run your boot loader (`#lilo -v`). If you forget to do so and do not have an emergency boot diskette, your system will be unbootable. There is no recovery method if you boot from a SCSI disk. See `$man mkbootdisk` for instructions on how to make a boot diskette.

---

## 11.3 Troubleshooting

If you have problems with any of these patches or if you need patches for an official kernel not listed, please send an email to [support@lsil.com](mailto:support@lsil.com) that details the kernel version. If patches have failed, also specify if it is an official kernel or vendor kernel and which patches failed.

Some potential problems and their suggestion solutions are:

### **Integrity checking (Domain Validation) is not enabled.**

Follow these steps to enable integrity checking:

- Step 1. To enable integrity checking, set the experimental option in `menuconfig` (or `xconfig`).
- Step 2. Under SCSI support-->SCSI Low-level drivers-->NCR53C8XX (or SYM53C8XX), select Perform integrity check.
- Step 3. Rebuild the kernel and run `lilo -v`.

**Integrity checking (Domain Validation) is enabled but a device behaves badly. How can it be disabled?**

Disable integrity checking by following these steps:

Step 1. To disable integrity checking, type at the prompt:

```
#insmod ncr53c8xx "ncr53c8xx=buschk:4"  
or  
#insmod sym53c8xx "sym53c8xx=buschk:4"
```

Step 2. To disable integrity checking when the driver is built into the kernel, type at the `lilo` prompt:

```
lilo: linux root=/dev/hda2 ncr53c8xx=buschk:4  
or  
lilo: linux root=/dev/hda2 sym53c8xx=buschk:4  
where hda2 is the root partition.
```

**The C1010 boards are shipped with the default speed set to Ultra2.**

To run at Ultra160 speeds, update the sync speed in the configuration (set to 80) and change the setting in NVRAM. If necessary, use the command line arguments `nvramp:7`, `sync:9`, and `wide:1` to the setup command; for example with `insmod`, type at the prompt:

```
#insmod sym53c8xx "sym53c8xx=nvramp:7 wide:1 sync:9"
```

**There are no patches for my kernel?**

Contact the LSI Logic technical support team at:

<http://www.lsillogic.com/support/index.html>

Call the listed number if you need patches for an official kernel.

# Chapter 12

## NetWare Device Driver Installation

---

This chapter describes the SDMS NWPAs for the Novell NetWare versions 4.XX and 5.XX operating systems. It provides installation instructions for new and existing systems along with command line options. This chapter includes these topics:

- [Section 12.1, "Introduction," page 12-1](#)
  - [Section 12.2, "Using NWPAs NetWare Drivers," page 12-4](#)
  - [Section 12.3, "Installing Drivers for NetWare," page 12-6](#)
  - [Section 12.4, "Using the Command Line Options," page 12-9](#)
  - [Section 12.5, "Important Additional Information," page 12-16](#)
- 

### 12.1 Introduction

The SDMS NWPAs for the Novell NetWare operating system allow you to utilize an LSI Logic SCSI controller or processor. These NWPAs, along with a SCSI controller or processor and an appropriate Custom Device Module (CDM), provide a SCSI solution within the NetWare environment.

LSI Logic provides three drivers for the Novell NetWare versions 4.XX and 5.XX environments. This document explains how to install and use the NWPAs SCSI Host Adapter Module (HAM) drivers for NetWare.

## 12.1.1 Features

The SDMS NWPAs drivers for NetWare support these features:

- Ultra160 data transfers (for LSI53C1000 and LSI53C1010)
- Domain Validation (for LSI\_U3NW.HAM driver only)
- Synchronous negotiation (including Fast SCSI, Ultra SCSI, Ultra2 SCSI)
- Multiple host adapters
- Multiple Logical Unit Numbers (LUNs)
- Large LUNs (larger than 7.844 Gbytes)
- Disconnect/Reconnect
- Tagged command queuing
- Simple and ordered queue tags
- Scatter/Gather
- Shared interrupts
- Wide SCSI (SE and differential)
- SDMS BIOS 4.XX or earlier (with ASPI8XX.SYS version 4.10 or greater)
- SDMS BIOS 4.18 (without ASPI8XX.SYS)
- SDMS DOS 4.XX drivers
- Target Initiated Negotiation (TIN) (wide and synchronous)
- SCSI Magneto Optical (MO) devices by using NetWare's SCSIMO.CDM

In conjunction with NetWare:

- ASPI interface using NetWare's NWASPI.NLM
- SCSI CD-ROM devices using NetWare's SCSICD.CDM
- SCSI-2 Tape devices using NWTAPE.CDM for versions 4.XX and 5.XX
- Symmetric Multiprocessing (SMP) under NetWare 4.XX requires the following files: SCSIHD.DDI 1.34, SCSIHD.COM 1.34, and NWP.NLM 2.32f. The newest versions of these files are available on the NetWare Support Service Pack 6A for NetWare 4.XX (but not for NetWare 4.2).

**Note:** The `SCSIHD.CDM` and `SCSIHD.DDI` files must be dated 5MAR1998 and version 1.34 or newer for all environments. The newest versions of these files are available on the NetWare Support Service Pack 6A for NetWare 4.XX and NetWare Support Service Pack 3A for NetWare 5.XX.

`NWPA.NLM` must be dated 9FEB1998 and version 2.32f or newer in SMP environments.

## 12.1.2 LSI Logic Devices Supported

All LSI Logic devices, host adapters, and device drivers have undergone a name change. They have transitioned from a SYM prefix to an LSI prefix.

The `LSI8XXNW.HAM` supports the following devices and their associated LSI Logic host adapters:

- LSI53C810, LSI53C810A, LSI53C810AE (LSI8100S, LSI8100ASP, LSI20810)
- LSI53C815 (LSI815XS, LSI8150SP)
- LSI53C825, LSI53C825A (LSI8250S, LSI8251S, LSI8251D, LSI8250ASP, LSI8251ASP, LSI8251AD)
- LSI53C860, LSI53C860AE (LSI8600SP, LSI20860)
- LSI53C875, LSI53C875E (LSI8750SP, LSI8751SP, LSI8751D)
- LSI53C876 (LSI22801, LSI22802)
- LSI53C885
- LSI53C895, (LSI8951U, LSI8952U)
- LSI53C895A (LSI8953U)

The `LSIHINW.HAM` supports the following devices and their associated LSI Logic host adapters:

- LSI53C895A (LSI8953U)
- LSI53C896 (LSI22910, LSI21002, LSI22902)

The LSI\_U3NW.HAM supports the following device and its associated LSI Logic host adapters:

- LSI53C1000 (LSI20160, LSI20160L)
- LSI53C1010 (LSI21003, LSI22915A, LSI21040, LSI22903, ITI6200U3LP).

### 12.1.3 Description

The SDMS NWP solution consists of the device drivers, LSI8XXNW.HAM, LSIHINW.HAM, and LSI\_U3NW.HAM and the NetWare installation files LSI8XXNW.DDI, LSIHINW.DDI, and LSI\_U3NW.DDI.

LSI8XXNW.HAM, LSIHINW.HAM, and LSI\_U3NW.HAM are NWP Host Adapter Modules (HAMs). In order to support SCSI devices, you must load the HAM module in conjunction with a SCSI Custom Device Module (CDM). Novell has developed generic CDMs to support SCSI-2 Hard Drives, SCSI CD-ROM devices, SCSI MO devices, SCSI tape devices, and SCSI changer devices. In addition, third party vendors are developing CDMs for device specific support.

### 12.1.4 Supporting NWP ASPI

The NWASPI driver for NetWare provides NWP ASPI support. NetWare or third party applications may use this interface to communicate with a SCSI device attached to an LSI Logic controller, including SCSI-2 tape devices using NWTAPE.CDM.

---

## 12.2 Using NWP NetWare Drivers

You will install NetWare as described in the Novell NetWare Installation Manual. The information in subsequent sections provides assistance during the installation process.

The SDMS NWP NetWare drivers must be loaded once for each LSI Logic controller SCSI channel present in the system. You must prepare an SDMS Driver Diskette before proceeding with the installation instructions.

## 12.2.1 Preparing an SDMS NWPB Driver Diskette

The SDMS Software Device Drivers and Utilities CD-ROM contains the NetWare NWPB drivers in this directory:

```
{CD-ROM Drive Letter}:\DRIVERS\NETWARE\NWPB
```

Copy the NWPB HAM drivers and installation files to the root directory of a clean 3.5-inch diskette. Label this diskette "SDMS NWPB Drivers Diskette." You will use this diskette during the installation process.

You can also download current NetWare NWPB drivers from the LSI Logic Web site at: <http://www.lsillogic.com>. After you are connected to this Web site, place your cursor on the Get Drivers option in the menu bar. Click on the Drivers selection. Choose the Novell NetWare operating system for SCSI and click on the Go button. Follow the instructions on subsequent screens to download these drivers.

## 12.2.2 Preparing your System for NWPB Drivers

The LSI8XXNW.HAM, LSIHINW.HAM, and LSI\_U3NW.HAM drivers support the following DOS drivers:

- ASPI8XX.SYS (Version 4.10 or greater)
- SYMCD.SYS
- SYMDISK.SYS

The HAM drivers do not support the older SDMS 3.XX DOS drivers (DOSCAM.SYS, MINICAM.SYS, CDROM.SYS, and SCSSIDISK.SYS). The SDMS BIOS version 4.18 is the minimum BIOS required for NetWare when not used with ASPI8XX.SYS. For any earlier BIOS versions, use the ASPI8XX.SYS driver (version 4.10 or greater). Refer to [Chapter 6, "DOS Device Driver Installation,"](#) for more information.

Important: Please see [Section 12.5.4, "Using the SDMS 4.XX BIOS,"](#) regarding 8XX\_32.ROM with SCAM enabled before upgrading the BIOS.

To upgrade the BIOS (Boot ROM) to 4.18 or later, follow these steps:

- Step 1. Load the FLASH8X5.EXE program.
- Step 2. Follow the screen instructions to upgrade the BIOS.
- Step 3. Select the appropriate BIOS file (that is, 8XX\_64.ROM).

To check the status of DOS drivers, follow these steps:

Step 1. Edit the CONFIG.SYS file.

Step 2. If any of the following lines appear, remove or delete these lines. LSI Logic recommends using the REM command to comment them out in case these lines are needed later.

```
DEVICE=<path>\DOSCAM.SYS  
DEVICE=<path>\MINICAM.SYS  
DEVICE=<path>\CDROM.SYS /d:<name>  
DEVICE=<path>\SCSIDISK.SYS  
DEVICE=<path>\HIMEM.SYS  
DEVICE=<path>\EMM386.SYS
```

Step 3. Add the following lines if CD-ROM support is required:

```
DEVICE=<path>\ASPI8XX.SYS  
DEVICE=<path>\SYMCD.SYS /d:<name>
```

Step 4. Add the following line to the AUTOEXEC.BAT file:

```
DEVICE=<path>\MSCDEX /d:<name>
```

**Note:** The /d: is not a drive letter designation; it indicates the name you wish assigned to your CD-ROM. You must include the NAME, which can be any combination of up to 8 characters.

---

## 12.3 Installing Drivers for NetWare

This section provides installation instructions for new and existing NetWare systems.

### 12.3.1 New NetWare 5.XX Installations

This section provides the instructions for new NetWare 5.XX installations. Read the steps before beginning the installation to familiarize yourself with this procedure.

Step 1. Begin the file server installation according to the instructions in the file server installation chapter in the Novell NetWare Installation Manual.

The NetWare installation procedure prompts you for a Disk Driver.



Step 2. Insert the SDMS NWPA drivers diskette into drive A: or B:.

Step 3. Press the INS key twice to select an unlisted driver.

A dialog box appears. If the driver diskette is in the A: drive, press Enter to continue. If the driver diskette is in the B: drive, press F3 (to specify the path to search for the driver), enter the drive letter: B:, and press Enter.

The LSI8XXNW.HAM, LSIHINW.HAM, or LSI\_U3NW.HAM driver appears as a selection.

The system prompts you with the limited available command line options for loading the driver. A description of each option appears in the box at the bottom of the installation screen. Refer to [Section 12.4, "Using the Command Line Options," page 12-9](#) for more information.

Step 4. Modify any option values as needed for this installation.

Step 5. Follow the prompts to complete this installation.

The HAM driver(s) are loaded for each LSI Logic controller SCSI channel automatically in NetWare 5.XX.

## 12.3.2 New NetWare 4.XX Installations

This section provides the instructions for new NetWare 4.XX installations. Read the steps before beginning the installation to familiarize yourself with this procedure.

Step 1. Begin the file server installation according to the instructions in the Novell NetWare Installation Manual.

The NetWare installation procedure prompts you for a Disk Driver.

Step 2. Insert the SDMS NWPA drivers diskette into drive A: or B:.

Step 3. Press the INS key twice to select an unlisted driver.

A dialog box appears. If the driver diskette is in the A: drive, press Enter to continue. If the driver diskette is in the B: drive, press F3 (to specify the path to search for the driver), enter the drive letter: B:, and press Enter.

The LSI8XXNW.HAM, LSIHINW.HAM, or LSI\_U3NW.HAM driver appears as a selection.

The system prompts you with the limited available command line options for loading the driver. A description of each option appears in the box at the bottom of the installation screen. A more detailed description is also available in [Section 12.4, "Using the Command Line Options," page 12-9.](#)

- Step 4. Modify any option values as needed for this installation.
- Step 5. Load a separate instance of the driver for every LSI Logic controller SCSI channel or host adapter present in the system.
- Step 6. Accept the slot numbers displayed when prompted for a slot number. Make sure to write these slot numbers down for use in [Step 8.](#)
- Step 7. Edit the `STARTUP.NCF` file when the system prompts you to do so. Make sure the `LSI8XXNW.HAM`, `LSIHINW.HAM`, or `LSI_U3NW.HAM` is loaded once per LSI Logic controller SCSI channel present in the system.
- Step 8. Add the statement `SLOT=<slot number>` to each load line in the `STARTUP.NCF`, specifying the slot numbers written down in Step 6 with only one slot number per load instance.

The system loads the `HAM` driver(s) for each LSI Logic controller SCSI channel from the first `LOAD` statement to the last `LOAD` statement.

### 12.3.3 Upgrading to Symmetric Multiprocessing (SMP)

To upgrade to SMP after NetWare version 4.XX has been installed, follow these steps:

- Step 1. Type at the server prompt:  

```
load install
```

A menu appears.
- Step 2. Select `Multiprocessor`.  
Another menu appears.
- Step 3. Select the default: `MPS14`.
- Step 4. Follow the remaining prompts and then exit from the Install Menu.
- Step 5. Shut down the server and reboot the system.

**Note:** Other third party CDMs may also support these devices.

### 12.3.4 Reconfiguring Driver Options

To reconfigure driver options, follow these steps:

Step 1. Unload all instances of the driver by typing:

```
unload LSI8XXNW.HAM  
or  
unload LSIHINW.HAM  
or  
unload LSI_U3NW.HAM
```

Step 2. Reload each instance of the driver with the desired option settings by typing:

```
load LSI8XXNW.HAM slot=<slot number> <options>  
or  
load LSIHINW.HAM slot=<slot number> <options>  
or  
load LSI_U3NW.HAM slot=<slot number> <options>
```

Step 3. Specify these options in the `STARTUP.NCF` file if the changes you made to the load options are permanent and the driver is loaded automatically at bootup.

---

## 12.4 Using the Command Line Options

The `LSI8XXNW.HAM`, `LSIHINW.HAM`, and `LSI_U3NW.HAM` drivers allows the use of command line options for tuning purposes. A list of these options is available below that include the default option along with a list of valid options. Each option has a description of when to use it, the syntax used, and any impact its use may have on the system.

If you specify an option but the assignment is not valid, then the system uses the default value. To specify a value, place the option's characters on the load command line for the NWPA driver. For example, if the Wide SCSI Option on the command line option is desired, the load command line should look like this:

```
load LSI8XXNW.HAM wide=off
```

or

```
load LSIHINW.HAM wide=off
```

or

```
load LSI_U3NW.HAM wide=off
```

**Note:** No spaces are allowed within a single command line option, but spaces are required between different command line options.

## 12.4.1 Information Option

### Using the Help Mode Option

<b>Option(s)</b>	? or h
<b>Function</b>	Display the options available in the driver.
<b>Possible Impact</b>	The driver will not load with ? or h specified.  Specify this option on the command line for a brief description of each of the options available in the driver, as well as valid values for each option. If you specify the ? or h option along with other options, the system invokes the Help screen and ignores the other options. In this case, the system does not load the driver.

## 12.4.2 NetWare NWP Driver Customizable Options

This section describes options that allow you to customize the driver for circumstances that may be unique to any system environment.

Each command may be preceded by a "/" or "-" for backwards compatibility at the discretion of the user. The line options with multiple names are simply aliases for the same command. For example, to specify a SCSI bus host identification value, you could use one of these three aliases:

- HostScsild
- HostId
- Hid

In this case, "hostscsiid", "hostid", and "hid" all specify the same option for the selection of the host adapter id.

The alpha-case does not matter, so you can intermix upper and lower case in any way. [Table 12.1](#) lists the customizable options for your NHPA HAM drivers.

**Table 12.1 Customizable Options for NHPA Drivers**

Option	Description
Autosense: autosense or asense	<p><b>Syntax:</b> autosense=&lt;option&gt;[targetIDlist]  <b>Default value:</b> on  <b>Valid options:</b> on or off  <b>Function:</b> Enables sense data to be returned automatically for the specified target.</p> <p>This option allows you to disable sense data if third party drivers do not support the autosense feature of the LSI Logic host adapters.</p>
Domain Validation: domainvalidation or dv	<p><b>Syntax:</b> domainvalidation=&lt;option&gt;[targetIDlist]  <b>Default value:</b> None  <b>Valid options:</b> on, off, no width, nowrrd, noread  <b>Description of each option:</b> domain validation on, all domain validation off, no domain validation for width settings, do not perform read/write cycle, do not perform media read  <b>Function:</b> Control domain validation options for the Target ID.</p> <p>This option is a software procedure in which a host queries a device to determine its ability to communicate at the negotiated width and sync rates. Domain Validation is performed at system boot time to test the data integrity of the SCSI bus between the host adapter and each target device. Note that some older SCSI devices do not tolerate Domain Validation operations.</p>
Elevator Threshold: elev	<p><b>Syntax:</b> elev=&lt;option&gt;[targetIDlist]  <b>Default value:</b> 4  <b>Valid options:</b> 0–250 (0=disable)  <b>Function:</b> Specify the maximum number of I/Os the HAM should queue before allowing NHPA to filter and organize requests.</p> <p>This option allows you to use NHPA elevator queues to determine how many I/Os are queued to the HAM before organizing requests and generating scatter/gather lists. If this number is set too low, adapter I/O starvation may result. If the number is too high, then sorting of I/Os and/or generation of scatter/gather lists may not occur. Varying the elevator threshold value may affect performance.</p>

**Table 12.1 Customizable Options for NHPA Drivers (Cont.)**

Option	Description
Handles: handles or handle or hdl	<p><b>Syntax:</b> handles=&lt;option&gt;[targetIDlist]  <b>Default value:</b> 300 handles  <b>Valid options:</b> Number of handles  <b>Function:</b> Defines the maximum number of bus/device/target handles</p> <p>This option allows you to set a number of handles for the bus/device/target(s) present on your system. Larger configurations should increase this value to the total number of bus/device/target(s) in a system.</p>
Host SCSI ID: hostscsiid or hostid or hid	<p><b>Syntax:</b> hostscsiid=&lt;option&gt;[targetIDlist]  <b>Default value:</b> 7  <b>Valid options:</b> Can range between 0–7 for narrow bus; or between 0–15 for wide bus.  <b>Function:</b> SCSI Identifier of an adapter</p> <p>This option indicates the SCSI bus host identifier of an adapter. LSI Logic recommends that the SCSI bus host identification value be set to 7.</p>
LUN: /lun	<p><b>Syntax:</b> /lun  <b>Default value:</b> off  <b>Valid options:</b> Not applicable  <b>Function:</b> Enables NHPA scan for Logical Unit Numbers (LUNs)</p> <p>This option allows you to enable NHPA scan for LUNs.</p>
Minimum Timeout: mintimeout or mint	<p><b>Syntax:</b> mintimeout=&lt;option&gt;[targetIDlist]  <b>Default value:</b> 0 (a value of zero disables this feature)  <b>Valid options:</b> 0–1200  <b>Function:</b> Specifies the minimum device timeout in seconds</p> <p>This option allows you to use a timeout mechanism to support particularly slow devices. When a drive issues a command to a SCSI device, a timer is started. If the timer expires before the command completes, the driver assumes something has gone wrong and takes steps to recover. The minimum setting is zero (0), which represents no timeout.</p>
Negotiation: negotiation or neg	<p><b>Syntax:</b> negotiation=&lt;option&gt;[targetIDlist]  <b>Default value:</b> None  <b>Valid options:</b> on, off, ppir, sync, wide, syncwide, twostep, threestep  <b>Description of each option:</b> all negotiations on; negotiation off; all negotiation on; synchronous negotiation only; width negotiation only; sync and wide negotiation only; sync and width negotiation only, one per I/O; sync, width, and ppir negotiation, one per I/O.  <b>Function:</b> Enable synchronous, wide, or ppir negotiation with the target ID.</p> <p>This option allows you to enable/disable all negotiations or just synchronous or width negotiations with a target ID of a device.</p>

**Table 12.1 Customizable Options for NHPA Drivers (Cont.)**

Option	Description
No Negotiation: noneg	<p><b>Syntax:</b> noneg=&lt;targetID&gt;  <b>Default value:</b> None  <b>Valid options:</b> 0–15  <b>Function:</b> Specify the target ID of the device that does not accept sync and wide negotiation.</p> <p>The noneg option allows you to specify no negotiation for the target ID of a device. Initially, during the scanning phase, the driver begins by negotiating with the asynchronous and narrow mode settings with each device found. Once the system establishes target communication, the desired settings are renegotiated. However, some devices have a problem with the initial negotiation, such as the SAF-TE chip from another vendor, and older or nonstandard, non-INT13h devices.</p>
Parity: parity or ecc	<p><b>Syntax:</b> parity=&lt;option&gt;[targetIDlist]  <b>Default value:</b> on  <b>Valid options:</b> on, off, parity, ecc  <b>Description of each option:</b> parity/error checking is enabled; parity/error checking is disabled; bus parity is enabled (without error checking); parity/error checking is enabled.  <b>Function:</b> Controls parity/error checking for the specified target ID(s).</p> <p>This option allows you to enable/disable the SCSI bus data integrity checking feature known as parity. Some SCSI devices do not generate parity in which case this option allows disabling this feature.</p>
Read Capacity: readcap or rc	<p><b>Syntax:</b> readcap=&lt;option&gt;[targetIDlist]  <b>Default value:</b> on  <b>Valid options:</b> on, off  <b>Function:</b> Enables a read capacity command during initial scan to the target ID(s).</p> <p>This option allows you to disable issuing the read capacity command during an initial scan to the target ID(s).</p>
Scan: scan	<p><b>Syntax:</b> scan=&lt;option&gt;[targetIDlist][lunIDlist]  <b>Default value:</b> list  <b>Valid options:</b> on, off, list, or order  <b>Function:</b> Specify Logical Unit Numbers (LUNs) to scan.</p> <p>This option allows you to enable the number of LUNs for scanning per the target ID(s) on the SCSI bus.</p>

**Table 12.1 Customizable Options for NFWA Drivers (Cont.)**

Option	Description
Slot: slot	<p><b>Syntax:</b> slot=&lt;option&gt;[targetIDlist]  <b>Default value:</b> None  <b>Valid options:</b> 0–10099  <b>Function:</b> Specify the slot instance number of the LSI Logic controller SCSI channel to which the load instance applies.</p> <p>The slot option specifies which LSI Logic controller SCSI channel (embedded chip or host adapter) to which the current load pertains. You <i>must</i> specify this information on the load line; otherwise, the driver for the slot number.</p>
Spin Up: spinup or spin	<p><b>Syntax:</b> spinup=&lt;option&gt;[targetIDlist]  <b>Default value:</b> on  <b>Valid options:</b> on, off  <b>Function:</b> Enables spinup command during initial scan.</p> <p>This option allows you to disable issuing a spinup command during an initial scan to the specified target ID(s).</p>
Synchronous SCSI: synchronous or sync or syn	<p><b>Syntax:</b> sync=&lt;option&gt;[targetIDlist]  <b>Default value:</b> Maximum of the HAB/HBA  <b>Valid options:</b> 0, 5, 10, 20, 33, 40, or 80  If any other value is entered, for example 15, then the system defaults to a zero (0) value.  <b>Function:</b> Enable/Disable support of synchronous SCSI.</p> <p>The synchronous SCSI option allows you to enable/disable support of Fast, Ultra, Ultra2, and Ultra160 SCSI synchronous data transfers when using a Fast, Ultra, Ultra2, or Ultra160 SCSI controller. Synchronous data transfers increase the I/O performance of a system, but there are a few non-SCSI compliant devices that may cause problems on a system. This option could cause a device to operate slower than its maximum speed.</p> <p>The valid options are referred to as megabytes per second and megatransfers per second.</p> <p><b>Important Note:</b> To enter a value you must use <b>MB</b> or <b>MT</b> as the syntax. For example, 5 MB = 5 Mbytes; 5 MT = 5 Mbytes (8 bits) or 10 Mbytes (16 bits).</p>



**Table 12.1 Customizable Options for NHPA Drivers (Cont.)**

Option	Description
Tagged Queuing: qtags	<p><b>Syntax:</b> qtags=&lt;option&gt;[targetIDlist]  <b>Default value:</b> on  <b>Valid options:</b> on, off  <b>Function:</b> Enable/disable tagged queuing for the devices.</p> <p>Enabling the qtags option results in the driver issuing tagged I/O requests to the devices that support tagged queuing. Tagged queuing may improve I/O throughput in devices that support such an option. Devices that do not support tagged queuing are not issued tagged requests. Depending on the drive controller, the use of queue tags increases throughput of the device. However, the optimal number of queue tags is based on the specific device type.</p>
Test Unit Ready: testready or tur	<p><b>Syntax:</b> testready=&lt;option&gt;[targetIDlist]  <b>Default value:</b> on  <b>Valid options:</b> on, off  <b>Function:</b> Issues a test to ensure unit is ready during initial scan</p> <p>This option allows you to disable issuing a test unit ready during the initial scan to the specified target ID(s).</p>
Verbose: verbose	<p><b>Syntax:</b> verbose=&lt;option&gt;[targetIDlist]  <b>Default value:</b> off  <b>Valid options:</b> on, off  <b>Function:</b> Displays more detailed information on options and DOS configuration.</p> <p>This option is useful when multiple adapters are present in the system and the PCI Device ID, the PCI Bus number, and the PCI Device/Function number for each adapter needs to be known.</p>
Width SCSI: width or wide or wid	<p><b>Syntax:</b> width=&lt;option&gt;[targetIDlist]  <b>Default value:</b> on  <b>Valid options:</b> narrow, wide, off, on, 8, 16,  <b>Function:</b> Enable/Disable support of wide SCSI.  <b>Possible Impact:</b> No wide SCSI support available</p> <p>The wide SCSI option allows you to disable support of a wide SCSI operation when using a wide SCSI controller. Set this option to narrow, off, or 8 to disable a wide SCSI device that is present on the system. For example, you would disable it when an 8-bit SCSI cable is connected somewhere on the bus between the wide SCSI host adapter and the wide device, thus prohibiting the transfer of wide data. When you disable this option, the wide device still works, but all data transferred to or from the device is narrow (8-bit). The driver does not initiate a wide SCSI transfer request negotiation.</p>

---

## 12.5 Important Additional Information

This section provides information regarding specific driver options and various DOS dependencies.

### 12.5.1 Specific Driver Options

This document addresses options available on the SDMS NWPA HAM drivers, versions 4.02.00 or later. For information pertaining to a specific driver, please do one of the following:

- For NetWare version 4.XX, consult the \*.DDI file for options available for LSI8XXNW.HAM, LSIHINW.HAM, and/or LSI\_U3NW.HAM drivers. Refer to the NetWare installation utility to access these files.
- Load the driver specifying the ? option on the command line of the LSI8XXNW.HAM, LSIHINW.HAM, and/or LSI\_U3NW.HAM drivers. The system displays the available options for the driver without loading the driver.

### 12.5.2 DOS Access Dependencies

Typically, NetWare requires access to the DOS partition (perhaps to load a file or to shutdown the system). The LSI8XXNW.HAM, LSIHINW.HAM, and/or LSI\_U3NW.HAM drivers support several SDMS DOS configurations.

The HAM drivers detect whether an older SDMS 4.XX BIOS exists on the system and if the ASPI8XX.SYS DOS driver is loaded. If you are using the unsupported SDMS 3.XX BIOS or using an older supported SDMS 4.XX, then ASPI8XX.SYS (version 4.10 or greater) must also be loaded.

**Note:** LSI8XXNW.HAM, LSIHINW.HAM, and LSI\_U3NW.HAM do not support the SDMS 3.XX DOS drivers: DOSCAM and MINICAM.

### 12.5.3 Supported DOS Configurations

The HAM drivers support these DOS configurations:

- SDMS 4.18 or greater BIOS (No DOS Drivers required)
- SDMS 4.XX BIOS, ASPI8XX.SYS (version 4.10 or greater)
- No SDMS BIOS, ASPI8XX.SYS

In addition to loading the `ASPI8XX.SYS` driver, you may optionally load the `SYMCD.SYS` and/or `SYMDISK.SYS` drivers for DOS CD-ROM and DOS removable media support. Netware does not require `SYMCD.SYS` and `SYMDISK.SYS` for CD-ROM or MO support.

#### 12.5.4 Using the SDMS 4.XX BIOS

If the system contains an older SDMS 4.XX BIOS, you *must* load `ASPI8XX.SYS` (version 4.10 or greater) in the `CONFIG.SYS` file. You *must* also disable SCAM in the SDMS 4.XX BIOS. If SCAM is enabled, then the SDMS NWPA HAM drivers will fail to load.

#### 12.5.5 Using the ASPI8XX.SYS Driver

SCAM support by default is off in ASPI Manager version 4.10 and later.

#### 12.5.6 Supporting DOS Drivers

The SDMS `ASPI8XX.SYS` (4.10 or greater) DOS driver supports the older SDMS 4.XX BIOS. `SYMCD.SYS` and `SYMDISK.SYS` support CD-ROM and MO devices under DOS. NetWare does not require `SYMCD.SYS` nor `SYMDISK.SYS` support for CD-ROM and MO devices; however, `ASPI8XX.SYS` and `SYMCD.SYS` are required for SCSI CD-ROM installation.

[Table 12.2](#) describes the DOS drivers currently supported by the SDMS NWPA drivers, `LSI8XXNW.HAM`, `LSIHINW.HAM`, and `LSI_U3NW.HAM`.

**Table 12.2 DOS Drivers and Descriptions**

Driver	Description
ASPI8XX.SYS	The ASPI8XX.SYS driver provides an ASPI layer interface for disk and nondisk devices. ASPI8XX.SYS is required for NetWare support if the SDMS 3.XX BIOS or an older SDMS 4.XX BIOS is used. If you install NetWare from a SCSI CD-ROM on an LSI Logic controller, you must load SYMCD.SYS as well as ASPI8XX.SYS.
SYMCD.SYS	The SYMCD.SYS driver along with the ASPI8XX.SYS driver enables you to install the NetWare operating system from a CD-ROM. Once the NetWare operating system installation has completed, the system no longer requires SYMCD.SYS. The NetWare NFWPA environment provides support for SCSI CD-ROMs through the NFWPA driver interface.
MSCDEX.EXE	The MSCDEX.EXE driver (provided with DOS) in conjunction with the SYMCD.SYS driver enables you to install NetWare from a CD-ROM.
SYMDISK.SYS	The SYMDISK.SYS driver provides support for removable media and large sector size devices under DOS. NetWare does not require SYMDISK.SYS to support these types of devices.

Note: The Netware drivers can function independently of any DOS drivers, with the following exceptions:  
If the installation of NetWare is from a SCSI CD-ROM, or If the unsupported SDMS 3.XX BIOS or supported 4.18 or older SDMS 4.XX BIOS is being used.

### 12.5.7 Using No SDMS BIOS

The LSI8XXNW.HAM, LSIHINW.HAM, and LSI\_U3NW.HAM drivers will operate properly on a system when no SDMS BIOS or SDMS DOS drivers are present. In this case, DOS must reside on a device that is not connected to an LSI Logic controller-based host adapter. For example, DOS could reside on an IDE drive.

# Appendix A

## Glossary of Terms and Abbreviations

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

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

<b>Address</b>	A specific location in memory, designated either numerically or by a symbolic name.
----------------	---

<b>API</b>	Application Programming Interface. A standard bridge (or specification) for which software is written, allowing the passing of information and instructions between the various parts of a computer system.
------------	---

<b>ASPI</b>	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.
-------------	---

<b>Asynchronous Data Transfer</b>	One of the ways data is transferred over the SCSI bus. Asynchronous transfers are tied to control signal handshaking and are slower than synchronous data transfer.
-----------------------------------	---

### B

<b>Bernoulli Box</b>	A high capacity data storage device that uses a removable, nonvolatile cartridge.
----------------------	---

<b>Binary Code</b>	Software instructions reduced to ones and zeros that are readable by a computer.
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<b>BIOS</b>	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.
<b>Bit</b>	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.
<b>Boot Disk</b>	A hard disk or diskette that contains an operating system which can be booted to set the computer into operation.
<b>Bundled</b>	Drivers are distributed with the operating system by the OS vendor.
<b>Bus</b>	A collection of unbroken signal lines across which information is transmitted from one part of a computer system to another. Connections to the bus are made using taps on the lines.
<b>Bus Mastering</b>	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.
<b>Byte</b>	A unit of information consisting of eight bits.
<b>C</b>	
<b>CD-ROM</b>	Compact Disk-Read Only Memory. An optical storage technology that uses compact disks to store up to 650 Mbytes of data per disk.
<b>Compile</b>	To translate source code written in a high-level language into object code.
<b>Configuration</b>	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.
<b>CPU</b>	Central Processing Unit. The "brain" of the computer that performs the actual computations. The term "microprocessor" is also used.
<b>CRC</b>	Cyclic Redundancy Check is an error detection code used in Ultra160 SCSI. Four bytes are transferred with the data to increase the reliability of data transfers. CRC is used on the Double Transition (DT) Data-In and DT Data-Out phases.

## D

<b>Device Driver</b>	A software program designed to drive or operate a peripheral device through a specific operating system. It is operating system and device dependent.
<b>Differential SCSI</b>	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.)
<b>DMA</b>	Direct Memory Access. The ability of an I/O system to transfer data to and from a memory subsystem without CPU intervention.
<b>DMA Bus Master</b>	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. This feature has less of an impact on the CPU.
<b>DMI</b>	Distributed Management Interface. This is a remote management tool to run across standard OS platforms to report on asset and configuration information for adapters and devices.
<b>Domain Validation</b>	Domain Validation is a software procedure in which a host queries a device to determine its ability to communicate at the negotiated Ultra160 data rate.
<b>Double Transition Clocking</b>	In Double Transition (DT) Clocking data is sampled on both the asserting and deasserting edge of the REQ/ACK signal. DT clocking may only be implemented on an LVD SCSI bus.

## E

<b>EISA</b>	Extended Industry Standard Architecture. An extension of the 16-bit ISA bus standard. It allows devices to perform 32-bit data transfers.
<b>External SCSI Device</b>	A SCSI device installed outside the computer cabinet. These devices are connected in a continuous chain using specific types of shielded cables.
<b>Fast SCSI</b>	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.

## F

<b>File</b>	A named collection of information stored on a disk.
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<b>Format</b>	To prepare a disk to receive information by organizing its surface into tracks and sectors.
<b>H</b>	
<b>Hard Disk</b>	A disk made of metal and permanently sealed into a drive cartridge. A hard disk can store very large amounts of information.
<b>HBA</b>	Host Bus Adapter. An integrated circuit that supplies a bus connector to a computer system. Also referred to as Host Adapter.
<b>Host</b>	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.
<b>Host Adapter</b>	A circuit board or integrated circuit that provides a SCSI bus connection to the computer system.
<b>I</b>	
<b>Internal SCSI Device</b>	A SCSI device installed inside the computer cabinet. Internal SCSI devices are connected in a continuous chain using an unshielded ribbon cable.
<b>IRQ</b>	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.
<b>ISA</b>	Industry Standard Architecture. A type of computer bus used in most PCs. It allows devices to send and receive data 16-bits at a time.
<b>K</b>	
<b>Kbyte</b>	Kilobyte. A measure of computer storage equal to 1024 bytes.
<b>L</b>	
<b>Link</b>	To produce an executable program from compiled modules (programs, routines, libraries) by merging the object code and resolving interconnecting references.



<b>Local Bus</b>	A way to connect peripherals directly to computer memory. It bypasses the slower ISA and EISA buses. PCI is a local bus standard.
<b>Logical Unit</b>	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.
<b>LUN</b>	Logical Unit Number. An identifier, zero to seven, for a logical unit.
<b>LVD</b>	Low Voltage Differential. LVD is a robust design methodology that improves power consumption, data integrity, cable lengths, and support for multiple devices, while providing a migration path for increased I/O performance.

## **M**

<b>Mainboard</b>	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.
<b>Main Memory</b>	The part of a computer's memory which is directly accessible by the CPU (usually synonymous with RAM).
<b>Motherboard</b>	See Mainboard.
<b>Multitasking</b>	The executing of more than one command at the same time. This allows programs to operate in parallel.
<b>Multithreading</b>	The simultaneous accessing of data by more than one SCSI device. This increases the data transfer rate.

## **N**

<b>Network</b>	A collection of devices, such as computers and printers, that are connected together. A network is a tool for communication that allows users to store and retrieve information, share printers, and exchange information.
<b>NVRAM</b>	Nonvolatile Random Access Memory. Actually an EEPROM (Electrically Erasable Read Only Memory chip) used to store configuration information.

<b>NVS</b>	Nonvolatile Storage. System memory allocated for configuration information storage as specified in the DMI specification.
<b>O</b>	
<b>Object code</b>	Software instructions that are compiled as an intermediate step between source code and binary code.
<b>Operating System</b>	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.
<b>P</b>	
<b>Parity Checking</b>	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.
<b>Partition</b>	A logical portion of space on a hard disk designated by a drive letter.
<b>Passive Termination</b>	The electrical connection required at each end of the SCSI bus, composed of a set of resistors. It improves the integrity of bus signals.
<b>PCI</b>	Peripheral Component Interconnect. A local bus specification that allows connection of peripherals directly to computer memory. It bypasses the slower ISA and EISA buses.
<b>Peripheral Device</b>	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.
<b>PIO</b>	Programmed Input/Output. A way the CPU can transfer data to and from memory using the computer's I/O ports. PIO is faster than DMA, but requires CPU time.
<b>Port Address</b>	Also Port Number. The address through which commands are sent to a host adapter. This address is assigned by the PCI bus.
<b>Port Number</b>	See Port Address.

<b>POST</b>	Power-On Self-Test. A set of routines stored in ROM that provides diagnostic tests for various system components before booting can proceed.
<b>PPR</b>	Parallel Protocol Request. This method sends messages to negotiate synchronous data transfer agreement, wide data transfer agreement, and set the protocol options between two SCSI devices. Negotiations using this message shall only be initiated by Initiators.
<b>Processor</b>	A computer hardware component that performs computations directed by software commands.
<b>Q</b>	
<b>Queue Tags</b>	A way to keep track of multiple commands that allows for increased throughput on the SCSI bus.
<b>R</b>	
<b>RAM</b>	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.
<b>Removable Media</b>	A computer data storage device in which the magnetic disk or tape is enclosed in a removable cassette or cartridge.
<b>RISC Core</b>	Most LSI Logic SCSI chips contain a RISC (Reduced Instruction Set Computer) processor, programmed through microcode scripts.
<b>ROM</b>	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.
<b>S</b>	
<b>SCAM</b>	SCSI Configured AutoMatically. A method to automatically allocate SCSI IDs using software when SCAM compliant SCSI devices are attached.
<b>Scatter/Gather</b>	The efficient method of storing, where it stores information in various sectors and tracks instead of trying to find enough sectors in a row to store the data.

<b>SCSI</b>	Small Computer System Interface. A specification for a high-performance peripheral bus and command set. The original standard is referred to as SCSI-1.
<b>SCSI-2</b>	The SCSI specification which adds features to the original SCSI-1 standard.
<b>SCSI-3</b>	The current SCSI specification which adds features to the original SCSI-2 standard.
<b>SCSI SPI-4</b>	SCSI Parallel Interface. This specification defines 16-bit SCSI asynchronous commands with synchronous data transfer rates up to 320 megabytes per second. Low Voltage Differential (LVD) SCSI is required SCSI SPI-4 for Fast-160DT.
<b>SCSI Bus</b>	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.
<b>SCSI Device</b>	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.
<b>SCSI ID</b>	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.
<b>SDMS</b>	Storage Device Management System. An LSI Logic software product that manages SCSI system I/O.
<b>Single-Ended SCSI</b>	A hardware specification for connecting SCSI devices. It references each SCSI signal to a common ground.
<b>Software</b>	The entire set of programs, procedures, and related documentation associated with a computer system.
<b>Source Code</b>	Software instructions written as text in a high level programming language. It is readable by humans who know the language.
<b>Synchronous Data Transfer</b>	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**

**Tape Drive** A storage device designed to back up data from another storage device onto magnetic tape at a high rate of speed. Data is stored sequentially (no random access).

## **U**

**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.”

**Ultra2 SCSI** A standard for SCSI data transfers. It allows a transfer rate of up to 80 Mbytes/s over a 16-bit SCSI bus. STA (SCSI Trade Association) supports using the term “Ultra2 SCSI” over the term “Fast-40.”

## **V**

**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.

**WORM** Write Once Read Many. An optical storage device, like CD-ROM, used to permanently store data.



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