PCI SCSI Device Management System SDMS 4.0

User's Guide

Version 7.0

Preface

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About This Book

This User's Guide is intended to explain how to install and configure the Symbios SDMS Software in a PCI computer system. The information is organized into chapters by individual operating system.

How to Get Updates

Software changes as products improve. The latest documentation and drivers are available for downloading from:

- Symbios Electronic Bulletin Board
  (719) 533-7235

- Symbios Web Site: http://www.symbios.com

Symbios Technical Support

Your entire Symbios host adapter solution has been designed for ease of use. However, if you require additional assistance, please contact the Symbios Technical Support Hot Line at (719) 533-

7230. The hours of operation are from 7:30 a.m. to 4:30 p.m. (MST), Monday through Friday. You may also send an e-mail to *support@symbios.com.*

Before calling or sending an e-mail, please have the following information:

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

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

Revision Record

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Page No.	Date	Remarks
n/a	9/93	Rev 1.0 First official release.
n/a	2/94	Rev 2.0 All sections updated to reflect current product.
n/a	8/94	Rev 3.0 All sections updated to reflect current product.
n/a	10/95	Rev 4.0 All sections updated to reflect current product.
n/a	2/97	Rev 5.0 All sections updated to reflect current product.
n/a	11/97	Rev 6.0 All sections updated to reflect current product.
n/a	7/98	Rev 7.0 All sections updated to reflect current product.

Trademarks

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Chapter **1**

Introduction

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General Description

The Symbios PCI SCSI Device Management System (SDMS) is a
complete software package that solves the increasingly complex
problem of managing system I/O. It addresses hardware and
software interfaces by supporting the Symbios family of SCSI
processors and controllers, and a wide range of SCSI peripheral
devices, while offering interoperability across application
programs, operating systems, and host platforms.

SDMS 4.0 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.

Operating System

Supports

SDMS SCSI Device Driver

SDMS SCSI BIOS

Supports

Symbios Controller or Processor
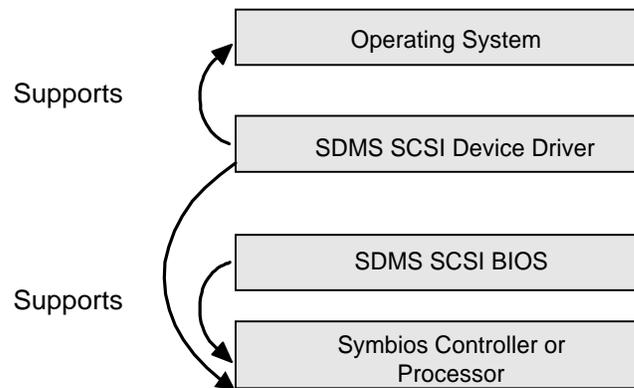
Figure 1-1   The Symbios SCSI Device Management System

Overview

A Symbios 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 (via the SCSI bus) to a SCSI host adapter on which the SCSI controller or processor resides.

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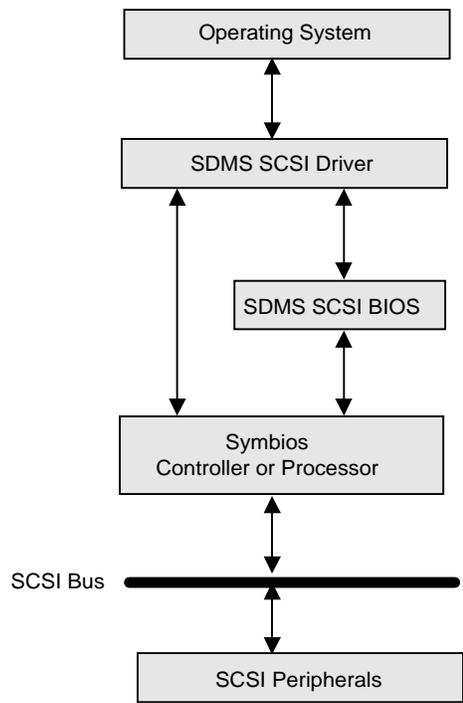
Figure 1-2 SDMS Information Flow

SYMBIOS PCI SDMS 4.0 USER'S GUIDE

SDMS Device Drivers

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

Symbios currently provides PCI SDMS device drivers for the following operating systems:

- MS-DOS/Windows

- Windows 95

- OS/2 - 4.x Warp

- SCO UNIX - Open Server 5.0 and above

- UnixWare - 2.1.2 and above

- NetWare - 3.12, 4.11 (NWPA)

- Windows NT - 3.51 and above

Device driver installation and configuration instructions for each of these operating systems are provided in the Symbios PCI SDMS 4.0 User's Guide.

Before You Begin

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 Symbios SCSI controller into your system, taking into account the configuration of other host adapters and system resources (see Basic Rules... listed below).

Symbios recommends that you back up all data before making any changes or installing any software, including Symbios SCSI controllers and software. Failure to adhere to this accepted computer practice may lead to loss of data.

Basic Rules For SCSI Host Adapter and Device Installation

You must terminate both ends of the SCSI bus. Refer to the hardware manuals for the devices and the host adapter to properly terminate the bus.

Unless your system is SCSI Configured AutoMatically (SCAM) capable, you must configure each SCSI device with a different SCSI ID number. Refer to the hardware manuals for the devices to locate where the 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). See 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 multi-colored SCSI cable) designates pin one on the cable connector and must connect to pin one on the device or host adapter connector. Refer to the hardware manuals for the devices and the controller to locate pin one of the connector.

Chapter **2**

SCSI BIOS

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Introduction

A SCSI BIOS is the bootable ROM code that manages SCSI
hardware resources. It is specific to a family of Symbios SCSI
controllers or processors. A Symbios 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
via 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, Symbios supports the BIOS Boot Specification (BBS).

The next section, "Boot Initialization with BIOS Boot Specification (BBS)," discusses selecting boot and drive order.

Boot Initialization with BIOS Boot Specification (BBS)

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

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

CD-ROM Boot Initialization

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

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

The drive letter for the CD-ROM is assigned based on the type of emulation. For example, if a 1.44 MB floppy emulation CD was loaded, then the CD-ROM drive would become the designated A: drive, and the existing Floppy would become drive B:.

Starting the SCSI BIOS Configuration Utility

If you have SCSI BIOS version 4.xx, and it includes the Symbios SCSI BIOS Configuration Utility, you can change the default configuration of your SCSI host adapters. You may decide to alter these default values if there is a conflict between device settings or if you need to optimize system performance.

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

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

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

```
Please wait invoking Symbios Configuration Utility...
```

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

To make changes with this menu driven utility, one or more Symbios SCSI host adapters must have NVRAM non-volatile random access memory) to store the changes.

IMPORTANT: The SCSI BIOS Configuration Utility is a powerful tool. If, while using it, you somehow disable all of your controllers, pressing Ctrl-A (or Ctrl-E on version 4.04 or later) after memory initialization during reboot allows you to re-enable and reconfigure.

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

Configuration Utility Main Menu

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

You can select an adapter only if Current Status is "On". Changes are possible only if NVRAM on your adapter is present. Selections that are not permissible will be grayed out.

Here is an example of the Main Menu:

```
Main Menu

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

SYM53C896    FC00    9      On       On         Yes
SYM53C896    F800    9      On       Off        Yes
SYM53C895    F400    9      On       Off        Yes

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

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

Change Adapter Status

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

```
Main Menu

Change Status on Next Boot:

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

SYM53C896    FC00    9       On        On         Yes
SYM53C896    F800    9       On        Off        Yes
SYM53C895    F400    9       On        Off        Yes
```

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

Adapter Boot Order

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

```
Main Menu

BootSeq          Bus DevFunc BootSeq          Bus DevFunc

  0    SYM53C896 00    A0   1      SYM53C89   00    98
                                   6

  2    SYM53C895 00    90
```

To change an adapter's boot order, select it and press Enter. You are then prompted to enter the new boot sequence number. To remove an adapter's boot order, press Enter again rather than entering a new sequence number. While the maximum capacity is 32 adapters, only 0 through 3 can be assigned a boot order. If an invalid number is entered, an error message appears. When the adapters are ordered as desired, press the Escape (Esc) key to exit from this menu and reboot.

Additional Adapter Configuration

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

```
Main Menu

BootSeq        Bus DevFunc BootSeq        Bus DevFunc

  1    SYM53C896 00    A0      0    SYM53C896 00    98

       SYM53C895
```

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

Display Mode

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

Mono/Color

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

Language

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

Help

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

Quit

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

Esc

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

Utilities Menu

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

```
SYM53C895

          Utilities

                  Adapter Setup
                  Device Selections
                  Help
                  Exit this menu
```

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

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

Adapter Setup Menu

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

```
SYM53C895

    Adapter Setup

        SCAM Support        Off

        Parity              None

        Host SCSI ID        7

        Scan Order          Low to High <0..Max>

        Removable Media
        Support             None

        CHS Mapping         SCSI Plug & Play Mapping

        Spinup Delay
        (secs)              2

        Help

        Restore Default Setup

        Exit this menu
```

The settings in this menu are global settings that affect the selected host adapter and all SCSI devices attached to it. One of these choices can be selected by highlighting it and pressing Enter.

SCAM Support   The Symbios BIOS version 4.xx supports the SCSI Plug and Play protocol called SCAM (SCSI Configured AutoMatically). SCAM support by default is off in versions 4.09.00 and later. The user may choose to turn this on. Note that if this BIOS is flashed onto a board with existing settings, then these settings will not be changed to reflect the new BIOS defaults.

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

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

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

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

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

See the section "Boot Initialization for BIOS Boot Specification (BBS)" for more information.

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

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

• None

• Boot Drive Only

• With Media Installed

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

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

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

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

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

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

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

To remove partitioning, two options are available:

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

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

IMPORTANT: Reformatting the disk or using FDISK /MBR erases all partitioning and data that exists. Be careful when using either the Format utility or the FDISK /MBR command that you target the correct disk. After clearing the partition data, it is necessary to reboot to clear memory, or the old partitioning data will be reused, thus nullifying the previous operation.

Spinup Delay (secs)   This option allows you to stagger spin ups between devices for a longer period of time to balance the total current load. The default value is 2 seconds with choices between 1 and 10 seconds.

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

Device Selections Menu

When you select the Device Selections option, the corresponding menu appears. Here is an example of the Device Selections Menu:

```
SYM53C895

Device Selections 0-7

          Sync Data  Disc Time         Queue Initia
                                Scan                 l

          Rate Width      Out  Bus LUNS Tags  Boot

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

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

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

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

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

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

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

SYM53C895

Device Selections 8-15

Help

Exit this menu
```

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

```
SYM53C895

    Inside device

        Sync Rate

        Width

        Disconnect

        Read/Write I/O Timeout (secs)

        Scan for Device at Boot Time

        Scan for SCSI
        LUNs

        Queue Tags

        Initial Boot

        Format

        Verify

        Help

        Restore Default Setup

        Exit this menu
```

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

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

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

Disconnect SCSI devices have the ability to disconnect from the initiator during an I/O transfer, freeing the SCSI bus to allow other I/O processes. Additionally, it tells the host adapter whether or not to allow a device to disconnect. Some devices run faster with disconnects enabled (mostly newer devices), while some run faster with disconnects disabled (mostly older devices).

Read Write I/O Timeout (secs) This option sets the 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, it is recommended that the user always set the time-out to a value greater than zero. A zero value allows unlimited time for an operation to complete and could result in a hang if the operation could not complete.

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

Scan for SCSI Logical Units (LUNs)   Set this option to "No" if 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 only.

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

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

Format   If enabled, this option allows the user to low-level format a disk drive. Low-level formatting will completely and irreversibly erase all data on the drive.

NOTE   Formatting will default the drive to a 512-byte sector size, even if the drive had previously been formatted to another sector size.

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

"Verify all sectors on the device
Press ESC to abort
Else press any key to continue"

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

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

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

To Exit the SCSI BIOS Configuration Utility

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

Device Drivers for DOS/Windows 3.x

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Introduction

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

Full Virtual DMA Services (VDS), including features such as scatter-gather, are also supported by the SCSI BIOS. Therefore, to gain maximum performance, you should disable any double

buffer option provided by disk caching software (such as, Microsoft's SMARTDRV.EXE) for all drives handled through SDMS.

When You Need to Load Drivers

Connecting peripherals other than hard disk drives requires loading the appropriate driver. Some of these drivers work together, and some are capable of direct communication with a Symbios PCI/SCSI controller.
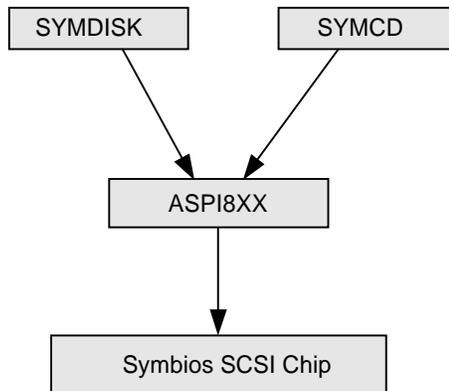
Figure 3-1   How SDMS DOS Drivers Communicate

ASPI8XX.SYS   This driver is an ASPI (Advanced SCSI Programming Interface) manager which provides standard ASPI compatibility between the SCSI host adapter hardware and ASPI compatible applications.

SYMDISK.**SYS**   This is a device driver for non-INT13h SCSI disk drives and removable media devices, and it works through the ASPI manager.

SYMCD.SYS   This is a device driver for CD-ROM drives, and it works through the ASPI manager.

The following sections list these drivers, their features, and their loading requirements.

Installation of SDMS Drivers for DOS

Using the DOS Installation Utility

The Symbios 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 Symbios 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 and the DOS Installation Utility. To install the DOS Drivers using this utility, copy the contents from the SDMS Software Device Drivers and Utilities CD-ROM:

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

directory on the CD-ROM to the root of a diskette. Then boot the system, insert the newly created diskette, and type:

```
INSTALL
```

Press Enter, and then 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.

About the ASPI8XX.SYS Driver

Features

- Supports Advanced SCSI Programming Interface (ASPI) applications

- Supports up to eight host adapters

- Releases initialization code for smaller runtime size

- Works with or without a SDMS 3.0 or SDMS 4.0 BootROM

- Performs synchronous negotiation

- Supports Wide SCSI

- Supports target initiated negotiation

- Supports Ultra2 SCSI (80 MBytes/Sec when using Wide SCSI)

- Has full Virtual DMA Services (VDS) support, including scatter-gather

- Allows Disconnect/Reselect

- Supports adapter exclusion

- Allows shared interrupts

- Supports single-threaded I/O

- Supports DMI Non-Volatile Storage (NVS) and can read device configuration information from NVS when NVRAM is not present for the device.

- Support for Symbios usage of PCI Subsystem ID to control various features and configuration settings. (See PCI Subsystem ID Definitions for SCSI Class, rev. 1.03, dated 5/28/97.)

- Supports booting from a CD-ROM

Description

ASPI8XX.**SYS** This driver is an ASPI manager that provides an interface to popular ASPI applications. It 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.

Installing the ASPI8XX.SYS Driver

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

1 Locate the ASPI8XX.SYS driver on the SDMS Software Device Drivers and Utilities CD-ROM and copy it to the boot disk.

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, SYMDISK.SYS), or any other ASPI compliant driver/application.

Command Line Options

The ASPI8XX.SYS driver has several configurable features that are set via switches on the command line in the CONFIG.SYS file. The command line options are listed in Table 3-1, ASPI8XX 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

NOTE   No spaces are allowed within a single command line option, but spaces are required between different command line options. Using these command line options will override the settings in the SCSI BIOS Configuration Utility

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Table 3-1   ASPI8XX Command Line Options

Option Name	Description
/NORST	Prevents a SCSI bus reset during loading of ASPI8XX.SYS. **Syntax:** /NORST Activate this option by modifying the line in the CONFIG.SYS file that loads ASPI8XX.SYS to look like this: DEVICE=C:[PATH]ASP8XX.SYS /NORST
/ASK	Prompts at system bootup about loading the ASPI8XX.SYS driver. **Syntax:** /ASK Activate this option by modifying the line in the CONFIG.SYS file that loads ASPI8XX.SYS to look like this: DEVICE=C:[PATH]ASPI8XX.SYS /ASK
/WIDTH	Defines the maximum data width negotiated with a device, and is used with host adapters capable of 16-bit data transfers. Valid settings are 8 or 16. **Syntax:** /WIDTH=n<path>[:id]>[,n<path[:id]>]* For example, 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 CONFIG.SYS file that loads ASPI8XX.SYS should look like this: DEVICE=C:[PATH]ASPI8XX.SYS /WIDTH=8<0:2>

Table 3-1   ASPI8XX Command Line Options (Continued)

Option Name	Description
/DISCONNECT or /DC	Disconnects a device 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. **Syntax:** /DISCONNECT=n<path[:id]>[,n<path[:id]>]* Valid options are ON (allow disconnects) or OFF (do not allow disconnects). The default value for all devices is ON. For example, to disable disconnects on the first host adapter (boot order designation=0) at SCSI ID2, the line in the CONFIG.SYS files that loads ASPI8XX.SYS should look like this: DEVICE=C:[PATH]ASPI8XX.SYS /DISCONNECT=OFF<0:2>
/SYNC_RATE or /SR	Sets the maximum synchronous transfer rate (in mega transfers per second) to negotiate with a particular device. The allowable values are 0, 5, 10, 20, and 40 providing the host adapter is capable of the specified speed. Specify 0 to turn off synchronous transfers for a particular device. **Syntax:** /SYNCH_RATE=n<path[:id]>[,n<path[:id]>]* For example, 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: DEVICE=C:[PATH]ASPI8XX.SYS /SYNCH_RATE=0<0:3> **Note:** When executing synchronous transfers using an 8-bit SCSI bus, mega bytes per second = mega transfers per second. Also, when doing synchronous transfers using a 16-bit SCSI bus, mega bytes per second = 2 times mega transfers per second.

Table 3-1 ASPI8XX Command Line Options (Continued)

Option Name	Description
/PARITY or /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 ON (check parity-default value) or OFF (do not check parity). **Syntax:** /PARITY=n<path[,path]*>[n<path[,path]*>]* For example, to turn off parity checking on the first host adapter (boot order designation = 0), the line in the CONFIG.SYS file that loads ASPI8XX.SYS should look like this: DEVICE=C:[PATH]ASPI8XX.SYS /PARITY=OFF<0> **Warning:** When disabling parity checking, 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.
/EXCLUDE or /X	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: **1** PCI Device ID **2** PCI Bus Number **3** PCI Device/Function Number To obtain these parameters, boot the system using the /VERBOSE command line option (explained below).

Table 3-1 ASPI8XX Command Line Options (Continued)

Option Name	Description
/EXCLUDE or /X (continued)	The monitor displays the parameters for the adapter or path you wish to exclude. **Syntax:** /EXCLUDE<a:b:c>[,<a;b;c>]* For example, 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 CONFIG.SYS file that loads ASPI8XX.SYS should look like this: DEVICE=C:[PATH]ASPI8XX.SYS /EXCLUDE<3:0:68>
/HOST_ID or ID	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. 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 will not be able to reselect the initiator. You are not allowed to change the SCSI ID of any adapter currently supported by the BIOS. **Syntax:** /HOST_ID=n<path>[,n<path>]* For example, 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: DEVICE=C:[PATH]ASPI8XX.SYS /HOST_ID=6<1>

Table 3-1 ASPI8XX Command Line Options (Continued)

Option Name	Description
/SCAM	Enables support for the SCSI Plug and Play protocol called SCAM (SCSI Configured AutoMatically). SCAM support is OFF by default in version 4.05 for the ASPI Manager. The SCAM setting may be changed only if the adapter specified is not controlled by the BIOS. **Syntax:** /SCAM=n<path>[,n<path>]* For example, to turn on SCAM support on the second host adapter (boot order designation = 1), the line in the CONFIG.SYS file that loads ASPI8XX.SYS should look like this: DEVICE=C:[PATH]ASPI8XX.SYS /SCAM=ON<1>
/TIMEOUT or /T	The ASPI8XX.SYS driver uses a time-out 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. 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, non-volatile memory settings can alter these defaults. The maximum setting is 0, which is no time-out. The range of allowable values is 0-65535 seconds. **Syntax:** /TIMEOUT=n<path[:id]>[,n<path[:id]>]* For example, you might have a particularly slow device (with SCSI ID 3) on the first host adapter (boot order designation = 0). If you wish to extend the time-out for this device to 60 seconds, the line in the CONFIG.SYS file that loads ASPI8XX.SYS should look like this: DEVICE=C:[PATH]ASPI8XX.SYS /TIMEOUT=60<0:3>

Table 3-1   ASPI8XX Command Line Options (Continued)

Option Name	Description
/VERBOSE or /V	Causes more detailed information to appear on the monitor, after the ASPI8XX.SYS driver is initialized, during a system boot. For example, the following may be displayed after using the /VERBOSE or /V option: (all on one line) 53C875 Rev 3 at Pci Id 15, Bus 0, Dev/Func 70h, CMD=0117h, SCRIPTS=FFFBE000h This option is useful if there are multiple adapters in the system and need to know the PCI Device ID, the PCI Bus number, and the PCI Device/Function number for each adapter. This information is required to use the /EXCLUDE option already described in this section. **Syntax:** /VERBOSE For example, 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: DEVICE=C:[PATH]ASPI8XX.SYS /VERBOSE

Troubleshooting

The following are some potential problems and their suggested solutions.

SYSTEM LOCKS UP AT BOOT TIME.

a Check for conflicts with other ASPI managers.

b Check for correct loading sequence in the CONFIG.SYS file.

c Boot the system.

THE DEVICE DRIVER DOES NOT RECOGNIZE ONE OF THE NON-BOOT SCSI PERIPHERALS (SYSTEM MAY LOCK UP).

a Make sure the drivers were installed in the correct sequence.

b Make sure the drivers' CONFIG.SYS line has the correct path to the drivers.

c Power down all units in the system.

d Make sure all SCSI devices have unique ID numbers.

e Make sure both ends of the SCSI bus are terminated.

f Check all cable and power connections.

g Boot the system.

About the SYMDISK.SYS Driver

Features

- Supports removable media devices

- Supports magneto optical devices

- Supports non-512-byte sectors (1024, 2048, 4096)

- Supports multiple logical unit number (LUN) support

- Supports OS/2 floppy format for MO and hard disks

- Supports multiple host adapters when adapter has not been controlled by the SCSI BIOS (no INT13h devices)

- Can reserve drive letters for installed devices without media present in the device (see /UNITS under Command Line Options)

- Can add drive letters

- Supports power management (to spin down drives)

- Supports up to eight host adapters

Description

The SYMDISK.SYS driver is needed when connecting drives with non-512-byte sectors, and when connecting removable drives if the user wants to change the media. It is also required 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, the user must also load ASPI8XX.SYS.

Installing the SYMDISK.SYS Driver

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

1 Locate the SYMDISK.SYS driver on the SDMS Software
Device Drivers and Utilities CD-ROM and copy it to the boot
disk. The ASPI8XX.SYS driver is also required.

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
```

Command Line Options

The SYMDISK.SYS device driver has several embedded functions that are accessed via switches on the command line. These options are listed in Table 3-2, SYMDISK.SYS 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

NOTE No spaces are allowed in a single command line option, but spaces are required between different command line options.

Table 3-2 SYMDISK.SYS Command Line Options

Option Name	Description
/ASK	Prompts the user at system boot-up 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: DEVICE=C:[PATH]SYMDISK.SYS /ASK
/EXCLUDE	Allows the user 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: DEVICE=C:[PATH]SYMDISK.SYS 　/EXCLUDE=path[:id[:lun]][,path[:id[:lun]]]* For example, if the path is 0, id 2, and lun 0, then the command line should look like this: DEVICE=C:[PATH]SYMDISK.SYS /EXCLUDE=0:2:0 **NOTE** A limit of 24 "path:id:lun" combinations is allowed.

Table 3-2   SYMDISK.SYS Command Line Options (Continued)

Option Name	Description
/UNITS	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. Symbios recommends that you use this option when using removable media with more than one partition. To use this option, the line in the CONFIG.SYS file that loads SYMDISK.SYS should look like this (all on one line): DEVICE=C:[PATH]SYMDISK.SYS /UNITS=path:id:lun:num_units [,path:id:lun:num_units]* For example, if there is a removable media drive at SCSI ID 2 on the first host adapter and you need to reserve three partitions, the command line should look like this: DEVICE=C:[PATH]SYMDISK.SYS /UNITS=0:2:0:3 When SYMDISK.SYS initializes, it defaults to either: • One drive letter for a removable media device with no media present. -or- • The number of partitions found on the media in the removable media device. The full path, id, lun, and num_units values are required for this option. Also, there is a limit of 24 devices.

Table 3-2   SYMDISK.SYS Command Line Options (Continued)

Option Name	Description
/SSIZE	Allows the user 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: DEVICE=C:[PATH]SYMDISK.SYS /SSIZE=512|1024|2048|4096 For example, if a removable media drive is used that has a sector size of 2048 bytes, the command line should look like this: DEVICE=C:[PATH]SYMDISK.SYS /SSIZE=2048 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 will refuse to read/write to that media. It will report an invalid media error to DOS.
/SPINDOWN	This is a power management feature that automatically spins down 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.

Table 3-2 SYMDISK.SYS Command Line Options (Continued)

Option Name	Description
/SPINDOWN (continued)	To use this option, the line in the CONFIG.SYS file that loads SYMDISK.SYS should look like this (all on one line): DEVICE=C:[PATH]SYMDISK.SYS /SPINDOWN=hh:mm<path[:id[:lun]]> [,hh:mm<path[:id[:lun]]>] 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: DEVICE=C:[PATH]SYMDISK.SYS /SPINDOWN=1:5<0:2:0> To spindown all devices after the default time-out of 15 minutes, the command line should look like this: DEVICE=C:[PATH]SYMDISK.SYS /SPINDOWN=<> Remember, the <> are required when you specify a path:id:lun in this option.

Troubleshooting

The following are some potential problems and their suggested solutions:

THE COMPUTER LOCKS UP AND WILL NOT COMPLETE BOOTING FROM A NON-SCSI HARD DISK DRIVE.

a 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:

```
Symbios SDMS (TM) v4.0 PCI SCSI BIOS,
PCI Rev. 2.0, 2.1 Copyright 1995
Symbios PCI-4.09.00
```

a Is the SCSI BIOS seen during boot?

YES   Go to b.

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.

Reseat the host bus adapter.

Check CMOS setup.

Boot system.

Go to a.

b   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    Symbios   SYM53C81   0003
                           5
```

YES Go to c.

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 a.

c If boot is still unsuccessful, follow the solution to the next problem.

THE DEVICE DRIVER DOES NOT RECOGNIZE ONE OF THE NON-BOOT SCSI PERIPHERALS (SYSTEM MAY LOCK UP).

a Make sure the drivers were installed in the correct sequence.

b Make sure the drivers' CONFIG.SYS line has the correct path to the drivers.

c Power down all units in the system.

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

e Make sure both ends of the SCSI bus are terminated.

f Check all cable and power connections.

g Boot the system.

About the SYMCD.SYS Driver

Features

- Compatible with Microsoft's CD-ROM Extension 2.21 and above

- Multi-session Photo CD support

- Supports up to eight host adapters

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 Microsoft's CD-ROM Extension 2.21 or above (MSCDEX.EXE). SYMCD.SYS communicates through ASPI8XX.SYS, so you must load ASPI8XX.SYS to use SYMCD.SYS.

Installing the SYMCD.SYS Driver

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

1 Locate the SYMCD.SYS driver on the SDMS Software Device Drivers and Utilities CD-ROM and copy it to the boot disk.

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 8 characters. This is the same NAME to be used in conjunction with MSCDEX.EXE (see next page).

---

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

```
LASTDRIVE=x
```

where x 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.

4 Unless the CD-ROM access software specifies otherwise, Microsoft's CD-ROM Extension (MSCDEX.EXE) should execute from the AUTOEXEC.BAT file in order to access the drive. 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.

5 Check installation instructions for the CD-ROM drive itself for other parameters necessary to include with MSCDEX.

6 When MSCDEX is loaded during the AUTOEXEC.BAT file execution, a message is returned assigning a drive letter to the CD-ROM drive. For example:

```
DRIVE E = DRIVER MY_CD UNIT 0
```

This informs the user that the CD-ROM drive is recognized and ready for use.

Command Line Options

The SYMCD.SYS device driver has several embedded functions available that are accessed via switches on the command line. These options are listed in Table 3-3, SYMCD.SYS 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

NOTE No spaces are allowed in a single command line option, but spaces are required between different command line options.

Table 3-3   SYMCD.SYS Command Line Options

Option Name	Description
/ASK	Prompts the user 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: 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. 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 cdplayer, Corel's cd-audio, or Future Domain's cd-audio, track numbers >16 are not reported correctly because these applications require binary track numbers. For example, the line in the CONFIG.SYS file that loads SYMCD.SYS would look like this: DEVICE=C:[PATH]SYMCD.SYS /NOBCD

Troubleshooting

The following are some potential problems and their suggested solutions:

THE CD-ROM DRIVE IS NOT SEEN AT BOOT TIME, OR THE SYSTEM LOCKS UP.

a Make sure the required drivers are installed and in the correct sequence.

b Make sure the drivers' CONFIG.SYS line has the correct path to the driver.

c Make sure MSCDEX.EXE, in the AUTOEXEC.BAT, has the same drive name as the CD-ROM driver in the CONFIG.SYS file.

d Make sure there is no ID or drive letter designation conflict.

e Power down all units in the system.

f Check the cable and power connections.

g Make sure the SCSI bus is properly terminated.

h 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.

Important Additional Information For DOS Users

Assignment of Drive Letters

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 one, and the CD-ROM is ID four. 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

DOS Utilities

This section provides information concerning four utilities:

1   SCSI Low-level Format Utility

2   SCSI SYM53C8XX DOS Configuration Utility

3   SCSI SYM53C8XX DOS Verify Utility

4   Host Adapter Flash Utility

SCSI Low-level Format Utility

Features

• Works with any ASPI-compatible host adapter

• Provides a graphical user interface (GUI)

• Supports multiple adapter/drive selection

• Supports multiple LUNs

• Supports Wide (16-bit) SCSI

• Provides automatic error retry

• Provides on-screen display of time elapsed

Description

This utility allows you to low-level format SCSI hard disk drives that are connected to Symbios PCI to SCSI host adapters. It provides a friendly graphical user interface (GUI), and help is available for any decision screen by pressing F1 or selecting Help in the window.

Three files, located on the SDMS Software Device Drivers and Utilities CD-ROM, are required to run this utility. They are labeled ASPIFMT.EXE, ASPIINF.DAT, and ASPI8XX.SYS (you may use another ASPI manager). It is recommended 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.

To run the SDMS SCSI Low-level Format Utility:

1 Create a DOS bootable diskette.

2 Because a 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. Therefore, add these files to the diskette:

   FDISK.EXE

   FORMAT.COM

   From the {CD-ROM Drive Letter:} \DRIVERS\Dosutils

   ASPIFMT.EXE

   ASPIINF.DAT

From the {CD-ROM Driver Letter:}DRIVERS\DOS

ASPI8XX.SYS

SYMDISK.SYS

NOTE   SYMDISK is required only if you are formatting removable media drives.

---

3   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
```

4   Boot from this diskette and at the DOS prompt type:

```
ASPIFMT
```

and press Enter.

The recommended minimum memory requirement for this utility is 2 MB. You need at least 500 KB 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.

Troubleshooting

The following are some potential problems and their suggested solutions:

FORMAT DOES NOT COMPLETE AND SYSTEM IS FROZEN.

   a   Check to see if the drive still has power.

   b   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.

AN UNKNOWN STATUS CODE IS RECEIVED FOR A MAGNETO OPTICAL DRIVE.

Check to see if the media is present.

THE UTILITY SCREENS ARE UNREADABLE.

Check that the graphics card and the monitor are compatible. For example, an SVGA card, and a VGA monitor may not display the screens accurately.

SCSI SYM53C8XX DOS Configuration Utility

The Symbios DOS Configuration Utility (CONFIG.EXE) is located on the SDMS Software Device Drivers and Utilities CD-ROM at the {CDROM Drive Letter:} \DRIVERS\Dosutils directory.

Features

- Configures all DOS drivers

- Works for all Symbios SYM53C8XX PCI host adapters

- Provides a SCSI bus view showing all SYM53C8XX cards and attached peripherals

- Provides a graphical user interface (GUI)

- Provides on-line Help

Description

This utility provides a user-friendly way to configure any of the DOS-based drivers for the CONFIG.SYS file. It assumes the drivers are already installed. The Symbios ASPI driver, ASPI8XX.SYS, must be present and loaded for this utility to run. On-line 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.

Several files are required to run this utility:

- 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 is pointed to by the driver line 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 line:

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

to the CONFIG.SYS file. Then, reboot for it to take effect. The path specified in the above line is your choice (C:\SYMBIOS 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 SYM53C8XX installation utility.

The recommended minimum memory requirement for this utility is 2 MB. You need at least 500 KB of conventional DOS memory, and the remainder in extended memory.

Troubleshooting

The following is a possible problem with its suggested solution:

THE UTILITY SCREENS ARE UNREADABLE.

Check that the graphics card and the monitor are compatible. For example, an SVGA card, and a VGA monitor may not display the screens accurately.

SCSI SYM53C8XX DOS Verify Utility

The Symbios DOS Verify Utility (SYMDIAG.EXE) is located on the SDMS Software Device Drivers and Utilities CD-ROM at the {CD-ROM Drive Letter:} \DRIVERS\Dosutils directory. The Z_VER.DAT and ASPI8XX.SYS files are also required.

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 graphical user interface (GUI)

- Provides on-line Help

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 via 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.

The following files are required to run this utility:

- SYMDIAG.EXE

- Z_VER.DAT

Also, ASPI8XX.SYS is included with these files in the event that it is not already installed in the CONFIG.SYS file. If ASPI8XX.SYS already exists on the system and is pointed to by the driver line 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:\SYMBIOS is recommended) and ASPI8XX.SYS must be copied to that location.

The recommended minimum memory requirement for this utility is 2 MB. You need at least 500 KB of conventional DOS memory, and the remainder in extended memory.

Troubleshooting

The following is a possible problem with its suggested solution:

THE UTILITY SCREENS ARE UNREADABLE

Check that the graphics card and the monitor are compatible. For example, an SVGA card, and a VGA monitor may not display the screens accurately.

Host Adapter Flash Utility

The Symbios Flash Utility (FLASH8X5.EXE) is located on the SDMS Software Device Drivers and Utilities CD-ROM at {CD-ROM Drive Letter:} \DRIVERS\BIOS.

Feature

- Supports host adapter selection for updating with a specific BIOS image

Description

This utility allows you to update the Symbios PCI SCSI BIOS on a host adapter based on a SYM53C815, SYM53C825, SYM53C825A, SYM53C875, SYM53C876, SYM53C885, SYM53C895, or SYMC53C896 SCSI chip. New versions of the PCI SCSI BIOS are released periodically. Your host adapter must have a flash on board to use this utility.

It is required that you place this utility on a DOS bootable diskette and execute it from this diskette. 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 200K 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.

Insert the diskette into drive A:. Boot the system to the DOS prompt A:\>. Type FLASH8X5 and press Enter.

The first screen displayed indicates what files are necessary to upgrade and general instructions to upgrade. Press Enter to continue to the next window.

This window is the main menu for the Flash Utility and contains these six choices:

1 Update the EEPROM.

2 Backup the current BIOS image.

3 View board summary.

4 Exit to DOS.

5 Reboot.

6 About Flash8x5.

Symbios 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 Chip, 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.

Now you are ready to update the current SCSI BIOS (option 1). Choosing option 1 gives you a summary of boards installed to choose from. You must mark at least one by pressing the space bar, even if there is only one to choose from. This takes you to a new window where the BIOS file name is provided. After marking the board and pressing Enter, a new window appears asking for

the file name of the BIOS to upgrade. 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.

Next, the utility displays the file name and notifies you when the file is successfully read. Press Enter to continue, and the system prompts you whether or not to overwrite the BIOS that is currently flashed in. Select "Y" to upgrade. This causes the flash to get erased and updated.

The system then displays the card information and verifies that the new BIOS is flashed. Press any key to get back to the main menu. Choose option 6 to Reboot. Remove the floppy if you want to boot off hard drive.

To verify the new BIOS installation, watch carefully during boot and look at the 3rd line of the SDMS banner when it is displayed. Or, re-run the Flash utility from the floppy 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 - 32K byte capacity
- 512 - 64K byte capacity
- 101/010 - 128K byte capacity
- 201/020 - 256K byte capacity

Host adapters supported are:

SYM8150SP	SYM8750SP
SYM8250ASP	SYM8751SP
SYM8251ASP	SYM8751D
SYM8251AD	SYM8951U
SYM22801	SYM22910
SYM22802	

(Previous versions of the host adapters use the format NCR8150S, NCR8250S,...)

Device Drivers for Windows 95

. . . .

Introduction

Windows 95 is an operating system designed to run on Intel processors using current technology. It provides a graphical user interface environment incorporating many high-level features (refer to the Microsoft Windows 95 documentation for details). An I/O manager handles I/O requests in Windows 95. To address a SCSI peripheral, the I/O manager goes through the appropriate drivers. Class drivers for hard disk, floptical, CD-ROM, printer, and scanner peripherals are provided in Windows 95. Other class drivers, provided by peripheral manufacturers, are added to support new devices.

Symbios/Microsoft provide miniport drivers, called SYMC8XX.MPD and SYM_HI.MPD, to complete the path to a Symbios controller or processor with an optional SDMS SCSI BIOS. The following sections describe these drivers and their installation.

Features

- Synchronous negotiation (including Fast/Ultra SCSI/Ultra2 SCSI)

- Wide negotiation

- Auto Request Sense

- Supports multiple host adapters

- Supports multiple Logical Unit Numbers (LUNs)

- Allows Disconnect/Reselect

- Supports Scatter-Gather

- Differential Support

- Supports SCSI pass-through functionality

- SCAM Support (SCSI Configured AutoMatically)

- Target initiated negotiation support

- NVRAM support (wide/sync parameters, SCSI Host ID, SCAM on/off)

Symbios Devices Supported

The SYMC8XX.MPD driver supports the following devices and Symbios host adapters based on those devices:

- SYM53C810, SYM53C810A, SYM53C810AE (SYM8100S, SYM8100ASP)

- SYM53C815 (SYM815XS, SYM8150SP)

- SYM53C825, SYM53C825A (SYM8250S, SYM8251S, SYM8251D, SYM8250ASP, SYM8251ASP, SYM8251AD)

- SYM53C860, SYM53C860AE (SYM8600SP)

- SYM53C875, SYM53C875E (SYM8750SP, SYM8751SP, SYM8751D)

- SYM53C876 (SYM22801, SYM22802)

- SYM53C885

- SYM53C895, SYM53C895A (SYM8951U)

The SYM_HI.MPD driver supports the following device and associated Symbios host adapter:

- SYM53C896 (SYM22910)

Description

SYMC8XX.MPD and SYM_HI.MPD are designed to Microsoft's 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 95 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.MPD or SYM_HI.MPD are required. These drivers are only supported under Windows 95.

SCSI commands are passed directly from a Windows application to the SCSI devices by using the SCSI pass-through facility (refer to Microsoft Windows 95 documentation for details). This facility allows applications to directly control and access SCSI devices by filling in a data structure and calling in to 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 Symbios host adapters that support Ultra SCSI. These drivers also support Ultra2 SCSI protocol, providing quadruple the raw data transfer rate of Fast SCSI.

CAUTION Ultra SCSI requires more stringent SCSI bus cabling setups than Fast SCSI. Ultra2 requires low-voltage differential (LVD) termination.

Installing Your SYMC8XX.MPD/ SYM_HI.MPD Driver

The Symbios Drivers, SYMC8XX.MPD and SYM_HI.MPD, are located on the SDMS Software Device Drivers and Utilities CD-ROM at {CD-ROM Drive Letter:} \DRIVERS\WIN95.

Preparing a Symbios Driver Diskette

Copy the files listed below for the appropriate driver (supplied to you on the SDMS Software Device Drivers and Utilities CD-ROM) to the root directory of a clean floppy diskette, and use this Symbios Driver diskette during installation.

For the SYMC8XX.MPD driver:

- SYMC8XX.MPD
- SYMC8XX.INF

For the SYM_HI.MPD driver:

- SYM_HI.MPD
- SYM_HI.INF

New System Installation

This procedure installs the SYMC8XX.MPD or SYM_HI.MPD drivers onto a Windows 95 system. Use this procedure when initially upgrading to Windows 95. Windows 95 automatically adds the driver to the registry and copies the driver to the appropriate directories.

NOTE Some Symbios PCI SCSI host adapters are supported by a driver bundled in Windows 95. For these adapters, the bundled driver is automatically installed during Windows 95 Setup. To change to the SYMC8XX.MPD or SYM_HI.MPD drivers, follow the instructions in the section "Existing System Installation" after the Windows 95 installation has completed.

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1 Start the Windows 95 Setup according to the Microsoft instructions.

2 Setup enters the hardware detection phase after a system reboot. (The "Setting up Hardware" message box is displayed.) If the message "Symbios PCI SCSI Host Adapter" appears, then the host adapter supports the bundled driver, and it installs automatically. After the Windows 95 installation completes, the user can install the SYMC8XX.MPD and/or SYM_HI.MPD drivers according to the "Existing System Installation" instructions.

3 If the bundled driver does not support the host adapter, Setup displays a New Hardware Found - PCI SCSI Bus Controller dialog box. Select "Driver from disk provided by hardware manufacturer" and click OK.

NOTE   If ASPI8XX.SYS (the Symbios SDMS 4.0 DOS ASPI
driver) is loaded when beginning the Windows 95
installation, no messages about PCI SCSI Bus
Controllers are displayed. The installation completes,
but real-mode disk drivers are used. See the section
below on "Verifying Correct Driver Installation".
To install the SYMC8XX.MPD or SYM_HI.MPD
drivers, (which disable loading of the ASPI8XX.SYS
driver under Windows 95) see "Existing System Using
ASPI8XX.SYS DOS ASPI Driver" section below.

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4   Insert the Symbios Driver diskette into drive A: (or B:) (the
one prepared in "Preparing a Symbios Driver Diskette") and
click OK. If using drive B:, you must select it from the pick list.

5   Windows 95 automatically copies the appropriate driver files
and rebuilds its driver database.

6   A "System Settings Change" dialog box appears. Remove the
flex disk from the drive and click Yes to restart the computer.

At this point, Windows 95 Setup completes and the new driver is
operational. To verify this, see the section "Verifying Correct
Driver Installation."

Existing System Installation

This procedure installs the SYMC8XX.MPD or SYM_HI.MPD drivers onto an existing Windows 95 system.

1 Boot Windows 95.

2 Click Start. Move to Settings, Control Panel, and click.

3 Double-click on the System icon.

4 Click on the Device Manager tab.

NOTE   If the SCSI controllers entry, or the PCI Symbios c8xx SCSI Host Adapter entry do not exist, the system is probably using the ASPI8XX.SYS DOS ASPI driver. See the "Existing System Using ASPI8XX.SYS DOS ASPI Driver" section below.

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

6 Select the PCI Symbios C8XX SCSI Host Adapter entry. Click the Properties button.

7 Click on the Driver button. The version of the currently active driver should display in the File details section.

> **NOTE** In certain versions of Windows 95, the version of the
> active driver is displayed as **not** available. This is an
> operating system issue and is fixed in later versions of
> Windows 95. To verify the version of the driver, click on
> the Properties field of the SYMC8XX.MPD or
> SYM_HI.MPD file under the Version tab. The MPD
> driver is generally found in the \WINDOWS
> \SYSTEM\IOSUBSYS\ directory.

8 Click the Change Driver... button.

9 Even though the user may have previously installed the
SYMC8XX.MPD or SYM_HI.MPD drivers, he/she may click
the Have Disk... button to install a newer version.

10 Insert the Symbios Driver diskette in drive A: (or B:) (the one
prepared in Preparing a Symbios Driver Diskette) and click
OK. If using drive B:, you must select it from the pick list.

11 The Select Device dialog box should display "Symbios 8xxxx
PCI SCSI Host Adapter", where 8xxxx matches the installed
adapter. Click OK.

12 The Driver tab is updated to display the new driver files. To
install these driver files, click OK. (Do **not** click the Change
Driver... button.) The driver files are copied and a new driver
database is built.

13 A "System Settings Change" dialog box appears. Remove the
flex disk from the drive and click Yes to restart the computer.

At this point, the new driver is operational. To verify this, see the
section "Verifying Correct Driver Installation."

Existing System Using ASPI8XX.SYS DOS ASPI Driver

This procedure installs the SYMC8XX.MPD or SYM_HI.MPD drivers onto an existing Windows 95 system that is using the ASPI8XX.SYS DOS ASPI driver. You can check this by using the Verifying Correct Driver Installation instructions below.

1 Boot Windows 95.

2 Click Start. Move to Settings, Control Panel, and click.

3 Double-click on the System icon.

4 Click on the Device Manager tab.

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

6 Select the PCI SCSI Bus Controller entry. Click the Properties button.

7 Click the Driver button. A message should state that no drivers are installed for this device.

8 Click the Change Driver... button.

9 In the Select Hardware Type dialog box, select SCSI Controllers.

10 In the Select Device dialog box, click the Have Disk button.

11 Insert the Symbios Driver diskette in drive A: (or B:) (the one prepared in "Preparing a Symbios Driver Diskette") and click OK. If using drive B:, you must select it from the pick list.

12 The Select Device dialog box should display "Symbios 8xxxx PCI SCSI Host Adapter", where 8xxxx matches the installed adapter. Click OK.

13 The Driver tab is updated to display the new driver files. To install these driver files, click OK. (Do **not** click on the Change Driver... button.) The driver files are copied and a new driver database is built.

14 A "System Settings Change" dialog box appears. Ignore the message saying to turn off your computer and change hardware settings. Remove the flex disk from the drive and click Yes to shut down the computer. Press Ctrl-Alt-Delete or the system reset button to restart the system.

At this point, the new driver is operational. To verify this, see the section "Verifying Correct Driver Installation."

Verifying Correct Driver Installation

After installing/updating with the SYMC8XX.MPD or
SYM_HI.MPD drivers, verify proper operation of the drivers.

1 Check that all devices on the SCSI bus are available via My
Computer. Double click on the My Computer icon. Check that
all logical SCSI hard drives and CD-ROM drives are shown.

2 Click on the Start button. Move to Settings, Control Panel, and
click. Double click on the System icon. Click the Device
Manager tab. Check that no host adapter appears with a yellow
or red symbol under the SCSI controllers entry. If there is,
continue with the steps below to help determine the problem.

3 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 is displayed. Select an entry,
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.

4 Click on the Driver tab. Two entries should appear, one for the
INF and one for the MPD file. The INF file does not contain
embedded version information, so the File Details are all Not
Available. Select the MPD file. The file version of the driver
appears.

5 Click Cancel to leave the Host Adapter Properties dialog box.
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 the Details

button. This provides more information on why the system is not performing optimally and methods to correct the problem.

If no problems are encountered in the above steps, the new driver is operating properly. Otherwise, consult the section on Troubleshooting for additional information.

Troubleshooting

The following are some potential problems and their suggested solutions:

DURING INSTALLATION, NO SCSI DEVICES ARE FOUND.

    a Ensure that all devices are powered on and terminated correctly.

    b Check that no devices have duplicate SCSI IDs.

    c Make sure INT A is assigned for the PCI slot(s) where your SCSI host adapter(s) are installed.

PROBLEMS WITH ULTRA SCSI DEVICES USING ULTRA SCSI PROTOCOL.

    a If the system is configured with a Symbios host adapter that supports Ultra SCSI, an Ultra SCSI device is on the SCSI bus, and Ultra SCSI support by the SYMC8XX.MPD or SYM_HI.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.

    b If the system is bootable, disable Ultra SCSI support using the procedure described below.

c If the system is not bootable to Windows 95, hold down F8 when Starting Windows 95... is displayed. At the menu, select Safe Mode. Once the system is booted, disable Ultra SCSI support using the procedure described below.

d 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. See the Symbios host adapter hardware manual for information on Ultra SCSI cabling requirements.

PROBLEMS WITH SCANNERS

a 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 Symbios host adapters. Disable the auto request sense feature as described below and try the scanner operation again.

Command Line Options

Enabling/Disabling Ultra SCSI Support

Ultra SCSI support is controlled by settings in the adapter NVRAM. These settings can be viewed or changed via the Configuration Utility. During system boot, after the Symbios PCI BIOS banner, the message "Press Ctrl-C to start Configuration Utility" appears for a few seconds. Press Control-C to start this utility.

Select one of the adapters displayed, then select "Device Selections". This shows the Sync Rate for each device and the selected adapter. To set a device to Ultra, the speed should be set to 20 MegaBytes/second (for width of 8) or 40 MegaBytes/second (for width of 16). To disable Ultra, the speed should be no higher than 10 MegaBytes/second (for width of 8) or 20 MegaBytes/second(for width of 16). If the speed of the adapter itself is changed, the speed for all devices will be set no higher than the adapter speed.

Disabling Auto Request Sense Support

When the SYMC8XX.MPD and/or SYM_HI.MPD drivers are installed, 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. Therefore, to allow these devices to operate properly, the auto request sense feature can be disabled using the Device Manager on a per adapter basis.

Use this procedure for disabling auto request sense support:

1 Click on the Start button. Move to Settings, Control Panel, and click. Double click on the System icon. Click on the Device Manager tab.

2 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. Select the adapter desired, then click on the Properties button. Click the Settings tab.

3 In the Adapter settings entry, type "DisableAutoReqSense=1;", without the quotes. If there is already an entry displayed, type the above at the end of the existing entry. Be sure to include the semi-colon.

4 Click OK to exit the Settings tab.

5 Click OK again. If the entry was changed, the "System Settings Change" dialog box is displayed. 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.

Enabling SCAM Support

SCAM (SCSI Configured AutoMatically) is a protocol that allows SCAM-compliant peripherals to assign their SCSI IDs dynamically at boot time, eliminating the need for the user to check and set unique SCSI IDs. This feature is disabled by default in the Symbios PCI BIOS and the SYMC8XX.MPD and SYM_HI.MPD drivers. Some legacy (non-SCAM) peripherals have problems with the SCAM protocol, resulting in the device either not being seen by the operating system, or not working correctly. However, if usage of the SCAM protocol is desired, there are two methods for enabling SCAM: Method 1 and Method 2.

Method 1

Use this method when the adapter has NVRAM. During system boot, after the Symbios PCI BIOS banner, the message "Press Control-C to start Configuration Utility" appears for a few seconds. Press Control-C to start this utility.

Select the desired adapter, then "Adapter Setup". On the Adapter Setup menu, highlight "S-SCAM Support" and press Enter. Use the up/down arrows to select the ON setting, and press Enter. Exit from the menus and save the settings. This turns SCAM on for both the PCI BIOS and the SYMC8XX.MPD or SYM_HI.MPD drivers (whichever is controlling the selected adapter). To disable SCAM, repeat the above procedure to change the setting to OFF.

Method 2

For adapters that do not have NVRAM, SCAM can be enabled within Windows 95:

1 Click on the Start button. Move to Settings, Control Panel, and click. Double click on the System icon. Click the Device Manager tab.

2 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. Select the adapter desired, then click on the Properties button. Click on the Settings tab.

3 In the Adapter settings entry, type in "do_SCAM=1;" without the quotes. If there is already an entry displayed, type the above at the end of the existing entry. Be sure to include the semi-colon.

4 Click OK to exit the Settings tab.

5 Click OK again. If the entry was changed, the "System Settings Change" dialog box appears. 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.

Multiple Symbios Host Adapters Considerations

If multiple Symbios 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 some Symbios host adapters are supported by the bundled driver, and also that one Symbios driver can support multiple Symbios host adapters installed in the system.

With multiple Symbios 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.

There are two methods for ensuring that all Symbios host adapters are controlled by only one version of the appropriate driver (when installing additional boards or updating drivers).

Method 1

Using the Device Manager, change the driver for a particular host adapter to the desired driver. When asked to reboot the system for the new settings to take effect, click No. Change drivers for all Symbios 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.

Method 2

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. Reboot the system.

While booting, the system may ask to load the bundled driver file from the Windows 95 installation disk. Click OK. When the system says it cannot find the file, click Skip File. Do this for all adapter messages while booting. After the system is booted, use the Device Manager to change the driver for each adapter to the desired driver. Do **not** reply Yes to reboot the system until the final adapter has been changed.

SCSI Tools for Windows 95

Features

- Allows for examination of SCSI device parameters

- Supports power management

- Supports disk cache management

Description

Symbios SCSI Tools for Windows 95 is a software utility that provides a mechanism for examining host adapters and SCSI devices within the Windows 95 environment.

Installing SCSI Tools for Windows 95

Preparing a Symbios Driver Diskette

The SCSI Tools for Windows 95 software is installed by executing an InstallShield setup program. If the software was obtained from the Symbios BBS or Web site, it is in the form of a self-extracting zip file. Install the software by expanding the zip file into a directory on the hard disk drive, or to a diskette and then run "setup".

Otherwise, the SCSI Tools for Windows 95 files are located on the SDMS Software Device Drivers and Utilities CD-ROM. Click on the hypertext link "Install SCSI Tools for Windows 95 and Windows NT" directly from this CD-ROM or locate this software at {CD-ROM Drive Letter:} \Utility \Symtools.

The setup program installs the SCSI Tools files into the proper directories and makes the appropriate registry entries. After installing the software, the user must reboot the computer.

NOTE   Under Windows 95, the ASPI support is bundled with the operating system.

Device Drivers for Windows NT 3.5x/4.x

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Introduction

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

Class drivers for hard disk, floptical, CD-ROM, printer, and scanner peripherals are provided in Windows NT. 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. Symbios/Microsoft provide miniport drivers, called SYMC8XX.SYS and SYM_HI.SYS, to complete the path to a Symbios controller or processor with an optional SDMS SCSI BIOS. The following sections describe these drivers and their installations.
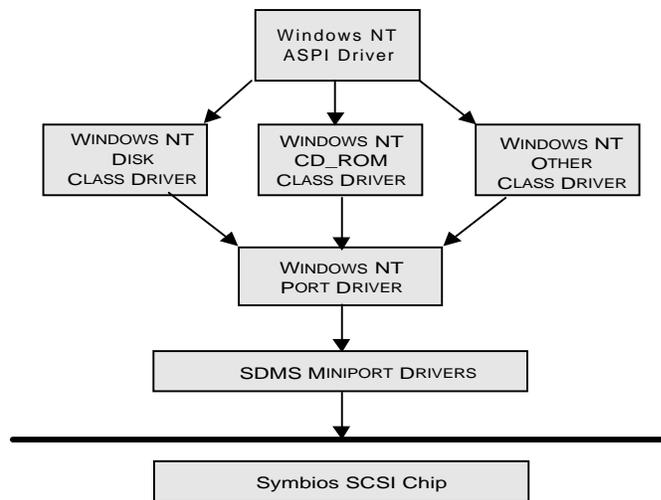
Figure 5-1 SCSI I/O Flow in Windows NT

Features

- Synchronous negotiation (including Fast/Ultra SCSI/Ultra2 SCSI)

- Wide negotiation

- Tagged command queuing

- Supports multiple host adapters

- Supports multiple Logical Unit Numbers (LUNs)

- Supports Disconnect/Reselect

- Supports Scatter-Gather

- Differential support

- Supports SCSI pass-through functionality

- Supports disk array configurations with no LUN 0

- Supports disk array configurations with non-contiguous LUNs

- Supports target initiated negotiation

- Auto request sense

- Maximum block size support: NT 4.0 - 1MB, NT 3.5x - 256K

- NVRAM support (wide/sync parameters, SCSI Host ID)

Symbios Devices Supported

The SYMC8XX.SYS driver is named "Symbios PCI (53C8XX)" for driver installation. It supports the following devices and Symbios host adapters based on those devices:

- SYM53C810, SYM53C810A, SYM53C810AE (SYM8100S, SYM8100ASP)

- SYM53C815 (SYM815XS, SYM8150SP)

- SYM53C825, SYM53C825A (SYM8250S, SYM8251S, SYM8251D, SYM8250ASP, SYM8251ASP,SYM8251AD)

- SYM53C860, SYM53C860AE (SYM8600SP)

- SYM53C875, SYM53C875E (SYM8750SP, SYM8751SP, SYM8751D)

- SYM53C876 (SYM22801, SYM22802)

- SYM53C885

- SYM53C895, SYM53C895A (SYM8951U)

The SYM_HI.SYS driver is named "Symbios PCI High Performance Driver" for driver installation. It supports the following device and associated Symbios host adapter:

- SYM53C896 (SYM22910)

Description

SYMC8XX.SYS and SYM_HI.SYS are designed to Microsoft's 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 or SYM_HI.SYS are required. These drivers are only supported under Windows NT 3.51 and later versions (including NT 4.0). They do not run under earlier versions of Windows NT.

SCSI commands are passed directly from a Windows application to the SCSI devices by using the SCSI pass-through facility (refer to the Microsoft Windows NT 3.5x/4.x 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 driver.

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

CAUTION   Ultra SCSI requires more stringent SCSI bus cabling setups than Fast SCSI. Ultra2 requires low-voltage differential (LVD) termination.

The Symbios driver bundled in Windows NT 3.51 is named NCRC810.SYS. When Windows NT selects the bundled Symbios driver during setup, the driver information (that is, "NCR C810 PCI SCSI Host Adapter") appears. Although this implies that the driver only supports the SYM53C810, it actually supports the SYM53C810, SYM53C810A, SYM53C815, SYM53C825, and SYM53C825A. In fact, the Symbios bundled driver controls all of the controllers listed that are in the system. Please keep in mind that Windows NT 3.51 setup only displays the driver information, not every controller found by that driver.

The Symbios driver bundled in Windows NT 4.0 is named SYMC810.SYS. When Windows NT selects the bundled Symbios driver during setup, the driver information (that is, "Symbios C810 PCI SCSI Host Adapter") appears. Although this implies that the driver only supports the SYM53C810, it actually supports the SYM53C810, SYM53C810A, SYM53C815, SYM53C825, SYM53C825A, SYM53C860, SYM53C875, and SYM53C876. In fact, the Symbios bundled driver controls all of the controllers listed that are in the system. This driver does not "see" or support the SYM53C885, SYM53C895, SYM53C896 and any newer host adapters that Symbios currently produces.

Please keep in mind that Windows NT 4.0 setup only displays the driver information, not every controller found by that driver.

Installing the SYMC8XX.SYS/SYM_HI.SYS Drivers

The Symbios Drivers, SYMC8XX.SYS and SYM_HI.SYS, are located on the SDMS Software Device Drivers and Utilities CD-ROM at {CD-ROM Drive Letter}: \DRIVERS\WINNT. Copy files to a diskette to proceed with the installation instructions below.

New System Installation

This procedure installs the SYMC8XX.SYS or SYM_HI.SYS drivers onto a Windows NT system. Use this procedure when installing Windows NT onto an unused SCSI drive. Windows NT automatically adds the driver to the registry and copies the driver to the appropriate directory.

1 Start the Windows NT installation by booting from the Microsoft Setup floppy disk.

2 Press Enter when the Welcome to Setup screen appears.

NOTE   Steps 3 & 4 occur with Win 3.5; for Win 4.0 go to Step 5.

---

3 With floppy disk 2, there is an initial setup screen that prompts you to continue by pressing Enter. Press Enter to see additional setup screens. Here you can choose Custom Setup or Express Setup. Symbios recommends that you choose Custom Setup by pressing C to skip the automatic scan of SCSI adapters and drivers, which is done by the Express Setup option.

If Express Setup is chosen, the installation program scans for SCSI adapters and finds the Symbios PCI (53C810) driver (NCR810.SYS for NT 3.5x, SYMC810.SYS for NT 4.0), which is an older version of the SYMC8XX.SYS driver. Let the installation continue. When installation completes, change the driver. See the section "Existing System Installation" to change the driver.

4 Press S to skip mass storage device detection. (If Enter is pressed, the installation program scans for SCSI adapters and finds the Symbios PCI (53C810) driver (NCRC810.SYS for NT 3.5x, SYMC810.SYS for NT 4.0), which is an older version of the SYMC8XX.SYS driver. Let the installation continue. When the installation completes, change the driver. See the section "Existing System Installation" to change the driver.

5 When a screen displays the SCSI adapters found, choose S to configure additional SCSI adapters.

6 Move the highlight bar to Other and press Enter.

7 When prompted for the manufacturer-supplied hardware support disk, insert the appropriate driver diskette containing the Windows NT driver required to support your Symbios adapter(s) and press Enter. The CD-ROM is distributed with the adapters. To obtain the Windows NT drivers from the Symbios Web Site, enter the URL: http://www.symbios.com.

NOTE If both Symbios drivers need to be installed, install them one after the other using steps 6 through 8. Installation order is not important.

---

8 Depending on the driver being installed, either "Symbios PCI (53C8XX)" or "Symbios PCI High Performance Driver" is shown highlighted. Press Enter to proceed.

9 Windows NT should now recognize the Miniport driver(s) and the SCSI hardware. Press Enter to continue. At this point, simply follow the Microsoft Windows NT installation procedure.

Existing System Installation

This procedure installs the SYMC8XX.SYS or SYM_HI.SYS driver onto an existing Windows NT system.

NOTE Windows NT 4.x uses the Windows 95 user interface, resulting in minor changes to the procedure for updating SCSI drivers. Procedures for both NT 4.x and NT 3.5x are listed.

Windows NT 4.x

1 Boot Windows NT and log on as Administrator.

2 Click on the Start button. Move to Settings, then to Control Panel, and click.

3 Double-click on SCSI Adapters.

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 or SYM_HI.SYS) is listed, remove it before

adding the new driver. Select OK when the Remove Driver message prompts, "Are you sure you want to remove this driver?". Another message may display saying "The SCSI Adapter has been marked as a boot device...". Click OK.

5 Click Add. A list of installed adapters appears.

6 Click the Have Disk button.

7 When prompted, insert the appropriate driver diskette containing the Windows NT driver, which was created from the SDMS Software Device Drivers and Utilities CD. This driver is required to support your Symbios adapter(s). For the path to copy manufacturer's files from, enter:

```
A:\WINNT\MINIPORT
```

Select OK.

8 Depending on the driver being installed, either "Symbios Logic PCI (53C8XX)" or "Symbios PCI High Performance 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 floppy disk. Unless you want to use the older version already on the system, choose New. If you chose Current, go to step 10.

9 For the path to the OEM SCSI Adapter files, A:\WINNT \MINIPORT should be displayed. Select Continue. Then remove the floppy disk from your A: drive.

10 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?" Click on the Yes button to restart and reboot NT. If you choose Cancel, remember that you must restart before the new driver is loaded.

11 If both Symbios drivers need to be installed, they can be installed one after the other without rebooting for each one. Installation order is not important.

12 Rebooting loads your new Miniport drivers.

Windows NT 3.5x

1 Boot Windows NT and log on as Administrator.

2 Open the Main window in the Program Manager.

3 Double-click on Windows NT Setup.

4 Choose Options, then choose Add/Remove SCSI Adapters.... 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 or SYM_HI.SYS) is listed, remove it before adding the new driver. Select OK when the Setup Message prompts, "Are you sure you want to remove the selected SCSI Adapter?"

5 Then choose Add, and select OK when the Setup Message prompts, "Are you sure you want to add a SCSI Adapter?"

6 On the SCSI Adapter list, go to the bottom and choose Other.

7 When prompted, insert your Symbios Driver diskette containing the appropriate Windows NT driver required to support your Symbios adapter(s). For the path to copy manufacturer's files from, enter

```
A:\WINNT\MINIPORT
```

Select OK.

8 Depending on the driver being installed, either "Symbios PCI (53C8XX)" or "Symbios PCI High Performance Driver" is shown highlighted on the Select OEM Option menu. If it is not highlighted, select it. Choose OK.

9 On the Select SCSI Adapter Option menu, choose Install with the appropriate driver highlighted.

At this point, the following message may be displayed:

"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 floppy disk. Unless you want to use the older version already on the system, choose New. If you chose Current, go to step 11.

10 For the path to the OEM SCSI Adapter files, A:\WINNT \MINIPORT should be displayed. Select Continue.

11 On the SCSI Adapter Setup menu, choose Close.

12 If both Symbios drivers need to be installed, they can be installed one after the other without rebooting for each one. Installation order is not important.

13 Rebooting loads your new miniport driver(s).

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 are large transfer block size support and a guaranteed number of concurrent I/Os for a particular SCSI bus.

Large Block Size Support   The SYMC8XX.SYS and SYM_HI.SYS drivers can support up to a 1 MegaByte transfer size in NT 4.0 and a 256K transfer size in NT 3.5x. This larger transfer size in NT 3.5x is enabled by default and cannot be changed. However, in NT 4.0 the default transfer size is 64K. To enable a larger transfer size, an entry must be added to the registry, using the file sym_256K.reg. This file will set a 256K maximum, but it can be edited to set other desired maximum transfer sizes.

There are two methods to add this registry setting. One is to locate the sym_256K.reg data file (supplied with the driver files) using Windows Explorer and double-click the file. The other method is to type at the command prompt:

```
regedit sym_256K.reg
```

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

Editing the sym_256K.reg file can set any maximum block size between 64K and 1MB (-8KB). The formula to calculate the proper value for MaximumSGList is:

```
MaximumSGList = (Maximum Block Size)/4K +1
```

For 256K: 256K/4K = 64, add 1 for 65 (decimal) or 0x41. The maximum value allowed for MaximumSGLIst is 255 or 0xFF. This denotes an absolute maximum transfer size of 1040384, which is 8K less than 1MB (1040384/4K = 0xFE, add 1 for 0xFF or 255). Be sure to read the information in the sym_256K.reg data file before editing it.

The system must be rebooted for the new registry setting to be effective.

To reset the maximum block size to the default of 64K, follow the instructions above, except use symdfblk.reg as the data file.

Maximum Number of Concurrent I/Os (Guaranteed)

Both Windows NT 3.51 and 4.0 only guarantee 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.

NOTE Windows NT 3.51 cannot be tuned for this parameter. Only Windows NT 4.0 uses this setting.

In order to have a guaranteed number of concurrent I/Os, an entry must be added to the registry, using the file sym100io.reg.

There are two methods to add this registry setting. One is to locate the sym100io.reg data file (supplied with the driver files) using Windows Explorer and double-click on the file. The other method is to 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 non-paged pool memory, a critical NT resource. High values for this setting can degrade system performance. Be sure to read the information in the sym100io.reg data file before editing it.

The system must be rebooted 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, except use symdefio.reg as the data file.

Auto Request Sense   Enabling and Disabling Auto Request Sense is found in the section titled "Troubleshooting."

Disk Mirroring

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

Symbios SDMS 4.xx PCI SCSI BIOS loads only one image in the memory when the system boots regardless of how many host adapters are used in the system. All of the disk drives on all host

adapters will be recognized through the INT13h function call. Because of this implementation, disk mirroring under Windows NT needs to be done by following these instructions which might be different from Microsoft's documentation.

Here's how to create an NT Fault Tolerant (FT) floppy so that you can boot from the mirrored partition in case the primary partition fails.

1   Format a floppy disk in drive A: using NT (File Manager or Windows Explorer) for use as a Fault Tolerant boot floppy.

2   From the root directory of the primary partition, copy NTLDR, NTDETECT.COM, and BOOT.INI to this floppy disk.

3   Temporarily remove the read-only attribute of the BOOT.INI file so that it can be modified and saved.

4   Edit BOOT.INI on the FT floppy 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 same.

x = the drive number of the mirrored partition in the INT13 chain - 80h.

The drive number of the mirrored partition can be found during system bootup of the Symbios SDMS 4.xx PCI 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)

For example, let's say there are two Symbios 8xx host adapters in the system. The first one, #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, the following line should be used in the BOOT.INI on the NT Fault Tolerant boot floppy to boot from the mirrored partition, host adapter #1 ID 2. Note that rdisk(1) was calculated from x=81h-80h.

multi(0)disk(0)rdisk(1)partition(1)\<winnt_directory>

5 Save the BOOT.INI and restore the "read-only" attribute.

Troubleshooting

The following are some potential problems and their suggested solutions:

DURING INSTALLATION, NO SCSI DEVICES ARE FOUND.

a Ensure that the custom setup is chosen on the Setup Method screen.

b Ensure that all devices are powered on and terminated correctly.

c Check that no devices have duplicate SCSI IDs.

d Make sure INT A is assigned for the PCI slot(s) where your SCSI host adapter(s) are installed.

SYSTEM CRASHES DURING INSTALLATION WITH A MESSAGE INDICATING INACCESSIBLE BOOT DEVICE.

a 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 via the system BIOS in CMOS.

b 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.

a 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.

PROBLEMS WITH SCSI DEVICES INSTALLATION OR OPERATION

a 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 Symbios host adapters. Disable the auto request sense feature as described below and try the device operation again.

b Using the file "symno_ar.reg" (supplied with the Symbios NT driver files), either double click the file in Windows Explorer or 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.

c To re-enable the auto request sense feature, use the file "sym_auto.reg" and perform one of the update methods in step b above.

PROBLEMS WITH CERTAIN SCSI DEVICES WHEN USING AN ULTRA SCSI ADAPTER

a 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 Control-C when the Symbios PCI BIOS banner is displayed during the system boot process).

Devices that do not support Ultra SCSI should be set to a maximum of 10 MB/sec for 8 bits, and 20 MB/sec for 16 bits.

PROBLEMS WITH ULTRA SCSI DEVICES USING ULTRA SCSI PROTOCOL.

a   If the system is configured with a Symbios 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.

b   Disable Ultra SCSI support for all devices via the SDMS 4.xx PCI BIOS Configuration Utility (press Control-C when the Symbios PCI BIOS banner is displayed during the system boot process).

c   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. See the Symbios host adapter user's guide for information on Ultra SCSI cabling requirements.

NT ASPI for Windows NT 4.x

Symbios NT ASPI is a software support package based on the
"ASPI for Win32", version 2.0 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 Win 32" version 2.0 specification for additional details.

Features:

- Provides information about SCSI adapters

- Provides information about SCSI devices

- Use to issue SCSI I/O requests

- Supports multi-threaded and multi-tasking operations

- Supports 32-bit Windows applications

Description:

Symbios NT ASPI is designed to the Advanced SCSI
Programming Interface (ASPI) version 2.0 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 types of applications are utility programs that
investigate and explore SCSI devices, or, applications such as
CD-R mastering software and scanner applications.

Symbios NT 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 NT operating system for execution of the request.

Installing NT ASPI

Preparing a Symbios Driver Diskette

NT ASPI software is installed by executing an InstallShield setup program. If you obtained the software from the Symbios BBS or Web site, it will be in the form of a self-extracting zip file. Install the software by expanding the zip file into a directory on your hard disk drive, or to a diskette and then run "setup".

Otherwise, the NT ASPI software is located on the SDMS Software Device Drivers and Utilities CD-ROM. Click on the hypertext link "Install ASPI Support NT 4.0" directly from this CD-ROM or locate this software at {CD-ROM Drive Letter}: \Drivers\WINNT\8XXNT\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.

Command Line Options

There are no command line options with the NT ASPI software.

NTCONFIG Utility

If you have Windows NT version 4.0, and you have installed the latest Symbios Windows NT Flint driver (version. 4.05.00 or later), you can change selected configuration parameters of your Symbios SCSI host adapters by using the NTCONFIG Utility. You may decide to alter these values if there is a conflict between device settings or if you need to optimize system performance. The system must be rebooted for the changes to take effect.

NOTE During boot, the version number of Windows NT appears in a banner on the computer monitor.

Since Windows NT and the Symbios Windows NT Flint driver 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 (MB/sec)

Installing the NTCONFIG Utility (x86 platforms)

The Symbios NTCONFIG Utility (SETUP.EXE) is located on the SDMS Software Device Drivers and Utilities CD-ROM at {CD-ROM Drive Letter}: \UTILITY\NTCONFIG. You can save the SETUP.EXE to diskette or run it directly from the CD-ROM.

To install the NTCONFIG utility using the x86 platforms, follow these steps:

1   Insert the NTCONFIG Utility setup diskette into drive A.

2   Click the Start button on the taskbar and choose Run.

3   Type A:\SETUP.EXE in the Open field.

4   Click the OK button and follow the on-screen instructions to install the NTCONFIG Utility.

    A shortcut icon is automatically placed on the desktop at the end of the installation process.

Installing the NTCONFIG Utility (ALPHA platforms)

The Symbios NTCONFIG Utility for Alpha platforms (NTCONFIG.EXE) is located on the SDMS Software Device Drivers and Utilities CD-ROM at {CD-ROM Drive}:\Diskimag\ntconfig.exe. Copy this executable file, NTCONFIG.EXE, to diskette or run it directly from the CD-ROM.

If you save the NTCONFIG.EXE to diskette by copying this executable program to the directory of your choice, it can then be executed from a command line or a shortcut can be created for it and placed on the desktop.

Starting the NTCONFIG Utility

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

To make changes with this menu driven utility, one or more Symbios SCSI host adapters installed in the system must have NVRAM (non-volatile random access memory) 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 NTCONFIG can properly identify the adapter.

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

Main Menu

When you start the Symbios NTCONFIG Utility, the main menu appears. This menu displays a summary list of all Symbios PCI to SCSI host adapters in your system and information about each of them.

Here is an example of the Main Menu Screen:

Table 5-4   Main Menu Screen

NTCONFIG - NVRAM Configuration Utility			
File Options Help			
Devices Found	Port Num	IRQ Level	NvRAM Found
SYM53C895	FC00	9	Yes
SYM53C896	F800	9	Yes
SYM53C896	F400	11	Yes
Save/Exit Cancel			

Main Menu Bar

The menu bar offers three items:

1 File

2 Options

3 Help

Each item has a drop-down menu displaying more choices. To familiarize you with this menu bar, a brief description of the menu items are discussed.

File   The menu path that appears after clicking on File displays Save and Exit choices.

- To save NVRAM data pertinent to the adapters via the NTCONFIG Utility, select the Save choice.

- To exit the NTCONFIG Utility, select the Exit choice.

NOTE   No automatic update to the adapter(s) is done. All changes are lost if not already saved by clicking on the Save menu choice above or clicking on the Save/Exit button.

Options   To display adapter configuration options for changing adapter values, click on the Options menu selection.

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 and default values are displayed, but no changes are allowed. The two choices available at this time are Adapter Settings and Device Selections.

- To change settings for adapters, select the Adapter Settings choice.

- To change settings for SCSI devices, select the Device Selections choice.

In each case, the selected choice displays a menu with adapters found. Click on the adapter whose related values are to be changed. Depending on the selection, either the Adapter Settings Menu or Device Selections Menu appears. See below for further information regarding these menus.

Help   To display information pertinent to a particular menu screen, click on the Help menu selection.

Main Menu Button Options

At the bottom of the main menu screen, two button options are available: Save/Exit, and Cancel. Clicking on the Save/Exit button simultaneously saves the configuration change(s) and exits from the Main Menu. Clicking on the Cancel button allows exit from a particular menu level, and discards any changes that may have been made.

Adapter Settings Menu

When you click on an adapter, the corresponding menu appears. Here is an example of the 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 click on 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. A brief description of each setting follows.

SCAM Support   This BIOS will issue or not issue SCSI Configured AutoMatically (SCAM) negotiations during initialization based on this parameter.

NOTE   Windows NT does not support the use of SCAM, and this selection should be turned off. Turning SCAM on may have adverse effects on your system.

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

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

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

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

Scan Order   This option allows the user to tell your device drivers to scan the SCSI bus from low to high (0 to max) SCSI ID, or from high to low (max to 0) SCSI ID. If you have more than one device on the SCSI bus, changing the scan order changes the order in which drive letters are assigned by the system.

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

Device Selections Menu

When you select the Device Selections option, the corresponding menu appears. Here is an example of the 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

SYM53C895     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 clicking on one of the displayed devices will allow the user 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.

Sync Rate (Mega Bytes/sec)   This option defines the maximum data transfer rate the host adapter will attempt to negotiate. The host adapter and a SCSI device must agree to a rate they can both handle. The width column affects this value.

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

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

Scan for Device at Boot Time   This option can be set to "No" when the user does 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)   This option can be set to "No" if the user has problems with a device that responds to all LUNs whether they are occupied or not. For example, if there is a SCSI device with multiple LUNs but you do not want all of those LUNs to be available to the system, then set this option to "No." This will limit the scan to LUN0 only.

Queue Tags   This option enables or disables the issuing of queue tags during I/O requests when your device driver can do this.

To Exit the NTCONFIG Utility

Since changes only take effect after your system reboots, it is important that you exit this configuration utility properly. Return to the Main Menu and exit either by clicking the Save/Exit button, or follow the menu path: File-->Save and then click on the Exit choice. If you reboot the system without properly exiting the utility, these changes may not take effect.

NT DMI 1.0 SDMS Component Instrumentation

The Symbios NT DMI 1.0 SDMS Component Instrumentation (CI) runs as an NT service. It reports asset and configuration information for the adapters and devices controlled by the Symbios Windows NT driver.

Features

- Dynamic AMS support for LanDesk 3.0

  If AMS for LanDesk 3.0 is present, then the CI will register with it. If AMS for LanDesk 3.0 is not present, then the CI will still load a function correctly.

- Support for the SYM_HI.SYS driver. The SYM_HI.SYS driver supports the SYM53C896 device and SYM22910 host adapter.

Description

The component instrumentation has specific hardware and software requirements, which are discussed below.

Hardware Requirements   The component instrumentation works with all Symbios PCI-SCSI I/O Processors that are supported by the SDMS BIOS and drivers. The CI is limited to no more than 10 devices per SCSI bus.

Software Requirements   The component instrumentation software requirements are:

- Requires a DMI 1.0 Service Layer.

- Runs with LanDesk version 2.8 or higher.

- Requires version 4.04.03 or higher of the Symbios NT SYMC8XX driver or version 4.06.00 or higher of the Symbios NT SYM_HI driver.

- Supports the Alert Management System of LanDesk 3.0.

Installation Instructions for the NT CI Service

The NT CI uses the SYSTEM environment variable WIN32DMIPATH to specify the root directory tree to locate its MIF file. (for example, assume its MIF file is in "WIN32DMIPATH\mifs\backup". Follow these instructions to install this service:

1 SET WIN32DMIPATH to the root directory tree where the service providers mifs\backup directory is located.

2 Copy the symsdms.mif to WIN32DMIPATH\mifs\backup.

3 Make sure all of the Service Layer .DLL files are in your path.

4 Copy symcint.exe to WIN32DMIPATH\bin\ or to wherever you want to run it from.

5 Copy instsrv.exe to WIN32DMIPATH\bin\ or to wherever you want to run it from when you install the symcint.exe as an NT service.

6 Install the symcint.exe as an NT Service by typing:

```
instsrv <serviceName> <full path to symcint.exe>
```

<serviceName> is any name you choose - as long as it is not already in use. If, for example, symcint.exe is in the directory c:\dmi\win32\bin\symcint.exe, then type:

```
instsrv SymCiService c:\dmi\win32\bin\symcint.exe
```

NOTE   The executable file, instsrv.exe, installs the service as a manual start. Make sure the NT Service Provider service has started before starting this service.

---

7   After a DMI 1.0 service provider has started, if AMS support is desired make sure the LANDESK Alert and Message services have started; then the user can start the NT CI service by going into the NT Control Panel and then into Services. Find the <serviceName> from step 6. Click on the Start button.

8   The NT CI service can be stopped by going into the NT Control Panel and then into Services. Find the <serviceName> from step 6. Click on the Stop button.

Removing the NT CI Service

To remove the service, type:

```
instsrv <serviceName> remove
```

SCSI Tools

Features

- Allows for examination of SCSI device parameters
- Supports power management
- Supports disk cache management

Description

Symbios SCSI Tools for Windows NT is a software support utility that provides a mechanism for examining host adapters and SCSI devices within the Windows NT environment.

Windows NT

If your system already has NT ASPI, go to the installation instructions for SCSI Tools for Windows NT. Otherwise, the NT ASPI utility must be installed first before installing this SCSI Tools package. For your convenience, the instructions for installing NT ASPI are repeated again below. Please also refer to the section in this chapter titled "NT ASPI for Windows NT 4.x."

Installing SCSI Tools for Windows NT

Preparing a Symbios Driver Diskette

The SCSI Tools for Windows NT software is installed by executing an InstallShield setup program. If you obtained the software from the Symbios BBS or Web site, it is in the form of a self-extracting zip file. You can install the software by expanding the zip file into a directory on your hard disk drive, or to a diskette and then run "setup".

Otherwise, the SCSI Tools for Windows NT files are located on the SDMS Software Device Drivers and Utilities CD-ROM. Click on the hypertext link "Install SCSI Tools for Windows 95 and Windows NT" directly from this CD-ROM or locate this software at {CD-ROM Drive Letter}: \Utility \Symtools.

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.

NOTE   The installer must have NT Administrator capabilities.

Installing NT ASPI

Preparing a Symbios Driver Diskette

The NT ASPI software is installed by executing an InstallShield setup program. If you obtained the software from the Symbios BBS or Web site, it is in the form of a self-extracting zip file. You can install the software by expanding the zip file into a directory on your hard disk drive, or to a diskette and then run "setup".

If you receive the NT ASPI files on the SDMS Software Device Drivers and Utilities CD-ROM, click on the hypertext link "Install ASPI Support NT 4.0" directly from this CD-ROM or locate this file at {CD-ROM Drive Letter}:\DRIVERS\WINNT\8XXNT \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.

NOTE   The installer must have NT Administrator capabilities.

Chapter **6**

Device Drivers for OS/2

....

Introduction

The OS/2 operating system version 4.0 provides an integrated platform featuring a graphical windowing interface, called Presentation Manager, that allows multiple applications to be viewed at the same time. Multi-tasking is also supported, enabling several different programs to run at the same time in different windows. Presentation Manager allows the user to switch between programs, start other programs, and maintain files and directories.

This version of OS/2 requires an 80386 or higher microprocessor. Other hardware requirements include a minimum of 8 megabytes of RAM and a minimum hard disk drive size of 90 megabytes. Symbios SDMS 4.0 provides the necessary SCSI device drivers for OS/2: SYM8XX.ADD and SYM_HI.ADD. Symbios recommends reviewing the OS/2 manual prior to proceeding.

The SYM_HI.ADD driver allows up to 8 host adapters to be present in the system. The first 4 host adapters are accessed in the order you specify using the SCSI BIOS Configuration Utility provided with some members of the 8XX family of host adapters. Refer to the host adapter's user guide for information on the availability and use of the SCSI BIOS Configuration Utility. Remaining host adapters will be accessed based on their physical position in the system. Refer to your system documentation for further information.

Features

- Supports synchronous negotiation (including Fast/Ultra SCSI/ Ultra2 SCSI)

- Supports Wide SCSI (single-ended and differential)

- Supports multiple host adapters

- Supports Disconnect/Reselect

- Supports Scatter/Gather

- Allows tagged command queuing

- Supports single-ended, differential and low-voltage differential

- Allows target-initiated negotiation

- Supports NVRAM/NVS configuration storage

- Support for alternative CHS (Cylinder Head Sector) mapping algorithm

Description

Although the Symbios 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 Symbios SYM8XX.ADD and SYM_HI.ADD device drivers are written in compliance with the IBM OS/2 ADD (Adapter Device Driver) specification, and the device drivers work with third party applications that comply with the same specification.

Symbios Devices Supported

The SYM8XX.ADD driver supports the following devices and the associated Symbios host adapters:

• SYM53C810, SYM53C810A, SYM53C810AE (SYM8100S, SYM8100ASP)

• SYM53C815 (SYM815XS, SYM8150SP)

• SYM53C825, SYM53C825A (SYM8250S, SYM8251S, SYM8251D, SYM8250ASP, SYM8251ASP, SYM8251AD)

• SYM53C860, SYM53C860AE (SYM8600SP)

• SYM53C875, SYM53C875E (SYM8750SP, SYM8751SP, SYM8751D)

• SYM53C876 (SYM22801, SYM22802)

• SYM53C885 (SYM23800)

• SYM53C895, SYM53C895A (SYM8951U)

The SYM_HI.ADD is a PCI High Performance Driver that supports the following device and associated Symbios host adapter:

• SYM53C896 (SYM22910)

Installing the SDMS OS/2 Drivers

These installation instructions are specific and accurate for the SDMS OS/2 drivers SYM8XX.ADD and SYM_HI.ADD. You may have a more recent version of these drivers. You should refer to the installation instructions for OS2 operating system which is located on the SDMS Software Device Drivers and Utilities CD-ROM for a version of these instructions guaranteed to match your driver.

If you previously installed OS2CAM.ADD (the previous version of this driver), delete OS2CAM.ADD and delete the corresponding BASEDEV= statement in the CONFIG.SYS file after you complete 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. The system will continue to boot using the previous drivers until these steps are taken.

Installing SYM8XX.ADD/SYM_HI.ADD with OS/2 Already Installed

The Symbios SDMS Software Device Drivers and Utilities CD-ROM contains six files for OS/2: the device drivers SYM8XX.ADD and SYM_HI.ADD, the text files SYM8XX.DDP and SYM_HI.DDP, and the executable files SYM8XXPC.EXE and SYM_HIPC.EXE. Copy these files to a diskette from {CD-ROM Drive Letter:}\DRIVERS\OS2. The following instructions provide details for installation:

1 At the OS/2 Desktop, open the System Setup folder located within the OS/2 System folder. Open the Install/Remove folder and then double-click on the Device Driver Install icon.

2 Insert the floppy diskette containing the Symbios device driver(s) in the source drive. The system will find all DDP files on the floppy diskette and automatically install the corresponding drivers.

3 To make sure that the installation was successful, open the Utilities folder located within the Programs folder on the OS/2 Desktop. Then double-click on the OS/2 System Editor to start the editor. 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
```

Then check that the appropriate drivers are in the \OS2\BOOT directory on the boot drive.

Installing SYM8XX.ADD/SYM_HI.ADD and OS/2 from a Floppy to a SCSI Hard Drive

In this case, since OS/2 will be installed from a floppy diskette, it is not required that the driver(s) be present to install the operating system (as is the case when installing from a CD-ROM).

1 After the installation of OS/2 completes and the WorkPlace Shell desktop builds, open the System Setup folder located in the OS/2 System folder. Open the Install/Remove folder and then double-click on the Device Driver Install icon.

2 Insert the floppy diskette containing the Symbios device driver(s) in the source drive. The system will find all DDP files on the floppy diskette and automatically install the corresponding drivers.

3 To make sure that the installation was successful, open the Utilities folder located within the Programs folder on the OS/2 Desktop. Then double-click on the OS/2 System Editor to start the editor. 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
```

Then check that the appropriate drivers are in the \OS2\BOOT directory on the boot drive.

4 Continue with the OS/2 installation process as documented in the OS/2 Installation Guide.

Installing SYM8XX.ADD/SYM_HI.ADD and OS/2 from a SCSI CD-ROM to a SCSI Hard Drive

To install OS/2 from a SCSI CD-ROM attached to a Symbios host adapter, the SCSI driver must be present in order to access the CD-ROM. The following steps allow installation of OS/2 from a SCSI CD-ROM.

1 Make copies of the floppy diskettes used for installation that are included with the CD-ROM version of OS/2.

2   Determine the appropriate driver for installation by locating the host adapter to which the CD-ROM is attached in the section of this guide titled "Symbios Devices Supported". Then copy the indicated driver 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 Volume 1.0 CD. 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 Symbios 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.

3   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
```

Follow the directions in the README.1ST file for adding the following line to the CONFIG.SYS file:

```
SET COPYFROMFLOPPY=1
```

This allows the Symbios driver to be copied from the installation diskette to the system's boot drive.

4   Place the copy of Installation Diskette in the A: drive and reboot the computer.

5   Proceed with the OS/2 installation process as documented in the OS/2 Installation Guide.

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:

- OS/2 Warp 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.

- 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.

- If you are installing both Symbios drivers, the driver corresponding to the host adapter with the boot drive attached must appear first in the CONFIG.SYS file.

Refer to the OS/2 documentation to fully understand this requirement.

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 8XX family of host adapters.

Refer to your host adapter's user guide for information on the availability and use of the SCSI BIOS Configuration Utility. In addition, the Symbios OS/2 device drivers have several embedded functions that can be accessed via switches on the command line in the CONFIG.SYS file.

Values are applied in the following order:

1 Manufacturer's settings

2 SCSI Configuration Utility changes

3 Command line options

At any point during this process, subsequent changes in synchronous and wide negotiations may only decrease speed or reduce width. Any changes that attempt to increase speed or width are ignored.

The options available using command line switches are described below. The SYM8XX.ADD driver is used in all examples; SYM_HI.ADD may be substituted for SYM8XX.ADD with identical results.

In the following descriptions, "path" represents the position of a host adapter as indicated by its numbering displayed by the Verbose option. This is **not** the SCSI ID of the host adapter. The "id" represents a SCSI target ID on the indicated path. The following conventions are also used:

[ ] indicates optional information.

* indicates the pattern enclosed in the [ ]'s may be repeated..

Table 6-5   OS/2 Command Line Options

Option Name	Description
/VERBOSE or /V	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. **Syntax:** /VERBOSE For example, if you wish to see more detailed information displayed when you boot, the line in the CONFIG.SYS file that loads SYM8XX.ADD should look like this: BASEDEV=SYM8XX.ADD /VERBOSE or BASEDEV=SYM8XX.ADD /V To disable this feature, remove this switch from the command line.
/!DM	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.

Table 6-5   OS/2 Command Line Options (Continued)

Option Name	Description
/!DM (continued)	**Syntax:** /!DM<path[:id]>[,<path[:id]>]* For example, if you want 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: BASEDEV=SYM8XX.ADD /!DM<0:3>, <0:5>
/!SM	Disables use of the IBM-supplied SCSI manager (OS2SCSI.DMD) for the devices listed. The SCSI manager supports SCSI tape drives. **Syntax:** /!SM<path[:id]>[,<path[:id]>]* where: For example, if you want 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: BASEDEV=SYM8XX.ADD /!SM<0:3>,<0:5>
/SYNCH_RATE or /SR	Sets the maximum synchronous transfer rate (in megabyte transfers per second) to negotiate with a particular device. The allowable values for this setting are 0,5,10, 20, and 40 megabyte transfers per second, if the adapter is capable of the specified speed. All host adapters in the SYM53C8XX family support at least 10 megabyte transfers per second; some support 20 or 40 megabyte transfers per second.

Table 6-5   OS/2 Command Line Options (Continued)

Option Name	Description
/SYNCH_RATE or /SR (continued)	To turn off synchronous transfers for a particular device, specify 0 (zero). The value set by this option only defines the maximum transfer rate negotiated. The actual rate also depends on what the device can do. The default value is the fastest transfer rate that is supported by a particular host adapter. **Syntax:** /SYNCH_RATE = n<path[:id]>[,n<path[:id]>]* where: n = 0, 5, 10, 20 or 40. For example, if you want 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: BASEDEV=SYM8XX.ADD /SYNCH_RATE=0<0:3> As another example, if you want to set synchronous transfers to 10 megabyte transfers per second on all devices on adapter 1, the line in the CONFIG.SYS file that loads SYM8XX.ADD should look like this: BASEDEV=SYM8XX.ADD /SR=10<1> **Note:** The maximum synchronous transfer rates effectively double when the adapter and device permit wide transfers (See the /WIDTH option). For example, a synchronous transfer rate setting of 40 megabyte transfers per second will actually produce a transfer rate of 80 megabyte transfers per second if the adapter and device both allow and are set to perform wide transfers.

Table 6-5 OS/2 Command Line Options (Continued)

Option Name	Description
/SYNCH_OFFSET or /SO	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 path. The SYM53C8XX controller chips support offsets up to 31. Refer to your host adapter's user 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. 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. **Syntax:** /SYNCH_OFFSET = n<path[:id]>[,n<path[:id]>]* where: n = 0 is the maximum synchronous offset for the adapter. For example, if you want to change the synchronous offset to 6 for ID 3, the line in the CONFIG.SYS file that loads SYM8XX.ADD should look like this: BASEDEV=SYM8XX.ADD /SYNCH_OFFSET=6<0:3>

Table 6-5   OS/2 Command Line Options (Continued)

Option Name	Description
/TIMEOUT or /T	The Symbios device drivers use a time-out 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 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 will be ignored. **Syntax:** /TIMEOUT = n<path[:id]>[,n<path[:id]>]* where: n = time-out value in seconds for device, n=(0..65535), 0=infinite. For example, if you have a particularly slow device on ID 3 and you wish to extend the time out on this device to 60 seconds, then the line in the CONFIG.SYS file that loads SYM8XX.ADD should look like this: BASEDEV=SYM8XX.ADD /TIMEOUT=60<0:3>
/DISCONNECT or /DC	SCSI devices have the ability to disconnect from the bus during an I/O transfer. This option allows (or does not allow) a device to disconnect during an I/O. 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. This is because the /PARITY option does not change the disconnect state for any device on that adapter. See the /PARITY option for more information.

Table 6-5   OS/2 Command Line Options (Continued)

Option Name	Description
/DISCONNECT or /DC (continued)	**Syntax:** /DISCONNECT = n<path[:id]>[,n<path[:id]>]* where: n = ON or OFF. Valid options are "ON" (allow disconnects) and "OFF" (do not allow disconnects). The default for all devices is "ON". For example, if you want to disable disconnects on the device at ID 2, then the line in the CONFIG.SYS file that loads SYM8XX.ADD should look like this: BASEDEV=SYM8XX.ADD /DISCONNECT=OFF<0:2>
/PARITY or /P	The SYM53C8XX chips are capable of enabling or disabling the SCSI bus data integrity checking feature known as "parity". Some non-SCSI compliant devices sold as SCSI devices do not generate parity. You can use this option to disable parity checking. The SYM53C8XX chips always generate parity (for outputs), but may optionally check the parity (for inputs). **Syntax:** /PARITY = n<path[,path]*>[,n<path[,path]*>]* where: n = ON or OFF. Valid options are "ON" (check parity) and "OFF" (do not check parity). The default for all devices is "ON", which enables parity checking for all devices.

Table 6-5   OS/2 Command Line Options (Continued)

Option Name	Description
/PARITY or /P (continued)	For example, 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: BASEDEV=SYM8XX.ADD /PARITY=OFF<0> **Note:** When disabling parity checking, it is necessary to disable disconnects for any device that does not generate parity, as the SYM53C8XX chips cannot disable parity checking for that device during the reselection phase. Please refer to using the /DISCONNECT option for more information on how to disable disconnects for a device. If a device does not generate parity and it disconnects, the I/O never completes as the reselection never completes.
/QTAG or /QT	Queue tagging (QTAG) 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 will be 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. **Syntax:** /QTAG = n<path[:id]>[,n<path[:id]>]* where: n = the number of queue tags allowed for a device (0..256).

Table 6-5 OS/2 Command Line Options (Continued)

Option Name	Description
/QTAG or /QT (continued)	For example, 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: BASEDEV=SYM8XX.ADD /QTAG=0<0:3> As another example, if you want 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: BASEDEV=SYM8XX.ADD /QT=5<2>
/WIDTH or /W	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. **Syntax:** /WIDTH = n<path[:id]>[,n<path[:id]>]* where: n = 8 or 16. For example, 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: BASEDEV=SYM8XX.ADD /WIDTH=8<0:3>

Table 6-5   OS/2 Command Line Options (Continued)

Option Name	Description
/WIDTH or /W (continued)	As another example, if you want 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: BASEDEV=SYM8XX.ADD /W=8<2>

Troubleshooting

The following are some potential problems and their suggested solutions:

YOU CANNOT ACCESS THE SCSI DEVICE(S).

    a Make sure the SCSI device driver is installed properly.

    b Make sure each device has power.

    c Verify that the appropriate BASEDEV = line (BASEDEV=SYM8XX.ADD /V or BASEDEV = SYM_HI.ADD /V) exists in the CONFIG.SYS file.

    d Verify that the correct driver is in the appropriate directory (\OS2\BOOT).

    e Check the cable connections and the host adapter installation.

THE COMPUTER HANGS OR LOCKS UP WHEN BOOTING AND THE SCSI DEVICES ATTACHED ARE NOT SEEN BY THE COMPUTER SYSTEM.

    a 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, depending on the scan order option selected in the configuration utility. For more information, see Chapter 2, SCSI BIOS or the documentation provided with your host adapter board.

    b Make sure both, but only, the ends of the SCSI bus are terminated.

    c Make sure the device driver is listed in the CONFIG.SYS file (and loaded when booting).

THE DEVICE DRIVER DOES NOT SEE ONE OF THE SCSI DEVICES.

    a Reboot the computer.

    b Make sure the SCSI devices have different ID numbers.

    c Make sure both, but only, the ends of the SCSI bus are terminated.

    d Check the cable and power connections.

OS/2 INSTALLS TO AN IDE DRIVE IN THE SYSTEM INSTEAD OF INSTALLING TO THE SCSI DRIVE.

The IDE drive must be physically disconnected and disabled in the CMOS setup before attempting to install to a SCSI drive.

THE FOLLOWING MESSAGE IS DISPLAYED 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."
```

a This problem is caused when your system is booting from a hard drive attached to an IDE bus, a SCSI disk is attached to your Symbios host adapter, and the statement(s):

```
BASEDEV=SYM8XX.ADD /V
```

and/or

```
BASEDEV=SYM_HI.ADD /V
```

appears in the CONFIG.SYS file before the IDE device driver statement.

b 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=SYM8XX.ADD /V and/or the BASEDEV=SYM_HI.ADD /V statement(s) to the last line in the CONFIG.SYS file.

c Restart your system.

Chapter *7*

Device Drivers for SCO UNIX
. . . .

Introduction

SCO UNIX 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 UNIX 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 UNIX kernel. Your Symbios Boot Time Loadable Driver (BTLD) on the SDMS Software Device Drivers and Utilities CD-ROM contains two packages:

- slha contains the driver for SCO OpenServer Releases 5.0.0 and 5.0.2

- symha contains the driver for SCO OpenServer Release 5.0.4

You must link-edit the proper driver into the SCO UNIX 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 UNIX with the software provided by SCO.

SCO OpenServer provides only one installation diskette, labeled Boot Disk. This diskette, along with the BTLD driver diskette that you create and other software media, is used during a SCO OpenServer installation.

```
┌─────────┐              ┌─────────┐                ┌─────────┐
│         │  Allows      │  SCO    │  Installation  │  Hard   │
│  BTLD   │  Easy        │  UNIX   │  On A          │  Drive  │
│         │              │  O/S    │                │         │
└─────────┘              └─────────┘                └─────────┘
```
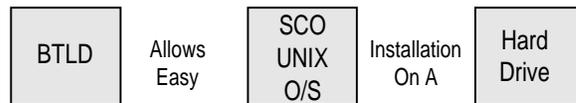
Figure 7- 1   Symbios Installation Tools

Building a Symbios SDMS 4.0 BTLD PCI Diskette

To create a BTLD diskette to use with SCO OpenServer installations, copy the raw dd image file onto a 1.44 MB floppy. The dd image file for SCO UNIX operating systems is available on the SDMS Software Device Drivers and Utilities CD-ROM at {CD-ROM Drive Letter:}\DRIVERS\UNIX\SCOUNIX directory. You must build the driver diskette. Follow these steps to create the BTLD driver diskette:

Creating a BTLD diskette is dependent upon the operating system that you are using. See the instructions below for UNIX System and DOS System Users.

For UNIX System Users:

Follow these steps to create the BTLD diskette:

1 Insert a 3.5-inch diskette into the floppy drive.

2 At the UNIX prompt, type:

> dd if=/{CD-ROM Drive Letter}:/DRIVERS/UNIX/
> SCOUNIX/SCO49610.DD of=/dev/fd0135ds18

The {CD-ROM Drive Letter}:/... indicates the dd image location. This command will dd the image to the floppy to create the BTLD diskette.

For DOS System Users:

Use a utility that will copy a raw image onto a 1.44 MB floppy to copy the file "SCO40300.DD" onto a 3.5-inch diskette. This .DD image is located at: {CD-ROM Drive Letter}:/DRIVERS/UNIX/ SCOUNIX.

"Rawrite", which is a public domain utility, is available. See the rawrite3.doc file located at {CD-ROM Drive Letter:} /DRIVERS/ UNIX/SCOUNIX for installation instructions.

After the image has been copied to a 3.5-inch diskette, use the BTLD diskette for SCO OpenServer installations as instructed.

The following sections provide instruction on configuring the SCO UNIX kernel with the Symbios driver, installing SCO UNIX onto a hard drive, and adding SCSI peripheral devices. These instructions assume you are familiar with UNIX system administration.

Features

- Provides easy UNIX installation on a hard disk with the Symbios Boot Time Loadable Driver (BTLD) diskette.

- Multiple processor support (with SCO Symmetrical Multiprocessing Support package installed)

- Supports synchronous negotiation (including fast, Ultra, and Ultra2 SCSI)

- Supports Wide SCSI (single-ended and differential)

- Supports Disconnect/Reselect

- Supports Scatter/Gather

- Allows tagged command queuing

- Provides dynamic interrupt mapping

- Supports target initiated negotiation

- Allows shared interrupts

- Supports Multiple LUNs

- Allows automatic drive spin up

- Supports RAID up to 1024 byte block sizes

- Supports NVRAM and NVS configuration data areas

Description

UNIX installation on a SCSI system requires creation of a SCO UNIX kernel that contains the SCSI driver to support SCSI devices. There are two possible installation procedures:

1 Installing UNIX and the proper Symbios driver for the first time on a SCSI boot drive.

2 Loading or updating the proper Symbios driver on a boot drive.

Please read the following important information before beginning any installation procedure.

1 This driver supports the three releases of SCO OpenServer (Releases 5.0.0, 5.0.2 and 5.0.4).

2 The diskette contains two packages:

a Package slha is for SCO OpenServer Releases 5.0.0 and 5.0.2

b Package symha is for SCO OpenServer Release 5.0.4.

3 Within the text instructions for adding SCSI Disk Drives, Tape Drives, and CD-ROM drives, the system prompts the user to check whether the driver is the default value or to enter the exact driver name. With the previous Symbios Boot Time Loadable Driver (BTLD), the package name and

the driver name for OpenServer were both slha. With this BTLD, both package symha and package slha contain drivers named slha. The driver code is identical but one of the operating system's interface routines is "linked" to a different macro.

Installing the SCO UNIX Driver

If you plan to perform a new SCO UNIX installation that includes the proper Symbios driver, then follow this procedure. The Boot Time Loadable Driver (BTLD) provides a user-friendly method for installing SCO UNIX onto a hard disk drive.

Symbios 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.

New System Installation Instructions

This procedure installs SCO UNIX onto a hard disk drive. This installation is necessary to build a new UNIX kernel that includes the Symbios 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.

1 Link the Symbios BTLD into the UNIX kernel during installation.

    a Insert the SCO UNIX installation diskette and reboot the system. For SCO OpenServer, this diskette is labeled Boot Disk.

    b At the "boot:" prompt, type:

```
link
```

      Press Enter.

c At the next prompt type:

- slha for SCO OpenServer Releases 5.0.0 and 5.0.2

- symha for SCO OpenServer Release 5.0.4

Do not remove the diskette. Press Enter.

d When prompted during the installation, insert either the proper installation diskette(s) or the BTLD diskette and press Enter.

If symha has been entered, 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 prompts 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"

Enter the indicated routine number that precedes this message.

e Continue the installation according to the SCO UNIX documentation.

f The SCO OpenServer system automatically creates the file unix.safe during installation. To access this Unix kernel, type at the "boot:" prompt:

```
unix.safe
```

2 Install SCSI device support.

   a Continue from Procedure 2, step 3.

Existing System Installation

If you plan to attach SCSI devices to a Symbios host adapter while using a non-SCSI hard drive (for example, an IDE drive) as the boot hard drive already containing a SCO UNIX system, follow the procedure below to install the Symbios driver on the non-SCSI boot drive. Some of the SCSI devices supported include tape drives, CD-ROM drives, and SCSI hard disk drives used as secondary storage. This procedure is also followed to replace a previously installed Symbios driver on a SCSI or non-SCSI boot drive.

Existing System Installation Instructions

This procedure assumes SCO UNIX is already installed on a hard disk drive. This installation is necessary to build a new UNIX kernel which includes the proper Symbios host adapter driver. The basic steps for accomplishing this are outlined below. For more details on UNIX installation, refer to the SCO UNIX System Administrator's Reference manual.

1 The SCO OpenServer system automatically creates a file unix.safe during installation. To access this Unix kernel, type at the "boot:" prompt:

```
unix.safe
```

2 Install the Symbios driver.

a Insert the BTLD diskette into the drive and type:
installpkg

Press Enter to continue.

b A prompt appears to insert the requested diskette. Since the Symbios diskette is already inserted, press the Enter key to continue.

c A prompt now asks for the name of the package. Type:

- slha for SCO OpenServer Releases 5.0.0 and 5.0.2

- symha for SCO OpenServer Release 5.0.4

Press Enter to continue.

d If a driver is already present from a previous installation, a prompt inquires about replacing it. Reply *y* for yes.

e Once the install package (installpkg) has completed, relink the kernel by typing /etc/conf/cf.d/link_unix at the command prompt.

f 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.

g To activate the new kernel, you must reboot the system. At the command prompt, type:

```
reboot
```

Press Enter.

3 Adding a SCSI Disk Drive

NOTE If you are not adding a SCSI disk drive to this system, go to step 4.

---

a At the command prompt, type:

```
mkdev hd
```

Press Enter

b The system prompts for the identifier of the host adapter that supports this device. If the default is correct, press Enter. If the default is not correct, type:

```
slha
```

for SCO OpenServer

Press Enter.

c The system prompts for the host adapter that supports the disk drive. Type the correct host adapter number and press Enter.

If an additional Symbios host adapter is being added to the SCO UNIX 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 incorrectly, type *n*, and press Enter; the system then prompts for the host adapter identifier of the preceding step.

d With SCO OpenServer, the system prompts for the SCSI bus number of the disk drive. The default bus number is 0 (zero).

e The system prompts for the Target ID of the disk drive. 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. Type *y* and press Enter if the device is wide. 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 re-issued so you can enter the correct Target ID.

f The system prompts for the Logical Unit Number (LUN) of the disk drive. Type the desired LUN and press Enter, or press Enter for the default value of zero.

g The system prompts you to update the SCSI Configuration file. Type *y* and press Enter if the displayed values are correct. Type *n* if the values are incorrect, and retry from step 3d.

h A prompt appears to create a new kernel. Type *y* if only one device or the last device, or type *n* if multiple devices are to be added later. See step 6, "Rebuilding the Kernel," if you replied *y*.

4 Adding a SCSI Tape Drive.

NOTE If you are not adding a SCSI tape drive to this system, go to step 5.

---

a At the command prompt, type:

```
mkdev tape
```

Press Enter.

b The Tape Drive Configuration Program menu appears. Select option 1 to install a tape drive, and press Enter.

c The Tape Drive Installation Menu appears. Select option 4 to install a SCSI tape drive, and press Enter. From the next list, select the type of SCSI tape drive to install, and press Enter.

d The system prompts to configure the tape drive. Type *y* and press Enter.

e The system prompts for the identifier of the host adapter that supports this device. If the default is correct, press Enter. If the default is not correct, type:

```
slha
```

for SCO OpenServer.

Press Enter.

f The system prompts for the host adapter that supports the tape drive. Type the correct host adapter number, and press Enter.

If an additional Symbios host adapter is being added to the SCO UNIX 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 incorrectly, type *n*, and press Enter; the system then prompts for the host adapter identifier of the preceding step.

g With SCO OpenServer, the system prompts for the SCSI bus number of the tape drive. The default bus number is 0 (zero). Since Symbios host adapters support only one bus per adapter, press Enter to get the default of zero, or type 0 (zero) and press Enter.

h The system prompts for the SCSI ID of the tape drive. Type the SCSI ID number of the tape drive and press Enter.

i The system prompts for the LUN of the tape drive. Type 0 (zero) and press Enter. The system then prompts to update the SCSI configuration file. Type *y* and press Enter.

j A list appears that shows the special devices created. Press Enter, and another list appears that shows the links to the installed tape drive. When prompted for a boot string, type

q and press Enter to return to the Tape Drive
Configuration Program menu. Type *q* and press Enter to
terminate the Tape Drive Configuration Program menu.

k   A prompt appears to create a new kernel. Type *y* if only one
device or the last device, or type *n* if multiple devices are to
be added later. See step 6, "Rebuilding the Kernel" if you
replied *y*; return to step 3 if you replied *n*.

5   Adding a SCSI CD-ROM Drive.

NOTE   If you are not adding a SCSI CD-ROM drive to this
system, go to Step 6.

a   At the command prompt, type:

```
mkdev CD-ROM
```

Press Enter.

b   The CD-ROM Configuration Program menu appears.
Select option 1 to install a CD-ROM drive and press Enter.

c   The system prompts to configure the CD-ROM Drive. Type
y and press Enter.

d   The system prompts for the identifier of the host adapter
that supports this device. If the default is correct, press
Enter. If the default is not correct, type:

```
slha
```

for SCO OpenServer.

Press Enter.

e The system prompts for the host adapter that supports the CD-ROM drive. Type the correct host adapter number and press Enter.

If an additional Symbios host adapter is being added to the SCO UNIX kernel, the system prompts if you want to update the link-kit (add another host adapter). Type *y* and press Enter. If you entered the host adapter number incorrectly, type *n*, and press Enter; the system then prompts for the host adapter identifier of the preceding step.

f With SCO OpenServer, the system prompts for the SCSI bus number of the CD-ROM. The default bus number is 0 (zero).

g The system prompts for the SCSI ID of the CD-ROM Drive. Type the SCSI ID number and press Enter.

h The system prompts for the LUN of the CD-ROM drive. Type the desired LUN and press Enter, or press Enter for the default value of zero.

i The system prompts to update the SCSI configuration file. Type *y* and press Enter. A prompt appears to configure a CD-ROM/TAPE installation device. Unless this is desired, type *n* and press Enter. A prompt appears to add a High-Sierra file system. Type *y* and press Enter. The system displays the High Sierra/ISO9600 file system Configuration Program menu. 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. Type *q* and press Enter to terminate the CD-ROM Configuration Program menu.

j   A prompt appears to create a new kernel. Type *y* if only one device or the last device, or type *n* if multiple devices are to be added later. See step 6, "Rebuilding the Kernel" if you replied *y*; return to step 3 if you replied *n*.

6 Rebuilding the Kernel.

    a To rebuild the kernel, type the command:

```
/etc/conf/cf.d/link_unix
```

    b 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.

        Then the system backs up the old kernel.

        2 Do you want the kernel environment rebuilt (y/n)?

        Type: y

        Press Enter.

    c To activate the new kernel, you must reboot the system. Type the command:

```
reboot
```

    Press Enter.

    d After the system reboots and the "boot:" prompt appears, press Enter and the new kernel loads by default.

    e Log in as usual.

Troubleshooting

The following conditions should exist after a successful installation:

- The directory etc/conf/sdevice.d should contain a file named slha, depending on your SCO UNIX Release. This file contains the sdevice entries.

- The directory etc/conf/cf.d contains the files sdevice, mdevice, and mscsi. 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 Symbios 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 mscsi file.

- Directory /etc/conf/pack.d/slha should exist and contain the files Driver.o and space.c.

The following are some potential problems and their suggested solutions:

LOADING THE SCO UNIX TO AN IDE HARD DRIVE

You only need to link if you have a SCSI device attached to a Symbios Host Adapter. Follow the instructions in the SCO UNIX Installation documentation. Once the installation has completed, then go to Step 2 in Procedure 2 and use the installpkg to install your Symbios driver.

A SCSI DEVICE IS NOT FOUND.

   a Reboot and press Cntl C to view the SCSI BIOS Configuration Utility.

   b Verify the device is on the correct host adapter and ID.

   c 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.

   a Reinstall the proper Symbios driver using the installpkg
      utility. Remember to relink the kernel.

   b Reboot the system.

THE ROOT DISK IS NOT FOUND OR THE PARTITIONING OF THE DISK
FAILS.

   a If your boot drive is a SCSI disk, use the SCSI BIOS
      Configuration Utility to check that the disk is assigned
      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 that the tape
drive is assigned SCSI ID 2, and that it is configured to host
adapter 0 (zero), LUN 0 (zero).

Also, verify that 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 that the CD-
ROM drive SCSI ID is set to 5, and that it is configured to host
adapter 0 (zero), LUN 0 (zero).

Also, verify that the ID of the CD-ROM drive does not conflict
with any other SCSI device ID.

Device Drivers for UnixWare

....

Introduction

UnixWare 2.1 and UnixWare 7 extends the Unix SVR4.2 operating system, allowing tight integration with NetWare in an easy-to-use graphical form. UnixWare features include a graphical user interface, NetWare networking, application compatibility, multi-tasking capability, and multi-user capability. Additionally, UnixWare 2.1 provides multiprocessor support.

The storage device drivers for UnixWare are based on the Portable Device Interface (PDI) architecture. PDI logically breaks down a driver into a controller specific portion (c8xx host adapter driver) and a device specific portion (the target driver). The third

component is SDI (the SCSI Device Interface), a kernel resident driver that interfaces with both the target driver and host adapters.

The Symbios SDMS C8XX driver allows SCO UnixWare (previously Novell UnixWare) operating systems to interface with SCSI devices connected to a Symbios SYM53C8XX chipset and/or Symbios 8XX host adapter cards.

The driver can be statically linked (integrated) or dynamically linked (loadable) with the kernel. If the driver is integrated with the kernel, then the rebuilt kernel must reside on the boot drive. The following sections describe the procedures to install the driver during a first time installation of UnixWare, and to update already installed UnixWare with the Symbios SDMS C8XX driver.
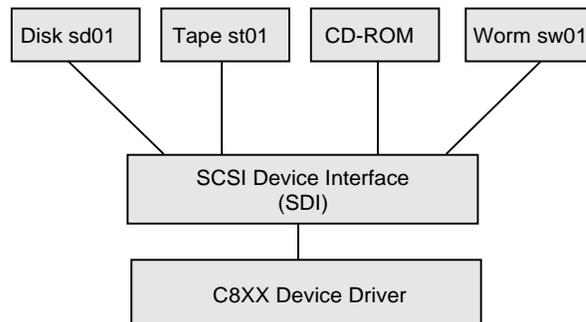
Figure 8-1 Portable Device Interface (PDI) Architecture

Features

- Allows easy installation using PDI - ID tools
- Synchronous negotiation (including Fast/Ultra SCSI/Ultra2 SCSI
- Supports multiple host adapters
- Supports Disconnect/Reselect
- Allows multiple and non-contiguous LUN support
- Supports dynamic interrupt mapping
- Supports Scatter/Gather
- Wide device support
- Supports SCSI pass-through functionality
- Supports tagged command queuing
- Multiprocessor support
- Supports target-initiated negotiation
- Supports NVRAM and NVS Configuration data areas

Description

To create a C8XX diskette to use with UnixWare installations, copy the raw dd image file onto a 1.44 MB floppy. The dd image file for SCO UnixWare operating systems is available on the SDMS Software Device Drivers and Utilities CD-ROM at {CD-ROM Driver Letter}:\DRIVERS\UNIX\SCOUWARE directory. You must build the driver diskette. Follow these steps to build the C8XX driver diskette:

For UNIX System Users:

1 Insert a 3.5-inch diskette into the floppy drive.

2 At the UNIX prompt, type:

dd if=/{CD-ROM Drive Letter}:/DRIVERS/UNIX/
SCOUWARE/UW49611.DD of=/dev/fd0135ds18

The {CD-ROM Drive Letter}:/... indicates the dd image location. This command will dd the image to the floppy to create the c8xx diskette.

For DOS System Users:

Use a utility that will copy a raw image onto a 1.44 MB floppy to copy the file "UW49611.DD" onto a 3.5-inch diskette. This .DD image is located at: {CD-ROM Drive Letter:}/DRIVERS/UNIX/SCOUWARE/.

Rawrite", which is a public domain utility, is available. See the rawrite3.doc file located at {CD-ROM Drive Letter:}/DRIVERS/UNIX/SCOUWARE for installation instructions.

After the image has been copied to a 3.5-inch diskette, use the C8XX diskette for UnixWare installations as instructed.

Use this diskette to load the driver during the installation of the operating system, or to access the devices on the SCSI bus after a UnixWare installation. The following sections describe these procedures.

For SCO UnixWare 2.1 and later, the Host Adapter diskette contains the C8XX driver for use during the initial installation of SCO UnixWare. If you have both the C8XX driver directly from Symbios and also the driver bundled with the UnixWare Operating System, use the latest release of the C8XX driver.

Installing the SDMS UnixWare Driver

Installing the c8xx Driver: New System Installation

When performing UnixWare installation, if the computer is set up to boot from the SCSI bus through a Symbios SYM53C8XX chipset, the driver is automatically linked statically with the kernel to suit the setup. You must follow the instructions in the UnixWare Installation Handbook before installing the driver.

1 Boot the computer using the Install diskette delivered with the UnixWare Operating System distribution package.

2 Follow the instructions on the screen.

3 Insert the SDMS PCI UnixWare driver diskette when prompted to insert the Host Adapter diskette and press Enter. The message "Please wait while HBA hardware modules are being loaded" appears.

If you want to install other host adapter drivers, then insert the HBA diskette provided with the UnixWare distribution package and press Enter. If there are no other host adapter drivers to install, press F10 to continue the installation and just follow the instructions.

4 The system loads the required drivers, such as C8XX and indicates when they are loaded.

5 Continue to follow instructions on the screen or refer to the UnixWare Installation Handbook to complete 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.

---

6 At the end of the installation you might see a prompt to
reinsert the C8XX driver diskette. Insert the SDMS PCI
UnixWare driver diskette and press Enter. The kernel is
rebuilt, and the system gets ready to boot from the SCSI disk
drive.

7 Remove the driver diskette when prompted to do so and
reboot the system.

Installing the C8XX Driver: Existing System Installation

You may install the C8XX driver on a system currently running
UnixWare by using one of three different procedures. The method
to use depends on the setup of your system and on whether you
want the system to remain running during this process. By
reviewing the following questions, you can determine which
procedure to follow.

*Is your Boot disk a SCSI hard disk on the SCSI bus connected to a
Symbios SYM53C8XX chipset?*

If the answer is yes, then you **must** statically link the kernel and
reboot the system. Follow the instructions in sections:

- Loading the Package
- Configure for Statically Linked driver
- Rebuild the UnixWare Kernel

Do you need or desire to install the driver without halting the system?

If the answer is *yes,* then you want to install the driver as a dynamically loadable driver. Follow instructions in sections:

- Loading the Package
- Configure for Dynamically Loadable driver
- Loading Loadable module

If the answer is *no* to the above questions, then follow instructions in sections:

- Loading the Package
- Rebuild the UnixWare Kernel

Loading the Package

Before you install the C8XX driver, make a backup copy of the existing kernel:

1 Log on as root.

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 the later section titled Troubleshooting for more information.

3 Once the old kernel is saved, insert the SDMS PCI UnixWare driver diskette.

4 Load the driver using the pkgadd command by typing:

```
pkgadd -d diskette1
```

5 Select C8XX and press Enter. The C8XX driver gets loaded on the system.

6 The system again prompts you to load the driver even if loading was successful. Type *q* (quit) and press Enter.

7 Verify that the driver is now listed and loaded successfully by typing:

```
pkginfo c8xx
```

8 The package information should look like this:

```
system c8xx Symbios IHV HBA
```

Configure for Statically Linked Driver

1 Make a backup copy of the C8XX system configuration file as follows:

```
cd  /etc/conf/sdevice.d

cp  c8xx  /tmp/c8xx.sys
```

2 Check if System file configured is static. If the file contains the line "$static", it is configured for static link. To look at this file, type the following command:

```
more c8xx
```

3 If the System file does not contain the text "$static" on the line immediately following the "$version" line, add it using a text editor. Do not include the double quotes.

Configure for Dynamically Loadable Driver

1 Make a backup copy of the C8XX system configuration file as follows:

```
cd  /etc/conf/sdevice.d

cp  c8xx  /tmp/c8xx.sys
```

2 Remove the "$static" line from the C8XX file using a text editor, or by typing the following commands:

```
grep  -v  '$static' c8xx > /tmp/c8xx.tmp

mv  /tmp/c8xx.tmp  c8xx
```

3 Configure the loadable driver into the system as follows:

```
/etc/conf/bin/idbuild  -M  c8xx
```

Loading the Loadable Module

1 Once the loadable driver is configured into the system, your driver is ready to load into the running system using the modadmin command as follows:

```
modadmin  -l  c8xx
```

NOTE   When the driver is loaded, it scans the SCSI bus and displays the devices found on it. An integer module-id used to identify the C8XX driver is displayed on the screen when loading completes.

---

2 To access the devices on the SCSI bus, create the entries into the device table using pdi commands as follows:

```
cd /etc/scsi

./pdimkdev  -ifS

./pdimkdtab  -ifS
```

The system is now ready to use.

Rebuilding the UnixWare Kernel

1 Reboot the system. When the C8XX package is loaded, it sets a system flag to automatically rebuild the kernel upon the next system boot. To reboot, type the following commands:

```
cd /

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 following section titled Troubleshooting. If the reboot is successful, the system is ready to use.

Troubleshooting

The following is a potential problem and its suggested solution:

DRIVER INSTALLATION FAILS.

a 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.

b Wait for the "Booting UnixWare ..." prompt and the subsequent beep, then press the space bar key to begin an interactive boot session.

c When the "boot:" prompt is displayed, type:

```
KERNEL=unix.safe

go
```

d The Operating System logo and "Booting UnixWare..." reappears. Then the system starts booting from the Unix kernel you specified in the previous step.

Chapter **9**

Device Drivers for NetWare

. . . .

Introduction

The Symbios NWPA driver for the Novell NetWare operating system allows you to utilize a Symbios SCSI controller or processor. This driver along with a Symbios SCSI controller or processor and an appropriate Custom Device Module (CDM), provide a SCSI solution within the NetWare environment.

A single driver is provided for the Novell NetWare versions 3.12 and 4.11 environments and for version 5.0 once it has been released. This document explains how to install and use the Symbios NWPA SCSI Host Adapter Module (HAM) driver for NetWare.

Features

- Synchronous negotiation (including Fast/Ultra SCSI/Ultra2 SCSI)

- Supports multiple host adapters

- Supports multiple logical unit numbers (LUNS)

- Large LUN support (larger than 7.844 gigabytes)

- Supports Disconnect/Reconnect

- Supports tagged command queuing

- Supports simple and ordered queue tags

- Supports Scatter/Gather

- Supports shared interrupts

- Supports Wide SCSI (single-ended and differential)

- Supports NetWare 4.11 SFT-III

- Supports SDMS 4.XX BIOS (with ASPI8XX.SYS version 4.05 or greater)

- Supports SDMS 4.11 BIOS (without ASPI8XX.SYS)

- Supports SDMS 4.XX DOS drivers

- Handles target initiated negotiation (wide and synchronous)

In conjunction with NetWare:

- Supports the ASPI interface via NetWare's NWASPI.NLM

- Support for SCSI CD-ROM devices via NetWare's SCSICD.CDM

- Support for SCSI-2 Tape devices via Novell's SCSI2TP.CDM

- Symmetric Multi-processing (SMP) under NetWare 4.11 requires Service Pack, Version 5 and is labeled IWSP5B.EXE. This Service Pack is available from the Novell Website and must be dated 6APR1998 or later. For some SMP systems, the following files are needed: SCSIHD.DDI, SCSIHD.COM, and NWPA.NLM 2.32f dated 2/9/98.

- The SCSIHD.CDM and SCSIHD.DDI files should be dated 5MAR1998 or newer.

- NWPA.NLM must be version 2.32f or newer.

NOTE   Other third party CDMs may also support these devices.

Symbios Devices Supported

The SYM8XXNW.HAM supports the following devices and Symbios host adapters based on those devices:

- SYM53C810, SYM53C810A, SYM53C810AE (SYM8100S, SYM8100ASP)

- SYM53C815 (SYM815XS, SYM8150SP)

- SYM53C825, SYM53C825A (SYM8250S, SYM8251S, SYM8251D, SYM8250ASP, SYM8251ASP, SYM8251AD)

- SYM53C860, SYM53C860AE (SYM8600SP)

- SYM53C875, SYM53C875E (SYM8750SP, SYM8751SP, SYM8751D)

- SYM53C876 (SYM22801, SYM22802)

- SYM53C885

- SYM53C895, SYM53C895A (SYM8951U)

The SYMHINW.HAM supports the following device and associated Symbios host adapter:

- SYM53C896 (SYM22910)

Description

The Symbios NWPA solution consists of the device drivers, SYM8XXNW.HAM and SYMHINW.HAM and the NetWare 4.XX installation files SYM8XXNW.DDI and SYMHINW.DDI. The SYMHINW.HAM is a Symbios PCI High Performance Driver.

 SYM8XXNW.HAM and SYMHINW.HAM are NWPA Host Adapter Modules (HAM). 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 Magneto Optical devices, SCSI tape devices, and SCSI changer devices. In addition, third party vendors are developing CDMs to device specific support.

ASPI Support

NWPA ASPI support is provided via NetWare's NWASPI driver. NetWare, or third party applications, may use this interface to communicate with a SCSI device attached to a Symbios controller, including SCSI-2 tape devices.

Installing NWPA NetWare Drivers

Install NetWare as described in the Novell NetWare Installation Manual. The following information is provided to assist in the installation.

The Symbios NWPA NetWare drivers must be loaded once for each Symbios controller SCSI channel present in the system. Locate the NetWare drivers on the SDMS Software Device Drivers and Utilities CD-ROM. Copy these files to a 3.5 floppy diskette. Follow the instructions below to use this diskette for loading NetWare drivers.

Preparing the System for NWPA Drivers

The Symbios NWPA drivers, SYM8XXNW.HAM and SYMHINW.HAM support the following DOS drivers:

- ASPI8XX.SYS (Version 4.05 or greater)
- SYMCD.SYS
- SYMDISK.SYS

These drivers do not support the older Symbios 3.XX DOS drivers (DOSCAM.SYS, MINICAM.SYS, CDROM.SYS, and SCSIDISK.SYS).

The BIOS version 4.11 is the minimum SDMS BIOS required for NetWare when not used with ASPI8XX.SYS. The SDMS 3.XX BIOS (version 3.07.00) and an SDMS 4.10 or older BIOS are supported, but ASPI8XX.SYS, version 4.05 or greater, is required.

To Upgrade the BIOS (Boot ROM) from 3.XX to 4.XX:

Please see the section titled "When using the 4.XX BIOS" regarding 8XX_32.ROM with SCAM enabled before upgrading the BIOS.

1 Load FLASH8X5.EXE

2 Follow the screen instructions to upgrade the BIOS.

3 Select the appropriate BIOS file (i.e., 8XX_64.ROM). BIOS version 4.03 or later must be loaded.

To Check the Status of DOS drivers:

1 Edit the CONFIG.SYS file.

2 If any of the following lines appear, remove or delete these lines. Use 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
```

3 If CD-ROM support is required, then add the following:

```
DEVICE=<path>\ASPI8XX.SYS

DEVICE=<path>\SYMCD.SYS /d:<name>

DEVICE=<path>\MSCDEX /d:<name>
```

For NetWare 4.11 New Installations

1 Begin the file server installation according to the instructions in the Novell NetWare Installation Manual.

2 When the NetWare installation procedure prompts you for a Disk Driver, insert the Symbios device drivers diskette into drive A: or B:. Then use the INS key 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 SYM8XXNW.HAM or the SYMHINW.HAM driver will appear as a selection.

NOTE   If the INS key option does not appear during the installation, choose Server Drivers to go to the Summary page. Highlight Disk and CD-ROM Drivers (for example, IDEATA). Press Enter and load an additional driver. Then press the INS key. The system always defaults to the A: path. Highlight the Symbios NWPA driver and press Enter. Select Yes to save and move the driver into the operating system. Press Enter for the system to copy the files.

---

3 Next the system prompts the user with the 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 given later in this document, in the section titled Command Line Options. Modify any option values as needed for this installation.

4 Load a separate instance of the driver for every Symbios controller or host adapter present in the system.

5 When prompted for a slot number, accept the slot numbers displayed. Make sure to write these slot numbers down for use at a later point.

6 When asked to edit the STARTUP.NCF file, make sure the SYM8XXNW.HAM (or SYMHINW.HAM) is loaded once per Symbios controller SCSI channel present in the system. Add the statement SLOT=<slot number> to each load line in the STARTUP.NCF, specifying the slot numbers written down in step 5 above, with only one slot number per load instance. The HAM driver(s) are loaded for each Symbios controller SCSI channel from the first LOAD statement to the last LOAD statement.

For NetWare 4.11 SFT-III Installations

1 Install your primary server following procedures for the native 4.11 installation.

2 Begin the SFT-III installation as instructed by NetWare installation procedures.

3 While installing the secondary server, you have the option of copying the SYM8XXNW.HAM driver from the primary server. Press F10 to accept.

For An Existing Installation Of NetWare 3.12

If the Symbios SDMS (DDFS) NetWare drivers (SDMSNETx.DSK and optionally NETASPIx.NLM) are currently installed on the system, then these files must be replaced with the driver, SYM8XXNW.HAM. Follow the instructions below to update the system.

From the website at:

http://developer.novell.com/devres/sas/certinfo.htm

Download NWPA_312.EXE from the "Download Upgrade Package for NetWare v3.12."

1   Install DOS and the CD-ROM driver on the target server machine.

2   Create the directory C:\SERVER.312 if it does not already exist and then change to that directory.

3   Copy NWPA_312.EXE to C:\SERVER.312.

4   Execute NWPA_312.EXE in the C:\SERVER.312 directory.

5   Execute 312PTB.EXE in the same directory.

6   Create the directory C:\SERVER.312\CDSAVE.

7   Copy CDROM.NLM to C:\SERVER.312\CDSAVE.

8   Change directory to the D:\NETWARE.312\ENGLISH directory on the CD-ROM drive, if its drive letter is D:

9   Enter install at the DOS command line. Proceed through the installation of NetWare v3.12 as usual, until the installation program ends with the cursor at the server console command line.

10 At the server console enter the following commands:

```
load native\start\npapatch

load mmattrfx

load nbi31x
```

11 Load the .HAM driver. (for example, load a:\sym8xxnw.ham)

12 Continue installation by loading INSTALL, creating and mirroring NetWare partitions, creating SYS: and VOL1: volumes, and installing the OS under the copy system and public files of System Options.

13 Edit the STARTUP.NCF file, adding the slot number for each card.

14 Edit the AUTOEXEC.NCF file, add the following lines after lines already present but before the mount all line, then save the file:

```
load after311

load c:\server.312\mmattrfx

load c:\server.312\nwpaload

search add 1 c:\server.312\cdsave

load cdrom
```

15 At the server console enter the following command:

```
load c:\server.312\patch312
```

16 DOWN and EXIT the server.

17 Copy the .HAM driver to the C:\SERVER.312 directory.

18 Remove the NetWare CD-ROM.

19 Reboot the server.

Reconfiguring Driver Options

To reconfigure driver options, follow these steps:

1 To unload all instances of the driver, type:

```
unload SYM8XXNW.HAM
```

-or-

```
unload SYMHINW.HAM
```

To reload each instance of the driver with the desired option settings, type:

```
load SYM8XXNW.HAM slot=<slot number> <options>
```

-or-

```
load SYMHINW.HAM slot=<slot number> <options>
```

2 If the changes made to the load options of one or more load instance are permanent, and the driver is loaded automatically at server boot time, you must specify these options in the STARTUP.NCF or AUTOEXEC.NCF file.

Command Line Options

The SYM8XXNW.HAM and SYMHINW.HAM drivers have many tuning parameters. A list of tuning 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 an option is specified but the assignment is not valid, then the default value is used. The options described below are used by placing the specified 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 SYM8XXNW.HAM wide=off
```

-or-

```
load SYMHINW.HAM wide=off
```

NOTE   No spaces are allowed within a single command line option, but spaces are required between different command line options.

Information Option

The information option described below is "Using the Help Mode Option."

Using the Help Mode Option

Command line option: ? or h

Function: Display the options available in the driver.

Possible Impact: The driver will not load with ? or h specified.

This option is specified 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 the ? or h option is specified along with other options, the help screen is invoked, the other options are ignored, and the driver is not loaded.

NetWare NWPA Driver Customizable Options

Table 9-6   Customizable Options

Option	Description
Slot slot=\<option\>	**Default value:** None. **Valid options:** 0-10099 **Function:** Specify the slot instance number of the Symbios controller SCSI channel that the load instance applies to. **Possible Impact:** This information may not be known to the user at load/install time. The slot option specifies which Symbios controller SCSI channel (embedded chip or host adapter) the current load pertains to. This information is required to load the driver. If this information is not specified on the load line, the driver prompts for the slot number.
Tagged Queuing qtags=\<option\>	**Default value:** on **Valid options:** on, off **Function:** Enable/disable tagged queuing for the devices. **Possible Impact:** Tagged queuing may result in improved I/O throughput in devices that support such an option. Enabling this option results in the driver issuing tagged I/O requests to the devices that support tagged queuing. Devices that do not support tagged queuing are not issued tagged requests. Depending on the drive controller, throughput of the device is increased by the use of queue tags. However, the optimal number of queue tags is based on the specific device type.

Table 9-6   Customizable Options (Continued)

Option	Description
Synchronous SCSI sync=<option>	**Default value:** 40 (maximum) **Valid options:** 0, 10, 20, or 40 **Function:** Enable/Disable support of synchronous SCSI. **Possible Impact:** Could cause a device to operate slower than its maximum speed. This synchronous SCSI option allows the user to enable/disable support of Fast, Ultra, and Ultra2 SCSI synchronous data transfers when using a Fast, Ultra, or Ultra2 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. If this option is disabled, and sync is enabled, the controller performs up to 10 Mega transfers/second with any device capable of synchronous negotiations.
Wide SCSI wide=<option>	**Default value:** on **Valid options:** on, off **Function:** Enable/Disable support of wide SCSI. **Possible Impact:** No wide SCSI support available The wide SCSI option allows the user to disable support of wide SCSI operation when using a wide SCSI controller. Set this option to "off" to disable a wide SCSI device is present on the system, but 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. If this option is set to "disable", 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.

Table 9-6   Customizable Options (Continued)

Option	Description
Elevator Threshold elev=<option>	**Default value:** 4 **Valid options:** 0-250 (0=disable) **Function:** Specify the maximum number of I/Os the HAM should queue before allowing NWPA to filter and organize requests. **Possible Impact:** Varying the elevator threshold value may affect performance. The elevator queues are used by NWPA 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.

Important Additional Information

For Information Pertaining to a Specific Driver

This document addresses options available on the Symbios NWPA NetWare driver, versions 4.02.00 or later. For information pertaining to a specific driver, please do one of the following:

- For NetWare version 4.11, consult the SYM8XXNW.DDI or SYMHINW.DDI file for options available for SYM8XXNW.HAM or SYMHINW.HAM. Refer to the NetWare installation utility to access these files.

- Load the driver specifying the ? option on the command line of the SYM8XXNW.HAM or SYMHINW.HAM driver. The driver does not actually load, but available options are displayed.

DOS Access Dependencies

Typically, NetWare requires access to the DOS partition (perhaps to load a file, or to down the system). The SYM8XXNW.HAM and/or SYMHINW.HAM drivers support several SDMS DOS configurations.

SYM8XXNW.HAM and SYMHINW.HAM detect whether an SDMS 3.XX or SDMS 4.XX BIOS is present. They also detect if the SDMS 4.05 DOS driver ASPI8XX.SYS is loaded. If the SDMS 3.XX BIOS or SDMS 4.10 or older BIOS is being used, then ASPI8XX.SYS 4.05 or greater must also be loaded. When using the SDMS 4.11 BIOS, the ASPI8XX.SYS is not required.

NOTE   SYM8XXNW.HAM and SYMHINW.HAM do not
support the SDMS 3.XX DOS drivers: DOSCAM and
MINICAM.

If DOS partitions exist on any device connected to a Symbios
controller, the SDMS 3.XX or SDMS 4.10 or older BIOS and/or
SDMS ASPI8XX.SYS DOS 4.05 or greater driver is required for
DOS support.

Supported DOS Configurations

The following are the DOS configurations supported by the
SYM8XXNW.HAM driver:

SDMS 3.XX BIOS, ASPI8XX.SYS[1]

SDMS 4.11 or greater BIOS, No DOS Drivers

SDMS 4.XX BIOS, ASPI8XX.SYS[1]

No SDMS BIOS, ASPI8XX.SYS[1]

No SDMS BIOS, No DOS Drivers

[1]In addition to ASPI8XX.SYS (version 4.05 or greater),
SYMCD.SYS and/or SYMDISK.SYS may be loaded for DOS CD-
ROM and DOS Magneto Optical (MO), respectively. SYMCD.SYS
and SYMDISK.SYS are **not** required for CD-ROM or MO
support under NetWare. Magneto Optical drives are not
supported by version 4.02 of the Symbios NWPA driver.

When Using the SDMS 3.XX BIOS

If the SDMS 3.XX BIOS is present, load ASPI8XX.SYS (version 4.05 or greater) in the CONFIG.SYS file. An optional driver for CD-ROM support (SYMCD.SYS) works with these drivers in conjunction with MSCDEX.EXE.

When Using the SDMS 4.XX BIOS

If the SDMS 4.10 or older BIOS is present, load ASPI8XX.SYS (version 4.05 or greater) in the CONFIG.SYS file. SCAM must be disabled in the 4.XX BIOS. If SCAM is enabled, then the Symbios NWPA driver will fail to load.

When Using ASPI8XX.SYS

SCAM support by default is off in ASPI Manager version 4.05 and later.

Supported DOS Drivers

The SDMS 3.XX BIOS and SDMS 4.10 or older BIOS are both supported by the SDMS 4.05 or greater ASPI8XX.SYS DOS driver. Support for CD-ROM and MO devices under DOS is provided by SYMCD.SYS and SYMDISK.SYS, respectively. Neither SYMCD.SYS nor SYMDISK.SYS are required for NetWare support of CD-ROM and MO devices; but for SCSI CD-ROM installation, ASPI8XX and SYMCD are required.

SCSI MO devices are not supported under NetWare by the Symbios NWPA driver(s). A list of DOS drivers currently supported by the Symbios NWPA drivers, SYM8XXNW.HAM and SYMHINW.HAM, are described below.

ASPI8XX.SYS The ASPI8XX.SYS driver provides an ASPI layer interface for disk and non-disk devices. ASPI8XX.SYS is not required for NetWare support if the SDMS 3.XX BIOS or SDMS 4.10 or older BIOS is not used. If NetWare is being installed from a SCSI CD-ROM on a Symbios controller, SYMCD.SYS is required with ASPI8XX.SYS.

SYMCD.SYS To install the NetWare operating system from CD-ROM, load the SYMCD.SYS driver with ASPI8XX.SYS. Once the NetWare operating system installation is complete, SYMCD.SYS is not needed. The NetWare NWPA environment provides support for SCSI CD-ROMs through the NWPA driver interface.

MSCDEX.EXE The MSCDEX.EXE driver (provided with DOS) is required in conjunction with SYMCD.SYS 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. This driver is not required for NetWare support of these devices.

NOTE   The NetWare drivers can function independently of any DOS drivers, with the following exceptions:
1. The installation of NetWare from a SCSI CD-ROM.
2. The SDMS 3.XX BIOS or SDMS 4.10 or older BIOS is being used.

When Using No SDMS BIOS

The SYM8XXNW.HAM and SYMHINW.HAM drivers 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 a Symbios controller-based host adapter. As an example, DOS could reside on an IDE drive.

NetWare DMI 1.0 SDMS Component Instrumentation

The Symbios NetWare DMI 1.0 SDMS Component Instrumentation (CI) runs as a NetWare service. It reports asset and configuration information for the adapters and devices controlled by the Symbios NetWare driver.

Features

- Dynamic AMS support for LanDesk 3.0

  If AMS for LanDesk 3.0 is present, then the CI will register with it. If AMS for LanDesk 3.0 is not present, then the CI will still load a function correctly.

- Support for the 4.XX based NetWare drivers

- Support for the SYMHINW.HAM driver, which supports the SYM53C896 device and SYM22910 host adapter.

Description

The component instrumentation has specific hardware and software requirements, which are discussed below.

Hardware Requirements   The component instrumentation works with all Symbios PCI-SCSI I/O Processors that are supported by the SDMS BIOS and drivers.

Software Requirements   The component instrumentation software requirements are:

- Requires LanDesk v. 2.8 or higher to be installed and running.

- Requires version 4.00.14 or higher of the Symbios SYM8XXNW.HAM driver

    -OR-

    version 4.0014 or higher of the Symbios SYMHINW.HAM driver.

- Requires version 4.11 of NetWare.

Installation Instructions for NetWare CI Service

Install the NetWare component instrumentation by following these instructions:

1 Copy symsdms.mif to system\dmi\netware\mifs\backup directory.

2 Copy symcinw.nlm to the system directory.

3 After the 1.0 service provider, amsdb.nlm, msgsys.nlm, and msgsrv.nlm have started, start the NETWARE CI by typing

```
load symcinw
```

Removing the NetWare CI Service

You can stop the NETWARE CI by typing:

```
unload symcinw
```

Device Drivers for NetWare..

Glossary

. . . .

Active Termination	The electrical connection required at each end of the SCSI bus, composed of active voltage regulation and a set of termination resistors. Ultra and Ultra2 SCSI require active termination.
Address	A specific location in memory, designated either numerically or by a symbolic name
API	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.
ASPI	Advanced SCSI Programming Interface. A specification for a common structured method of supporting SCSI peripherals. It provides an interface between host adapters and SCSI device drivers.

Asynchronous Data Transfer	One of the ways data is transferred over the SCSI bus. Asynchronous transfers are tied to control signal handshaking and are slower than synchronous data transfer.
Bernoulli box	A high-capacity data storage device that uses a removable, non-volatile cartridge.
Binary code	Software instructions reduced to ones and zeros that are readable by a computer.
BIOS	Basic Input/Output System. Software that provides basic read/write capability. Usually kept as firmware (ROM based). The system BIOS on the mainboard of a computer is used to boot and control the system. The SCSI BIOS on your host adapter acts as an extension of the system BIOS.
Bit	A binary digit. The smallest unit of information a computer uses. The value of a bit (0 or 1) represents a two-way choice, such as on or off, true or false, and so on.
Boot disk	A hard disk or diskette that contains an operating system which can be booted to set the computer into operation.
Bundled	Drivers are distributed with the operating system by the OS vendor.
Bus	A collection of unbroken signal lines across which information is transmitted from one part of a computer system to another. Connections to the bus are made via taps on the lines.

Bus Mastering	A high-performance way to transfer data. The host adapter controls the transfer of data directly to and from system memory without bothering the computer's microprocessor. This is the fastest way for multitasking operating systems to transfer data.
Byte	A unit of information consisting of eight bits.
CAM	Common Access Method. A specification (API), developed by an industry committee, for a common structured method of supporting SCSI peripherals.
CD-ROM	Compact Disk-Read Only Memory. An optical storage technology that uses compact disks to store up to 650 megabytes of data per disk.
Compile	To translate source code written in a high-level language into object code.
Configuration	Refers to the way a computer is set up; the combined hardware components (computer, monitor, key board, and peripheral devices) that make up a computer system; or the software settings that allow the hardware components to communicate with each other.
CPU	Central Processing Unit. The "brain" of the computer that performs the actual computations. The term Microprocessor is also used.

Device Driver	A software program designed to drive or operate a peripheral device through a specific operating system. It is operating system and device dependent.
Differential SCSI	A hardware configuration for connecting SCSI devices. It uses a pair of lines for each signal transfer (as opposed to single-ended SCSI which references each SCSI signal to a common ground.)
DMA	Direct Memory Access. The ability of an I/O system to transfer data to and from a memory subsystem without CPU intervention.
DMA Bus Master	A feature that allows a peripheral to control the flow of data to and from system memory by blocks, as opposed to PIO (Programmed I/O) where the flow is by byte. This feature has less of an impact on the CPU.
EISA	Extended Industry Standard Architecture. An extension of the 16-bit ISA bus standard. It allows devices to perform 32-bit data transfers.
External SCSI Device	A SCSI device installed outside the computer cabinet. These devices are connected in a continuous chain using specific types of shielded cables.
Fast SCSI	A standard for SCSI data transfers. It allows a transfer rate of up to 10 MBytes/sec over an 8-bit SCSI bus and up to 20 MBytes/sec over a 16-bit SCSI bus.

File	A named collection of information stored on a disk.
Formatting	To prepare a disk to receive information by organizing its surface into tracks and sectors.
Hard Disk	A disk made of metal and permanently sealed into a drive cartridge. A hard disk can store very large amounts of information.
HBA	Host Bus Adapter. An integrated circuit that supplies a bus connector to a computer system. Also referred to as Host Adapter.
Host	The computer system in which a SCSI host adapter is installed. It uses the SCSI host adapter to transfer information to and from devices attached to the SCSI bus.
Host Adapter	A circuit board or integrated circuit that provides a SCSI bus connection to the computer system.
Internal SCSI Device	A SCSI device installed inside the computer cabinet. Internal SCSI devices are connected in a continuous chain using an unshielded ribbon cable.
IRQ	Interrupt Request Channel. A path through which a device can get the immediate attention of the computer's CPU. The PCI bus assigns an IRQ path for each SCSI host adapter.

ISA	Industry Standard Architecture. A type of computer bus used in most PC's. It allows devices to send and receive data 16-bits at a time.
KByte	Kilobyte. A measure of computer storage equal to 1024 bytes.
Link	To produce an executable program from compiled modules (programs, routines, libraries) by merging the object code and resolving interconnecting references.
Local Bus	A way to connect peripherals directly to computer memory. It bypasses the slower ISA and EISA busses. PCI is a local bus standard.
Logical Unit	A subdivision, either logical or physical, of a SCSI device (actually the place for the device on the SCSI bus). Most devices have only one logical unit, but up to eight are allowed for each of the eight possible devices on a SCSI bus.
LUN	Logical Unit Number. An identifier, zero to seven, for a logical unit.
LVDlink	Low Voltage Differential Link allows greater Ultra2 SCSI device connectability and longer SCSI cables. LVDlink lowers the amplitude of noise reflections and allows higher transmission frequencies.

Main board	A large circuit board that holds RAM, ROM, the microprocessor, custom integrated circuits, and other components that make a computer work. It also has expansion slots for host adapters and other expansion boards.
Main Memory	The part of a computer's memory which is directly accessible by the CPU (usually synonymous with RAM).
Motherboard	See Mainboard.
Multi-tasking	The executing of more than one command at the same time. This allows programs to operate in parallel.
Multi-threading	The simultaneous accessing of data by more than one SCSI device. This increases the data transfer rate.
Network	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.
NVRAM	Non-Volatile Random Access Memory. Actually an EEPROM (Electronically Erasable Read Only Memory chip) used to store configuration information.
Object code	Software instructions that are compiled as an intermediate step between source code and binary code.

Operating System	A program that organizes the internal activities of the computer and its peripheral devices. An operating system performs basic tasks such as moving data to and from devices, and managing information in memory. It also provides the user interface.
Parity Checking	A way to verify the accuracy of data transmitted over the SCSI bus. One bit in the transfer is used to make the sum of all the 1 bits either odd or even (for odd or even parity). If the sum is not correct, an error message appears.
Partition	A logical portion of space on a hard disk designated by a drive letter.
Passive Termination	The electrical connection required at each end of the SCSI bus, composed of a set of resistors. It improves the integrity of bus signals.
PCI	Peripheral Component Interconnect. A local bus specification that allows connection of peripherals directly to computer memory. It bypasses the slower ISA and EISA busses.
Peripheral Device	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.

PIO	Programmed Input/Output. A way the CPU can transfer data to and from memory via the computer's I/O ports. PIO is faster than DMA, but requires CPU time.
Port Address	Also Port Number. The address through which commands are sent to a host adapter. This address is assigned by the PCI bus.
Port Number	See Port Address.
POST	Power On Self Test. A set of routines stored in ROM that provides diagnostic tests for various system components before booting can proceed.
Processor	A computer hardware component that performs computations directed by software commands.
Queue Tags	A way to keep track of multiple commands that allows for increased throughput on the SCSI bus.
RAM	Random Access Memory. The computer's primary working memory in which program instructions and data are stored and are accessible to the CPU. Information can be written to and read from RAM. The contents of RAM are lost when the computer is turned off.
Removable Media	A computer data storage device in which the magnetic disk or tape is enclosed in a removable cassette or cartridge.

RISC Core	Symbios Logic SCSI chips contain a RISC (Reduced Instruction Set Computer) processor, programmed through microcode scripts.
ROM	Read Only Memory. Memory from which information can be read but not changed. The contents of ROM are not erased when the computer is turned off.
SCAM	SCSI Configured AutoMatically. A method to automatically allocate SCSI IDs via software when SCAM compliant SCSI devices are attached.
Scatter/Gather	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.
SCSI	Small Computer System Interface. A specification for a high performance peripheral bus and command set. The original standard is referred to as SCSI-1.
SCSI-2	The current SCSI specification which adds features to the original SCSI-1 standard.

SCSI Bus	A host adapter and one or more SCSI peripherals connected by cables in a linear chain configuration. The host adapter may exist anywhere on the chain, allowing connection of both internal and external SCSI devices. A system may have more than one SCSI bus by using multiple host adapters.
SCSI Device	Any device that conforms to the SCSI standard and is attached to the SCSI bus by a SCSI cable. This includes SCSI host adapters and SCSI peripherals.
SCSI ID	A way to uniquely identify each SCSI device on the SCSI bus. Each SCSI bus has eight available SCSI IDs numbered 0 through 7 (or 0 through 15 for Wide SCSI). The host adapter usually gets ID 7 giving it priority to control the bus.
SDMS	SCSI Device Management System. A Symbios software product that manages SCSI system I/O.
Single Ended SCSI	A hardware specification for connecting SCSI devices. It references each SCSI signal to a common ground. This is the most common method (as opposed to differential SCSI which uses a separate ground for each signal).
Software	The entire set of programs, procedures, and related documentation associated with a computer system.

Source code	Software instructions written as text in a high level programming language. It is readable by humans who know the language.
Synchronous Data Transfer	One of the ways data is transferred over the SCSI bus. Transfers are clocked with fixed-frequency pulses. It is faster than asynchronous data transfer, but cannot be used for certain kinds of transfers, so some negotiation is required.
System BIOS	Controls the low level POST (Power On Self Test), and basic operation of the CPU and computer system.
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).
Ultra SCSI	A standard for SCSI data transfers. It allows a transfer rate of up to 20 MB/sec over a 8-bit SCSI bus and up to 40 MB/sec over a 16-bit SCSI bus. STA (SCSI Trade Association) supports using the term "Ultra2 SCSI" over the term "Fast-20".
Ultra2 SCSI	A standard for SCSI data transfers. It allows a transfer rate of up to 80 MB/sec over a 16-bit SCSI bus. STA (SCSI Trade Association) supports using the term "Ultra2 SCSI" over the term "Fast-40".
Virtual Memory	Space on a hard disk that can be used as if it were RAM.

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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