PCI SCSI Device Management System SDMS 4.0

USER'S
GUIDE

Preface

About This Book

This User's Guide is intended to explain how to install and configure the Symbios Logic 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 Logic Electronic Bulletin Board
(719) 573-3562

Symbios Logic Technical Support

Your entire Symbios Logic host adapter solution has been designed for ease of use. However, if you require additional assistance, please contact the Symbios Logic Technical Support Hot Line at (719) 573-3016. The hours of operation are from 7:30 to 4:30 (MST), Monday through Friday.

Before calling, please have the following information:

● Which Symbios Logic 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

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.

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Chapter 1

Introduction

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Introduction

General Description

The Symbios Logic SCSI Device Management System (SDMS) is a complete software package that solves the increasingly complex problem of managing system I/O. It seamlessly addresses hardware and software interfaces by supporting the Symbios Logic 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 provides a standard method to interface SCSI I/O subsystems with devices, operating systems, and application software. It also enhances system capabilities already provided by SCSI controllers and processors by facilitating system-wide SCSI device access.

Figure 1-1
The Symbios Logic SCSI Device
Management System
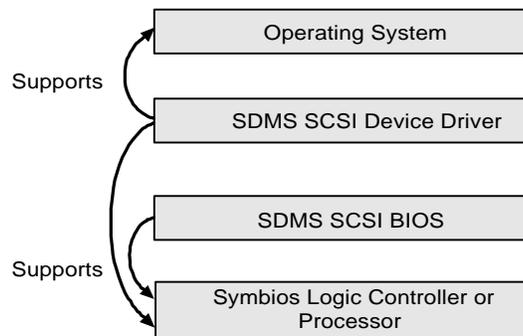
Overview

A Symbios Logic SCSI controller or processor can control peripherals such as hard disk drives, CD-ROM drives, tape drives, and removable media. SCSI peripherals are intelligent devices that do not need the constant attention required by non-intelligent devices. You can connect up to 15 SCSI peripheral devices (via the SCSI bus) to a SCSI host adapter on which the SCSI controller or processor resides.

A SCSI host adapter can function as a secondary adapter in a system that already has a primary hard drive controller card (IDE, ESDI, ST506). Only SCSI host adapters can do this, expanding the possibilities for system configuration.

Figure 1-2
SDMS Information Flow

```
        ┌─────────────────────┐
        │  Operating System   │
        └─────────────────────┘
                  ↕
        ┌─────────────────────┐
   ┌───▶│  SDMS SCSI Driver   │
   │    └─────────────────────┘
   │              ↕
   │    ┌─────────────────────┐
   │    │   SDMS SCSI BIOS    │
   │    └─────────────────────┘
   │              ↕
   │    ┌─────────────────────┐
   └───▶│   Symbios Logic     │
        │Controller or Processor│
        └─────────────────────┘
                  ↕
SCSI Bus ━━━━━━━━━━━━━━━━━━━━━━━
                  ↕
        ┌─────────────────────┐
        │  SCSI Peripherals   │
        └─────────────────────┘
```
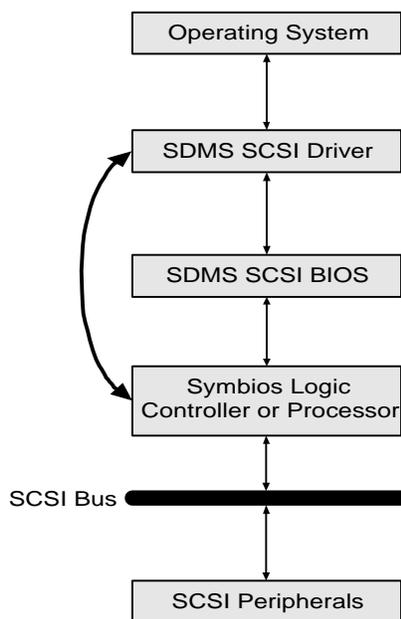
SCSI BIOS

A SCSI BIOS is the bootable ROM code that manages SCSI hardware resources. It is specific to a family of Symbios Logic SCSI controllers or processors. A Symbios Logic SCSI BIOS integrates with a standard system BIOS, extending the standard disk service routine provided through INT13.

During its boot time initialization, the SCSI BIOS determines if another hard disk is already installed. If there is, the SCSI BIOS maps any SCSI drives it finds behind the drive 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.

Using the Symbios Logic SCSI BIOS Configuration Utility

If you have SDMS BIOS version 4.x or higher, and it includes the Symbios Logic SCSI BOS 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 SDMS BIOS in a banner displayed on your computer monitor during boot. If the utility is available, a message also appears on your monitor (for about five seconds) that looks like this:

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

To use this menu driven utility, your SCSI host adapter must have NVRAM (non-volatile memory) to store the changes.

IMPORTANT: This utility is a powerful tool. If, while using it, you somehow disable all your controllers, pressing Ctrl-A (or Ctrl-E on version 4.04 or later) after memory count during reboot allows you to recover and reconfigure.

The SDMS device drivers configure themselves based on the settings stored in NVRAM. If you change the default configuration settings for your SCSI host adapter, the drivers reflect these changes.

SDMS Device Drivers

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

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

- DOS/Windows
- Windows 95
- OS/2
- SCO Unix
- UnixWare
- NetWare - NWPA and DDFS
- Windows NT

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

Before You Begin

SDMS software requires an IBM PC/AT or compatible computer with an 80386 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 Logic SCSI controller into your system, taking into account the configuration of other host adapters and system resources (see Basic Rules... listed below).

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

Basic Rules For SCSI Host Bus 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 determine what the terminators are, and where they are located.

Unless your system is SCAM (SCSI Configured AutoMatically) capable, you must configure each SCSI device with a different SCSI ID number. Refer to the hardware manuals for the devices and the host adapter 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) using the BIOS configuration utility. The

bootable hard drive must have the lowest numerical SCSI ID.

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.

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

Introduction
Before You Begin

Chapter 2

Device Drivers for DOS/Windows

Introduction

In SDMS 4.0, the SCSI BIOS for the Symbios Logic family of PCI SCSI chips is capable of mapping SCSI hard disk drives behind any non-SCSI hard disk drives (IDE, ESDI, etc.) within the same system. A driverless solution will allow 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 the drivers work together, and some are capable of direct communication with a Symbios Logic PCI/SCSI controller.

Figure 2-1
How SDMS DOS Drivers
Communicate
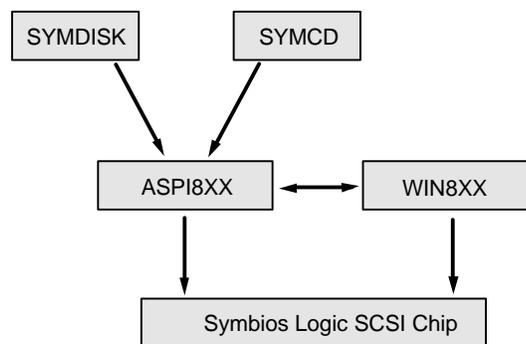
ASPI8XX.SYS   is an ASPI (Advanced SCSI Programming Interface) manager which provides standard ASPI compatibility between your SCSI host adapter hardware and ASPI compatible applications.

SYMDISK.SYS   is a device driver for SCSI disk drives, and works through the ASPI manager.

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

WIN8XX.386   is a Windows ASPI manager that does not require the ASPI8XX.SYS driver to function. However, if either the SYMCD.SYS or SYMDISK.SYS driver is needed, ASPI8XX.SYS is still required.

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

Automatic Installation of SDMS for DOS

Using the DOS Installation Utility

The Symbios Logic SDMS DOS installation utility provides a quick and easy method for performing either an automatic or custom installation of the SCSI device drivers in a DOS/Windows environment. It works with any system using an SDMS supported Symbios Logic SCSI chip. The installation utility identifies the system, scans the SCSI bus, and properly installs the needed SCSI device drivers.

The SDMS Drivers diskette containing the DOS device drivers also holds the DOS installation utility. To use the utility, insert the disk into your floppy drive while in the DOS environment, and type:

```
INSTALL
```

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 Your ASPI8XX.SYS Driver

Features

- Supports Advanced SCSI Programming Interface (ASPI) applications
- Supports single-threaded I/O
- Supports up to four host adapters
- Releases initialization code for smaller runtime size
- Performs synchronous negotiation (including Fast-20)
- Performs Wide SCSI negotiation
- Full VDS (Virtual DMA Services) support, including scatter-gather
- Allows Disconnect/Reselect
- Supports adapter exclusion
- Allows shared interrupts

Description

ASPI8XX.SYS is an ASPI manager which 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.

ASPI8XX.SYS 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 Your ASPI8XX.SYS Driver

1 Use the COPY command to copy the ASPI8XX.SYS driver from the SDMS SCSI Drivers disk to your boot disk.

2 Add this line to your system's CONFIG.SYS file:

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

This line must appear before any line loading other ASPI drivers (like SYMCD.SYS, SYMDISK.SYS, or any other ASPI compliant driver/application).

Command Line Options

The ASPI8XX.SYS driver has several configurable features which are set via switches on the command line in your CONFIG.SYS file.

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

IMPORTANT   **No spaces are allowed in specifying these command line options. Spaces are required between different command line options.**

Using the /ASK Option

This option prompts you at system boot-up time whether to load the ASPI8XX.SYS driver.

Option Syntax:

```
/ASK
```

For example, to activate this option, the line in your CONFIG.SYS file that loads ASPI8XX.SYS should look like this:

```
DEVICE=C:[PATH]ASPI8XX.SYS /ASK
```

Using the /WIDTH (or /W) Option

The width parameter defines the maximum data width negotiated with a device. This is used with host adapters capable of 16-bit data transfers. Valid settings are 8 or 16.

Option Syntax:

```
Option Syntax: /WIDTH=n<path[:id]>[,n<path[:id]>]*
```

For example, if your 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 your CONFIG.SYS file that loads ASPI8XX.SYS should look like this:

```
DEVICE=C:[PATH]ASPI8XX.SYS /WIDTH=8<0:2>
```

Using the /DISCONNECT (or /DC) Option

SCSI devices have the ability to disconnect from the bus during an I/O transfer. This option is used to allow a device to disconnect. 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. Valid options are ON (allow disconnects) or OFF (do not allow disconnects). The default for all devices is ON.

Option Syntax:

```
/DISCONNECT=n<path[:id]>[,n<path[:id]>]*
```

For example, to disable disconnects on the device attached to the first host adapter (boot order designation = 0) at SCSI ID 2, the line in your CONFIG.SYS file that loads ASPI8XX.SYS should look like this:

```
DEVICE=C:[PATH]ASPI8XX.SYS /DISCONNECT=OFF<0:2>
```

Using the /SYNCH_RATE (or /SR) Option

This option sets the maximum synchronous transfer rate (in mega transfers per second) to negotiate with a particular device. The allowable values are 0, 5, 10, and 20, providing the host adapter is capable of the specified speed. To turn off synchronous transfers for a particular device, you should specify 0. The default value is the fastest rate supported by your host adapter.

Option 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 your CONFIG.SYS file that loads ASPI8XX.SYS should look like this:

```
DEVICE=C:[PATH]ASPI8XX.SYS /SYNCH_RATE=0<0:3>
```

Using the /PARITY (or /P) Option

This option tells your 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) or OFF (do not check parity). The default for all devices is ON.

WARNING   **When disabling parity checking, it is necessary to 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.**

Option 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 your CONFIG.SYS file that loads ASPI8XX.SYS should look like this:

```
DEVICE=C:[PATH]ASPI8XX.SYS /PARITY=OFF<0>
```

Using the /EXCLUDE (or /X) Option

This option allows you to exclude support for an adapter that does not currently have BIOS support. You may not exclude an adapter that is supported (included) by the BIOS when you boot your system. This option has three required parameters:

a   PCI Device ID

b   PCI Bus Number

c   PCI Device/Function Number

These parameters identify the specific adapter you want to exclude. To obtain these parameters, boot your system using the /VERBOSE command line option (explained later in this section). The parameters for the adapter or path you wish to exclude will display on your monitor.

Option Syntax:

```
/EXCLUDE<a:b:c>[,<a;b;c>]*
```

For example, if you found the adapter you wish to exclude to have PCI Device ID 3, PCI Bus Number 0, and PCI Device/Function Number 68, then the line in your CONFIG.SYS file that loads ASPI8XX.SYS should look like this:

```
DEVICE=C:[PATH]ASPI8XX.SYS /EXCLUDE<3:0:68>
```

Using the /HOST_ID (or /ID) Option

This option lets you alter the SCSI ID for a host adapter. On an 8-bit adapter, the SCSI IDs are 0-7. On a 16-bit adapter, the SCSI IDs are 0-15 (it is suggested that IDs 8-15 are not used for your adapter). This option will not allow you to select a SCSI ID already in use.

Note: You are not allowed to change the SCSI ID of any adapter currently supported by the BIOS.

Option Syntax:

```
/HOST_ID=n<path>[,n<path>]*
```

For example, to change the SCSI ID of your second host adapter (path=1) to ID=6 (providing that adapter is not controlled by the BIOS), the line your CONFIG.SYS file that loads ASPI8XX.SYS should look like this:

```
DEVICE=C:[PATH]ASPI8XX.SYS /HOST_ID=6<1>
```

Using the /SCAM Option

This option allows you to disable support for the SCSI Plug and Play protocol called SCAM (SCSI Configured AutoMatically). SCAM support is ON by default. You may change the SCAM setting only if the path (adapter) specified is not controlled by the BIOS.

Option Syntax:

```
/SCAM=n<path>[,n<path>]*
```

For example, to turn off SCAM support on the second host adapter (boot order designation = 1), the line in your CONFIG.SYS file that loads ASPI8XX.SYS should look like this:

```
DEVICE=C:[PATH]ASPI8XX.SYS /SCAM=OFF<1>
```

Using the /TIMEOUT (or /T) Option

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. The default for this option is 10 seconds, if the device is BIOS controlled. If the device is not BIOS controlled, the default is 0 seconds. 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.

Option 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 your CONFIG.SYS file that loads ASPI8XX.SYS should look like this:

```
DEVICE=C:[PATH]ASPI8XX.SYS /TIMEOUT=60<0:3>
```

Using the /VERBOSE (or /V) Option

This Option causes more detailed information to appear on your monitor, after the ASPI8XX.SYS driver is initialized, during a system boot. This is useful if you have multiple adapters in your system and need to know the PCI Device ID, the PCI Bus number, and the PCI

Device/Function number for each adapter. For example,
this information is required to use the /EXCLUDE option
already described in this section.

Option Syntax:

```
/VERBOSE
```

For example, to see more detailed adapter information
displayed when you boot, the line in your CONFIG.SYS
file that loads ASPI8XX.SYS should look like this:

```
DEVICE=C:[PATH]ASPI8XX.SYS /VERBOSE
```

Troubleshooting

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 Your 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 multiple host adapters when adapter has not been controlled by BIOS (no INT13 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)

Description

SYMDISK.SYS 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 a BIOS. SYMDISK.SYS communicates through ASPI8XX.SYS. To use the SYMDISK.SYS driver you must load ASPI8XX.SYS also.

Installing Your SYMDISK.SYS Driver

1 Use the COPY command to copy the appropriate drivers from the SDMS SCSI Drivers disk to your boot disk.

2 Add the lines shown below to your system's CONFIG.SYS file. The ASPI8XX.SYS driver is also required. 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 which are accessed via switches on the command line. These options are described below, and use the following conventions:

[ ]   items in brackets are optional
*   items in brackets followed by an * mean repeat 0 or more times
| choose one of the given items

IMPORTANT **No spaces are allowed in specifying these command line options. Spaces are required between different command line options.**

Using the /ASK Option

This option prompts the user at system boot-up whether to load SYMDISK.SYS or not. To use this option, the

line in CONFIG.SYS that loads SYMDISK.SYS should look like this:

```
DEVICE=C:[PATH]SYMDISK.SYS /ASK
```

Using the /UNITS= Option

Note: It is strongly suggested that you use this option when using removable media with more than one partition.

SYMDISK.SYS 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. To use this option, the line in CONFIG.SYS that loads SYMDISK.SYS should look like this:

```
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 the first host adapter set to SCSI ID 2, 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 will default to either:

a One drive letter for a removable media device with no media present.

b The number of partitions found on the media in the removable media device.

Note: The full path, id, lun, and num_units values are required for this option. Also, there is a limit of 24 devices.

Using the /EXCLUDE= Option

This option allows a 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 CONFIG.SYS that loads SYMDISK.SYS should look like this:

```
DEVICE=C:[PATH]SYMDISK.SYS/EXCLUDE=path[:id[:lun]]
    [,path[:id[:lun]]]*
```

As an example, for path 0, id 2, and lun 0 the command line should look like this:

```
DEVICE=C:[PATH]SYMDISK.SYS /EXCLUDE=0:2:0
```

Note: There is a limit of 24 'path:id:lun' combinations allowed.

Using the /SSIZE= Option

SYMDISK.SYS   will default to the largest sector size found during boot, handling all different sector sizes found. In the case of removable media, SYMDISK.SYS will assume a 512 byte sector size when no media is present. This option overcomes this limitation. To use this option, the line in CONFIG.SYS 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
```

Note: 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.

Using the /SPINDOWN= Option

This is a power management feature that can automatically spin 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. To use this option, the line in CONFIG.SYS that loads SYMDISK.SYS should look like this:

```
DEVICE=C:[PATH]SYMDISK.SYS
    /SPINDOWN=hh:mm<path[:id[:lun]]>
            [,hh:mm<path[:id[:lun]]>]
```

For example, if you wish 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>
```

Or, if you wish 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 COMPUTER LOCKS UP AND WILL NOT COMPLETE BOOTING FROM A NON-SCSI HARD DISK DRIVE.

Refer to the drive manufacturer's user manual.

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

a Is the SCSI BIOS seen during boot?

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

```
Symbios Logic SDMS (TM) v4.0 PCI SCSI BIOS, PCI Rev. 2.0, 2.1.1
Copyright 1995 Symbios Logic
PCI-4.02.00
```

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 system.

Reconnect and check all cable and power connections.

Boot system.

Go to a.

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?

Note: 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   SYM53C815  0003
```

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
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, go to the following
item.

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 Your SYMCD.SYS Driver

Features

- Compatible with Microsoft's CD-ROM Extension 2.21 and above
- Multi-session Photo CD support
- Support for reading CCDA disks

Description

SYMCD.SYS 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 Your SYMCD.SYS Driver

1 Use the COPY command to copy the appropriate driver(s) from the SDMS SCSI Drivers disk to your boot disk.

2 Add SYMCD.SYS to your CONFIG.SYS file. It goes in after ASPI8XX.SYS and SYMDISK.SYS (if this driver also is 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 you wish assigned to your CD-ROM. You must include the NAME, which can use any combination of up to 8 characters.

3 To insure 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
```

with x specifying 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 your MS-DOS manual.

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

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

For example, if:

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

is in CONFIG.SYS, 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 you that the CD-ROM drive is recognized and ready for use.

Command Line Options

The SYMCD.SYS device driver has several embedded functions available, which are accessed via switches on the command line. An explanation of these options follows:

IMPORTANT **No spaces are allowed in specifying these command line options. Spaces are required between different command line options.**

Using the /ASK Option

This option prompts the user at initialization time whether to load SYMCD.SYS or not. For example, the line in CONFIG.SYS that loads SYMCD.SYS would look like this:

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

Using the /UPTOLUN= Option

This option is used to change 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.

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

where 'x' is in the range of 0 to 7. It uses LUN 0 through LUN x to assign a separate drive letter for each of the x+1 CDs in the CD magazine. The SYMCD.SYS driver defaults to supporting LUN 0 only.

Using the /NOBCD Option

This Option is used to support 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 cdaudio, track numbers >16 are not reported correctly because these applications require binary track numbers. For example, the line in

CONFIG.SYS that loads SYMCD.SYS would look like this:

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

Troubleshooting

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 driver's CONFIG.SYS line has the correct path to the driver.

c Make sure MSCDEX, in the AUTOEXEC.BAT, has the same drive name as the CDROM 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 your CD-ROM. A CD-ROM that uses multiple disks requires a letter for each disk.

About Your WIN8XX.386 Driver

Features

- Supports Windows Advanced SCSI Programming Interface (ASPI) applications
- Supports 32-bit Disk Access in Windows 3.1 and Windows for Workgroups 3.11 via the FastDisk interface
- Processes all I/O requests, including ASPI requests, using 32-bit protected-mode code for the highest possible performance

Description

WIN8XX.386 is both a Windows FastDisk driver and an ASPI Manager for Windows which provides an interface to popular ASPI applications. It is required when you want to use 32-bit Disk Access in Windows. Even though WIN8XX.386 controls all SCSI drives on your Symbios Logic host adapter, Windows allows 32-bit Disk Access on the first two drives only.

Installing Your WIN8XX.386 Driver

1 Use the COPY command to copy the WIN8XX.386 driver from the SDMS SCSI Drivers disk to your boot disk. For example, to copy the driver to your system's Windows SYSTEM directory, use the command shown below:

```
copy a:\WIN8XX.386 c:\WINDOWS\SYSTEM
```

2 Add an entry in the [386Enh] section of your Windows SYSTEM.INI file, as shown below:

```
device=WIN8XX.386
```

In the example shown above, the driver is in the Windows SYSTEM directory. If you choose to place the driver in another location, simply specify the complete path along with the filename shown in the example.

3 Add an entry in the [386Enh] section of your Windows SYSTEM.INI file, as shown below:

```
device=*int13
```

This entry may or may not already exist in your SYSTEM.INI file, depending on the hardware present when you installed Windows. Check to make sure that it appears only once in your SYSTEM.INI file.

4   Add an entry in the [386Enh] section of your
Windows SYSTEM.INI file, as shown below:

```
32BitDiskAccess=off
```

This entry may or may not already exist in your
SYSTEM.INI file, depending on the hardware
present when you installed Windows. Check to make
sure that it appears only once in your SYSTEM.INI
file.

5   Remove an entry from the [386Enh] section of your
Windows SYSTEM.INI file, either by removing the
line completely, or by placing a semicolon in column
one of the line so it is treated as a comment, as shown
below:

```
;device=*wdctrl
```

This entry may or may not already exist in your
SYSTEM.INI file, depending on the hardware
present when you installed Windows. This entry
controls the loading of the standard FastDisk driver
that ships with Windows for the purpose of providing
32-bit Disk Access to an IDE drive. This driver is not
compatible with vendor-supplied FastDisk drivers,
such as WIN8XX.386.

6   Use the COPY command to copy the WIN8XX.DLL
driver from the SDMS SCSI Drivers disk to your boot
disk. For example, to copy the driver to your system's
Windows SYSTEM directory, use the command
shown below:

```
copy a:\WIN8XX.DLL c:\WINDOWS\SYSTEM\WINASPI.DLL
```

NOTE: In the above statement the file name is
changed. This is important.

7 Add profile switches to your SYSTEM.INI file, as necessary. See below for a detailed description.

Command Line Options

Profile settings are the Windows equivalent of DOS command line options. They are entered into a particular section of your SYSTEM.INI file which resides in your Windows directory. Edit SYSTEM.INI and add a section anywhere (except in the middle of another section like [386Enh]) called [Win8xx]. For example, the section might look like this:

```
[Win8xx]
Synchronous=on
Wide=off
Disconnect=on
SCAM=off
ParityChecking=on
Timeout=0<>
Verbose=OFF
```

In the following descriptions, 'ha_num' refers to the adapter number (boot order designation). Please note that this version of the driver only supports one adapter, so the host adapter number is always zero. In the following descriptions 'id' refers to the SCSI device ID.

These conventions are also used:

[ ]   items in brackets are optional

*   means repeat 0 or more times

IMPORTANT: **No spaces are allowed in specifying any of these options. Spaces are required between different options.**

Using the SYNCHRONOUS Option

Synchronous=ON or OFF (Default = ON)

This option allows you to turn off SCSI synchronous transfers. By default they are on, which is faster. However, if you are having problems with your system you might want to try turning synchronous off.

Using the WIDE Option

Wide=ON or OFF (Default = ON)

This option allows you to turn off SCSI wide transfers. By default they are on, which is faster if you have a wide disk drive. However, if you are having problems with your system you might want to try turning wide off.

Using the DISCONNECT Option

Disconnect=ON or OFF (Default = ON)

This option allows you to turn off SCSI disconnects. By default they are on, which is sometimes faster. However, if you are having problems with your system you might want to try turning disconnects off.

Using the SCAM Option

SCAM=ON or OFF (Default = ON)

This option allows you to turn off SCAM (SCSI Configured Auto-Matically). By default SCAM is on. If you have a SCAM capable SCSI peripheral, SCAM automatically assigns SCSI device ID's to avoid conflicts. If you are having problems with your system you might want to try turning SCAM off.

Using the PARITYCHECKING Option

ParityChecking=ON or OFF (Default = ON)

This option allows you to turn off SCSI parity checking. By default it is on. Parity is a mandatory part of SCSI-2,

however some old peripherals may not support parity. If you are having problems with your system you might want to try turning parity checking off. Typically this is necessary only if you add a new peripheral that doesn't support parity. CD-ROM drives sometimes do not support parity.

Using the VERBOSE Option

Verbose=ON or OFF (Default = OFF)

This option allows you to turn on verbose mode for the driver. This displays a message with the version of the driver each time the driver is loaded. This is a good way to make sure the driver is loaded. Typically you want to set this ON once, then turn it off until you need it again so the message is not displayed each time the driver loads.

Using the FASTDISK Option

Fastdisk=ON or OFF (Default = ON)

This option allows you to turn off the FASTDISK portion of this driver. The FASTDISK portion allows 32-Bit Disk Access on a SCSI drive at C: or D:. Since Windows only allows 32-Bit Disk Access on one kind of drive at a time, you may want to disable it for your SCSI drive so you can use it on an IDE drive you have in your system. This allows the ASPI portion of the driver to continue to function, while the FASTDISK (32-Bit Disk Access) portion is disabled.

Using the TIMEOUT Option

Timeout=n (Default = 0, which disables time-outs)

Option Syntax:

```
Timeout=n<ha_num[:id]>[,n<ha_num[:id]>]* (n = time-out
value in seconds for device, n=(0..65535), 0=infinite)
```

WIN8XX.386 uses a time-out mechanism to detect certain errors. When WIN8XX.386 issues a command to a SCSI device, a timer is started. If the timer expires before the command completes, WIN8XX.386 assumes that something has gone wrong with the device, and takes steps to recover. The default value for this is zero, which means time-outs are disabled by default. It is recommended that you use time-out values of at least 10 minutes (600 seconds) for SCSI tape devices, since they have many commands which take much longer to complete. The SYMDISK.SYS and SYMCD.SYS drivers use time-outs of their own (typically 10 to 30 seconds). A time-out value of up to 65535 seconds (over 18.2 hours) is possible.

For example, if you have a particularly slow device on your host adapter (ha_num=0) at id=3, and you wish to extend the time-out on this device to 60 seconds, the line in SYSTEM.INI should look like this:

```
[Win8xx] Timeout=60<0:3>
```

As another example, suppose you have a tape drive on your host adapter (ha_num=0) at id=3, and you wish to set the time-out on this device to 600 seconds. Suppose you also have a scanner on your host adapter (ha_num=0) at id=2, and you wish to set the time-out on this device to 30 minutes (1800 seconds). The line in SYSTEM.INI should look like this:

```
Timeout=1800<0:2>,60<0:3>
```

Troubleshooting

SYSTEM LOCKS UP AT BOOT TIME.

a Make sure no other ASPI manager is loaded.

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

c Boot the system.

WINDOWS DISPLAYS THE FOLLOWING
MESSAGE WHILE BOOTING:

The Microsoft Windows 32-bit disk driver (WDCTRL)
cannot be loaded. There is unrecognizable disk software
installed on this computer.

a Make sure the line controlling WDCTRL in your
SYSTEM.INI is either removed or commented out,
as explained in the driver installation instructions.

b Re-boot the system.

THE DRIVER DOES NOT RECOGNIZE ONE OF
THE NON-BOOT SCSI PERIPHERALS (system may
lock up)

a Make sure the driver is installed properly according to
the driver installation instructions.

b Power down all devices in the system.

c Make sure all SCSI devices have unique ID numbers.

d Make sure the SCSI bus is properly terminated.

e Check all cable and power connections.

f Boot the system.

A MESSAGE SAYING ASPI8XX.SYS IS NOT
LOADED IS DISPLAYED

Load ASPI8XX.SYS in your CONFIG.SYS.

THE FOLLOWING MESSAGE IS DISPLAYED
WHEN YOU TRY TO ENTER THE VIRTUAL
MEMORY SETTINGS IN THE 386 ENHANCED
SECTION OF THE CONTROL PANEL

32-bit File Access was unable to run. This may be because you started the network before starting Windows, because Windows could not find the IFSHLP.SYS driver, or your hard disk(s) may be incompatible with 32-bit File Access.

Make sure IFSHLP.SYS is being loaded in your CONFIG.SYS. It should appear there when Windows For Workgroups 3.11 is installed, but sometimes it does not.

A WINDOWS ASPI APPLICATION SUCH AS COLORADO BACKUP FOR WINDOWS SAYS IT CAN'T FIND AN ASPI MANAGER

Colorado Backup for Windows, and possibly other programs, leave a copy of WINASPI.DLL for another vendor's host adapter in the directory in which it is installed. When WINASPI.DLL is looked for, it is found in that directory before looking in your Windows system directory. To fix the problem, delete or rename WINASPI.DLL in the Colorado Backup For Windows directory.

WIN8XX.386 DISPLAYS THE FOLLOWING MESSAGE WHILE LOADING

```
Win8xx VxD Initialization Error:
FastDisk registration failed for drive
80h (C:) (or 81h (D:)).
Please check the settings in your SYSTEM.INI file.
```

In this case, check the [386Enh] section of your SYSTEM.INI file to make sure you have the line: device=*int13.

Important Additional Information For Windows Users

Enabling 32-bit Disk and File Access in Windows

Only Windows for Workgroups 3.11 offers both 32-bit Disk and File access. To enable these features, make sure your system is backed up, then do the following:

1 Select the Control Panel applet in the Main program group.

2 Select the 386 Enhanced icon.

3 Select the Virtual Memory settings.

4 Select the Change button.

5 Check the two boxes at the bottom of the screen to enable 32-Bit Disk Access and 32-Bit File Access. Make sure the swapfile is set to permanent.

6 Click OK.

7 Click Restart Computer.

Restrictions

This version of the driver has the following restrictions:

● This version only supports one host adapter.

● The NVRAM settings in the Configuration Utility for the SDMS 4.0 BIOS are not yet supported by this driver.

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 PC 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

Using the SCSI Low-level Format Utility

Features

- Works with any ASPI host adapter
- Provides a graphical user interface (GUI)
- Supports multiple adapter/drive selection
- Supports multiple LUNs
- Supports Wide 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 connected to Symbios Logic 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 your Symbios Logic SDMS drivers diskette, 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 your system.

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 the DOS files

FDISK.EXE and FORMAT.COM. If you are formatting magneto optical or other removable media drives you also need the SYMDISK.SYS driver from your Symbios Logic SDMS drivers diskette in the CONFIG.SYS file.

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.

WARNING: **Use extreme caution when selecting a drive for formatting. The format process completely removes all information on a drive.**

Troubleshooting

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 your graphics card and your monitor
match. For example, an SVGA card, and a VGA
monitor may not deliver the screens.

Using the SCSI SYM53C8XX CONFIG Utility

Features

- Configures all DOS drivers and the Windows 3.1 driver
- Works for all Symbios logic SYM53C8xx PCI host adapters
- Provides a SCSI bus view showing all 8xx cards and attached peripherals
- Provides a graphical user interface (GUI)
- Provides online Help

Description

This utility provides a user friendly way to configure any of the DOS based drivers for your CONFIG.SYS and SYSTEM.INI. It assumes the drivers are already installed. The ASPI8XX.SYS driver must be present and loaded for this utility to run. For the Windows Configure option, the WIN8XX.386 driver must be present in the SYSTEM.INI file. Online help is available at each step for each screen you encounter. You may press F1 at any time for a list of all the help available.

Several files are required to run this utility. They are CONFIG.EXE, CONFIG.DAT, 8BITBUS.PCX, 16BITBUS.PCX, ADAPTERS.PCX, LUNVIEW.PCX, TILE.PCX, VIEWIT.PCX, and ASPI8XX.SYS. If ASPI8XX.SYS already exists on your system and is pointed to by the driver line in your CONFIG.SYS, you do not need it in the CONFIG.EXE directory. It is included here in case an install of the drivers has not yet

taken place. If this is the case, add the line DEVICE=[path]ASPI8XX.SYS to the CONFIG.SYS (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 [path] location.

If you wish to configure the SYMDISK.SYS or SYMCD.SYS DOS drivers, they also require installation prior to running the Configuration utility. To do a full installation of all the DOS drivers, run the SYM53C8XX install 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 UTILITY SCREENS ARE UNREADABLE

Check that your graphics card and your monitor match. For example, an SVGA card, and a VGA monitor may not deliver the screens.

Using the SCSI SYM53C8XX VERIFY Utility

Features

- Provides a system check for our SDMS 3.0 and 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 online Help

Description

This utility troubleshoots your system by systematically testing and checking various hardware and software components. No changes or side effects occur to your system as a result of running this utility. There is a help button on the first screen that explains in detail exactly what tests and checks are performed on your 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 and Z_VER.DAT. Also, ASPI8XX.SYS is included with these files in the event it is not already installed in your CONFIG.SYS file. If ASPI8XX.SYS already exists on your system and is pointed to by the driver line in your CONFIG.SYS, you do not need it in

the SYMDIAG.EXE directory. It is included here in case an install of the drivers has not yet taken place. If this is the case, the line DEVICE=[path]ASPI8XX.SYS must be added to the CONFIG.SYS (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 [path] 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 UTILITY SCREENS ARE UNREADABLE

Check that your graphics card and your monitor match. For example, an SVGA card, and a VGA monitor may not deliver the screens.

Using the Host Adapter Flash Utility

Features

● Supports host adapter selection for updating with a specific BIOS image
● Supports 64K flash parts

Description

This utility allows you to update the Symbios Logic PCI SCSI BIOS on a host adapter based on a SYM53C815, SYM53C825, or SYM53C875 controller. New versions of the PCI SCSI BIOS are released periodically. Your host adapter must have a flash EEPROM onboard to use this utility.

The utility is labeled FLASH8X5.EXE, and is located on your Symbios Logic SDMS drivers diskette. It is recommended that you place this utility on a DOS bootable diskette, and execute it from this diskette rather than from a hard disk drive. Power down any hard disk drives attached to the host adapter you are updating.

Using DOS 5.0 or higher, create a bootable diskette by formatting it with the /s option (e.g., 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.

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 seven choices:

1 Update the EEPROM.

2 Backup the current BIOS image.

3 View board summary.

4 Change SCSI ID.

5 Exit to DOS.

6 Reboot.

7 About Flash8x5.

We recommend you do a view (option 3) and a backup (option 2) prior to updating the EEPROM. The view identifies the SCSI controller, its Device ID, the Flash Chip and current BIOS version. The backup, backs up the old BIOS image to the diskette. Incase 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 installed boards 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 comes up asking for the file name of the BIOS to upgrade. At this time you can press

F2 to view the available files on the diskette. The available files should be, the BIOS file just backed up, and 8XX_32.ROM. In the F2 case, highlight the file 8XX_32.ROM for the Symbios Logic and NCR Host Adapter controllers and press Enter. Or type the filename in manually at the a:\ prompt 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 EEPROM to get erased and updated. The system then displays the card information and verifies that the new BIOS is installed. Press any key to get back to the main menu. Choose option 6 to Reboot. Remove the floppy if you want to boot off your hard drive.

To verify the new BIOS installation, watch carefully during boot and look at the 3rd line of the SDMS banner (which should read PCI-4.03.00) when displayed. Or rerun the flash utility from the floppy and choose the view option to see the current BIOS version.

Host adapters supported:

SYM8150SP	NCR8150S
SYM8250ASP	NCR8250S
SYM8251ASP	NCR8251S
SYM8251AD	NCR8251D
SYM8750SP	
SYM8751SP	SYM8751D

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

Device Drivers for Windows 95

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Device Drivers for Windows 95

Introduction for Windows 95

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). I/O requests in Windows 95 are handled by an I/O manager. 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 Logic / Microsoft provide a miniport driver, called SYMC8XX.MPD, to complete the path to a Symbios Logic controller or processor with an optional SDMS SCSI BIOS. The following sections describe this driver and its installation.

Features

- Synchronous negotiation (including Fast/Ultra SCSI)
- Wide negotiation
- Auto Request Sense
- Supports multiple host adapters
- Supports multiple Logical Unit Numbers (LUNs)
- Disconnect/Reselect
- Scatter-Gather
- Differential Support
- Supports SCSI pass-through functionality
- BUS device reset

- Scan order change (scans the bus from SCSI ID 0 to MAX SCSI ID [7 or 15])
- Ultra SCSI (Fast 20) Support (20 MB/s narrow, 40 MB/s wide)
- SCAM Support (SCSI Configured AutoMatically)

Description

SYMC8XX.MPD is designed to Microsoft's specification for miniport drivers. This driver allows connection of SCSI devices including disk drives, CD-ROMs, and tape drives for PCI-based machines. To support a new SCSI device the Windows 95 architecture requires that a class driver for that type device is present (usually supplied by Microsoft, or possibly by the peripheral manufacturer). No changes to SYMC8XX.MPD are required. This driver is 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 the 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 driver supports Ultra SCSI protocol, providing twice the raw data transfer rate of Fast SCSI for disk drives and Symbios Logic host adapters that support Ultra SCSI. However, Ultra SCSI requires more stringent SCSI bus cabling setups than Fast SCSI.

Installing Your SYMC8XX.MPD Driver

Preparing a Symbios Driver Diskette

Copy the following files (supplied to you on diskette) to the root directory of a clean floppy diskette, and use this Symbios Driver diskette during installation.

SYMC8XX.MPD

SYMC8XX.INF

New System Installation

This procedure installs the SYMC8XX.MPD driver 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 Logic 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 driver, follow the instructions for Existing System Installation after Windows 95 installation is completed.

1   Initiate Windows 95 Setup according to the Microsoft instructions.

2   Setup enters the hardware detection phase after a system reboot. ("Setting up Hardware" message box is displayed.) If the message "NCR PCI SCSI Host Adapter" is displayed, then the host adapter is supported by the bundled driver, and it is installed automatically. After Windows 95 installation

completes, you can install the SYMC8XX.MPD driver according to the "Existing System Installation" instructions.

3   If the host adapter is not supported by the bundled driver, 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 Logic SDMS 4.0 DOS ASPI driver) is loaded when beginning the Windows 95 installation, no messages about PCI SCSI Bus Controllers is displayed. The installation completes, but real-mode disk drivers are used. See Verifying Correct Driver Installation below. To install the SYMC8XX.MPD driver (which disables loading of the ASPI8XX.SYS driver under Windows 95), see Existing System Using ASPI8XX.SYS DOS ASPI Driver below.

4   Insert the Symbios Driver diskette into drive A: (or B:) 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 is displayed. 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."

Note: At driver installation, the Symbios Logic PCI (53C8XX) Miniport driver defaults to Ultra SCSI support turned OFF. To enable Ultra SCSI support, see Enabling/Disabling Ultra SCSI Support below.

Existing System Installation

This procedure installs the SYMC8XX.MPD driver 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 NCR C8xx SCSI Host Adapter entry do not exist, the system is probably using the ASPI8XX.SYS DOS ASPI driver. See the section Existing System Using ASPI8XX.SYS DOS ASPI Driver below.

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 NCR C8xx SCSI Host Adapter entry. Click the Properties button.

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

8   Click the Change Driver... button.

9   Even though you may have previously installed the
    SYMC8XX.MPD driver, click the Have Disk...
    button to install a newer version.

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

11 The Select Device dialog box should display
    "Symbios Logic 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 is displayed.
    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"

NOTE: At driver installation, the Symbios Logic PCI
(53C8XX) Miniport driver defaults to Ultra SCSI
support turned OFF. To enable Ultra SCSI support, see
Enabling/Disabling Ultra SCSI Support below.

Existing System Using ASPI8XX.SYS DOS ASPI Driver

This procedure installs the SYMC8XX.MPD driver onto
an existing Windows 95 system which 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:) and click OK. If using drive B:, you must select it from the pick list.

12 The Select Device dialog box should display "Symbios Logic 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 the Change Driver… button.) The driver files are copied and a new driver database is built.

14 A "System Settings Change" dialog box is displayed. 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"

NOTE: At driver installation, the Symbios Logic PCI (53C8XX) Miniport driver defaults to Ultra SCSI support turned OFF. To enable Ultra SCSI support, see Enabling/Disabling Ultra SCSI Support below.

Verifying Correct Driver Installation

After installing/updating with the SYMC8XX.MPD driver, you should verify proper operation of the driver.

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 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 is displayed 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 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 on the problem.

4   Click the Driver tab. Two entries should appear, one for SYMC8XX.INF and one for SYMC8XX.MPD. The INF file does not contain embedded version information, so the File Details are all Not Available. Select the SYMC8XX.MPD file. The file version of the driver is displayed.

5   Click Cancel to leave the Host Adapter Properties dialog box. Click on the Performance tab. A list of performance attributes is displayed. 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.

Command Line Options

There are no command line options with the Windows 95 device driver.

Troubleshooting

DURING INSTALLATION, NO SCSI DEVICES ARE FOUND.

a Insure 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.

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

This error is usually associated with an IRQ, DMA channel, I/O (chip) address, or BIOS address conflict. Set the SCSI host bus adapter board to use a different interrupt.

PROBLEMS WITH ULTRA SCSI DEVICES USING ULTRA SCSI PROTOCOL

a If the system is configured with a Symbios Logic host adapter that supports Ultra SCSI, an Ultra SCSI device is on the SCSI bus, and Ultra SCSI support by the SYMC8XX.MPD driver is enabled, intermittent problems and possible system crashes can occur if 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 above.

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 Logic host adapter hardware manual for information on Ultra SCSI cabling requirements.

Important Additional Information

Enabling/Disabling Ultra SCSI (Fast 20) Support

Once the SYMC8XX.MPD driver is installed, support for Ultra SCSI (Fast 20) is enabled or disabled using the Device Manager. Ultra SCSI is enabled/disabled on a per adapter basis.

Use the following procedure for enabling/disabling Ultra SCSI Support:

1   Click 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 is displayed. Select the adapter desired, then click the Properties button. Click the Settings tab.

3   The Adapter settings entry will display "Fast20_Support=x;", where x is 0 or 1. Do not change anything but the number just to the right of the equal sign. Set this number to:

> 1 for Ultra SCSI (Fast 20) enabled

> 0 for Ultra SCSI (Fast 20) disabled

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, the new setting for Ultra SCSI (Fast 20) is in effect.

Multiple Symbios Logic Host Adapter Considerations

If multiple Symbios Logic PCI SCSI host adapters are installed in the system, special actions are sometimes required to install or change drivers. This is due to the fact that some Symbios Logic host adapters are supported by the bundled driver, and also that one Symbios driver supports all 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 driver. This can cause conflicts which 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 Logic host adapters are controlled by only one 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, but when asked to reboot the system for the new settings to take effect, click No. Change drivers for all Symbios Logic host adapters in the system to the new driver, and reply No to rebooting until the final adapter is changed. If booting from a SCSI device, check 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, then when the system says it can't 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.

Chapter 4

Device Drivers for OS/2

Table of Contents
Device Drivers for OS/2

Introduction

The OS/2 operating systems version 3.0 and later provide an integrated platform featuring a graphical windowing interface, called Presentation Manager, that allows multiple applications to be viewed at the same time. Multitasking is also supported, enabling several different programs to run at the same time in different windows. Presentation Manager allows the user to switch between programs, start other programs, and maintain files and directories. These versions of OS/2 require an 80386 or higher microprocessor. Other hardware requirements include a minimum of 4 megabytes of RAM (8 megabytes or more is recommended) and a minimum hard disk drive size of 40 megabytes. Symbios Logic SDMS provides the necessary SCSI device driver for OS/2. We recommend reviewing the OS/2 manual prior to proceeding.

Features of the SDMS OS/2 Driver

- Enhances host bus adapter performance
- Supports synchronous negotiation (including fast SCSI)
- Supports wide SCSI (single-ended and differential)
- Supports multiple host adapters
- Supports Disconnect/Reselect
- Supports scatter/gather
- Allows tagged command queuing

Description of the SDMS OS/2 Driver

Although the Symbios Logic SCSI controller's firmware can access the SCSI hard disk drives attached to the computer independently, the SCSI device driver SYM8XX.ADD acts as an enhanced interface between the computer system and the SCSI BIOS firmware. Use of the device driver increases the abilities of the SCSI controller firmware and fully utilizes the advancements and improvements of 80386 and higher microprocessors.

The device driver is also necessary to support the use of SCSI tape drives and CD-ROM drives with an OS/2 system. The Symbios Logic SYM8XX.ADD device driver is written in compliance with the IBM OS/2 ADD (Adapter Device Driver) specification, and will work with third party applications that comply with the same specification.

Installing Your SDMS OS/2 Driver

These installation instructions are specific and accurate for the SDMS OS/2 driver SYM8XX.ADD V4.02. You may have a more recent version of this driver. You should refer to the text file OS2.TXT located on the SDMS diskette for a version of these instructions guaranteed to match your driver.

Note: If you previously installed OS2CAM.ADD (an older version of the OS2 driver), delete OS2CAM.ADD and delete the corresponding BASEDEV= statement in CONFIG.SYS after you complete installation procedures. If you previously installed SYM8XX.ADD in a directory other than \OS2\BOOT, move SYM8XX.ADD to \OS2\BOOT, where the new version of SYM8XX.ADD can replace the old version. The system continues to boot using the previous driver until these steps are taken.

Installing SYM8XX.ADD (with OS/2 already installed)

The Symbios Logic device driver floppy diskette contains three files, the device driver SYM8XX.ADD, a text file, SYM8XX.DDP and an executable file, SYMCHECK.EXE. When the device driver installation utility under OS/2 is activated, it looks for a file with the DDP extension. The DDP file contains the necessary information to install the SCSI device driver. The EXE file contains a utility that verifies that an appropriate adapter is present.

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

2   Insert the floppy diskette containing the Symbios
        Logic device driver in the source drive.

3   Choose the Symbios Logic SYM8XX.ADD driver
        from the list provided by clicking on it once. The
        choice will be highlighted. Then click the OK button,
        then the EXIT button.

4   To make sure that the installation was successful,
        open the productivity 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:

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

        Then check that the file SYM8XX.ADD is in the
        \OS2\BOOT directory on the boot drive.

Installing SYM8XX.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 be present to
install the operating system (as is the case when installing
from a CD-ROM).

1   After the installation of OS/2 is complete and the
        WorkPlace Shell desktop is built, open the System
        Setup folder in the OS/2 System folder and double-
        click on the Device Driver Install icon.

2   Insert the floppy diskette containing the Symbios
        Logic device driver in the source drive.

3   Choose the Symbios Logic SYM8XX.ADD driver
        from the list provided by clicking on it once. The
        choice will be highlighted. Then click the OK button,
        then the EXIT button.

4   To make sure that the installation was successful, open the productivity 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:

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

Then check that the file SYM8XX.ADD is in the \OS2\BOOT directory on the boot drive.

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

Installing SYM8XX.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 Logic 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   Copy the file SYM8XX.ADD from the Symbios Logic distribution diskette to the copy of "Diskette 1". "Diskette 1" does not contain enough available space for a copy of SYM8XX.ADD. You must delete files in order to copy the driver file onto the diskette. If you are installing a version of OS/2 other than Warp 4.0, any unused .ADD driver(s) may be deleted. If you are installing Warp 4.0, 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.

When .ADD drivers are deleted from "Diskette 1", make certain to delete or remark out the corresponding BASEDEV= statement in CONFIG.SYS. Otherwise, error messages will show up during installation.

3   Edit the file CONFIG.SYS on the copy of "Diskette 1" by adding the following line at the end of the file:

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

If you are installing OS/2 Warp 4.0, follow the directions in the README.1ST file for adding the following line to CONFIG.SYS:

```
SET COPYFROMFLOPPY=1
```

This will allow SYM8XX.ADD 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.

● If the system is to boot from a hard drive attached to an IDE bus, the IDE driver must appear before SYM8XX.ADD in CONFIG.SYS.

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

Command Line Options

The SYM8XX.ADD driver has several embedded functions which can be accessed via switches on the command line in the CONFIG.SYS file. These options are described below.

Using the /VERBOSE (or/V) Option

Usage:

```
/VERBOSE
```

This option appears on the command line by default. It enables display of a banner, version number, and SCSI bus information during start up of the system.

For example, if you wish to see more detailed information displayed when you boot, the line in CONFIG.SYS 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.

Using the /!DM Option

Usage:

```
/!DM<path[:id]>[,<path[:id]>]*
```

Where:

> path represents a host adapter ID.
> id represents a SCSI target ID on the indicated path.
> [ ]s indicate optional information.
> * indicates the pattern enclosed in the [ ]s may be repeated.

This option disables use of the IBM-supplied SCSI manager (OS2SCSI.DMD) for the devices listed. The SCSI manager is used to support SCSI tape drives.

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>
```

Using the /!SM Option:

Usage:

```
/!SM<path[:id]>[,<path[:id]>]*
```

Where:

> path represents a host adapter ID.
> id represents a SCSI target ID on the indicated path.
> [ ]'s indicate optional information.
> * indicates the pattern enclosed in the [ ]'s may be repeated.

This option disables use of the IBM-supplied SCSI manager (OS2SCSI.DMD) for the devices listed. The SCSI manager is used to support SCSI tape drives.

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>
```

Using the /SYNCH_RATE (or /SR) Option:

Usage:

```
/SYNCH_RATE=n<path[:id]>[,n<path[:id]>]*
```

Where:

n =0, 5, 10 or 20.
path represents a host adapter ID.
id represents a SCSI target ID on the indicated path.
[ ]'s indicate optional information.
* indicates the pattern enclosed in the [ ]'s may be repeated.

This sets the maximum synchronous transfer rate (in mega transfers per second) to negotiate with a particular device. The allowable values for this setting are 0, 5, 10 and 20 mega transfers per second, if the adapter is capable of the specified speed. All host adapters in the 8XX family support at least 10 mega transfers per second; some support 20 mega transfers per second. 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.

For example, if you want to turn off synchronous transfers to ID=3 on host adapter 0, the line in CONFIG.SYS 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 mega transfers per second on all devices on adapter 1, the line in CONFIG.SYS that loads SYM8XX.ADD should look like this:

```
BASEDEV=SYM8XX.ADD /SR=10<1>
```

Using the /SYNCH_OFFSET (or /SO) Option:

Usage:

```
/SYNCH_OFFSET=n<path[:id]>[,n<path[:id]>]*
```

Where:

n = 0..maximum synchronous offset for the adapter.
path represents a host adapter ID.
id represents a SCSI target ID on the indicated path.
[ ]'s indicate optional information.
* indicates the pattern enclosed in the [ ]'s may be repeated.

This 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 16. 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.

For example, if you want to change the synchronous offset to 6 for ID=3, the line in CONFIG.SYS that loads SYM8XX.ADD should look like this:

```
BASEDEV=SYM8XX.ADD /SYNCH_OFFSET=6<0:3>
```

Using the /TIMEOUT (or /T) Option:

Usage:

```
/TIMEOUT=n<path[:id]>[,n<path[:id]>]*
```

Where:

n = time-out value in seconds for device
n=(0..65535), 0=infinite.
path represents a host adapter ID.
id represents a SCSI target ID on the indicated path.
[ ]'s indicate optional information.
* indicates the pattern enclosed in the [ ]'s may be
repeated.

SYM8XX.ADD uses a time-out mechanism to detect
certain errors. When SYM8XX.ADD issues a command
to a SCSI device, a timer is started. If the timer expires
before the command completes, SYM8XX.ADD assumes
that something has gone wrong with the device, and takes
steps to recover. The default value for this is 10 seconds,
and the maximum setting for this switch is 0, which
represents no time-out. If you set the value to be less than
the system has allocated for a particular device, your value
will be ignored.

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 CONFIG.SYS that loads
SYM8XX.ADD should look like this:

```
BASEDEV=SYM8XX.ADD /TIMEOUT=60<0:3>
```

Using the /DISCONNECT (or /DC) Option:

Usage:

```
/DISCONNECT=n<path[:id]>[,n<path[:id]>]*
```

Where:

> n = ON or OFF.
> path represents a host adapter ID.
> id represents a SCSI target ID on the indicated path.
> [ ]'s indicate optional information.
> * indicates the pattern enclosed in the [ ]'s may be repeated.

SCSI devices have the ability to disconnect from the bus during an I/O transfer. This option is used to allow (or 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.

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 CONFIG.SYS that loads SYM8XX.ADD should look like this:

```
BASEDEV=SYM8XX.ADD /DISCONNECT=OFF<0:2>
```

Using the /PARITY (or /P) Option:

Usage:

```
/PARITY=n<path[,path]*>[,n<path[,path]*>]*
```

Where:

> n = ON or OFF.
> path represents a host adapter ID.
> [ ]'s indicate optional information.

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

The SYM53C8XX chips are capable of enabling or disabling the SCSI bus data integrity checking feature know 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 SYMC538XX chips always generate parity (for outputs), but may optionally check the parity (for inputs). 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.

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.

For example, to turn off parity checking on host adapter number 0, the line in CONFIG.SYS that loads SYM8XX.ADD should look like this:

```
BASEDEV=SYM8XX.ADD /PARITY=OFF<0>
```

Using the /QTAG (or /QT) Option:

Usage:

```
/QTAG=n<path[:id]>[,n<path[:id]>]*
```

Where:

n = the number of queue tags allowed for a device (0..256).
path represents a host adapter ID.
id represents a SCSI target ID on the indicated path.
[ ]'s indicate optional information.
* indicates the pattern enclosed in the [ ]'s may be repeated.

Queue tagging is used to allow 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.

For example, to turn off queue tagging for ID 3 on host adapter number 0, the line in CONFIG.SYS 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 CONFIG.SYS that loads SYM8XX.ADD should look like this:

```
BASEDEV=SYM8XX.ADD /QT=5<2>
```

Using the /WIDTH (or /W) Option:

Usage:

```
/WIDTH=n<path[:id]>[,n<path[:id]>]*
```

Where:

n = 8 or 16.
path represents a host adapter ID.

id represents a SCSI target ID on the indicated path.
[ ]'s indicate optional information.
* indicates the pattern enclosed in the [ ]'s may be repeated.

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. The value given in the command line option will determine the size of data transfers.

For example, to have the device at ID 3 on host adapter number 0 treated as a narrow device, the line in CONFIG.SYS that loads SYM8XX.ADD should look like this:

```
BASEDEV=SYM8XX.ADD /WIDTH=8<0:3>
```

As another example, if you want to have all devices on host adapter number 2 treated as narrow devices, the line in CONFIG.SYS that loads SYM8XX.ADD should look like this:

```
BASEDEV=SYM8XX.ADD /W=8<2>
```

Troubleshooting

YOU CANNOT ACCESS THE SCSI DEVICES.

a Make sure the SCSI device driver is installed properly.

b Make sure each device has power.

c Verify that a BASEDEV = SYM8XX.ADD /V line exists in the CONFIG.SYS file.

d Verify that SYM8XX.ADD is in the appropriate directory (\OS2\BOOT).

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 (the boot drive must have the
lowest ID).

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

c Make sure the device driver is listed in CONFIG.SYS
(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 (the boot drive must have the lowest ID).

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 SYM8XX host adapter, and the statement:

```
BASEDEV=SYM8XX.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 statement to the last line in the CONFIG.SYS file.

c Restart your system.

DURING MODERATE TO HEAVY I/O LOADS THE MACHINE HANGS

a If you are running OS/2 Warp SMP on a multi-processor machine, IBM has published an errata which may affect your system. On some multi-processor platforms, during moderate to heavy I/O loads, the machine will hang. This hang is due to a configuration problem between the machine and OS/2's SMP program, OS2APIC.PSD. In order to keep this from happening, we suggest that you add the following command line option exactly as shown to the PSD= line in the CONFIG.SYS file.

Old line:

```
PSD=OS2APIC.PSD
```

New line:

```
PSD=OS2APIC.PSD /prec=lid
```

The /prec=lid text IS case-sensitive, make sure you use lower case letters and do not add any spaces to the example. This will keep your machine from encountering the hang condition.

Chapter 5

Device Driver for SCO UNIX

Table of Contents
Device Driver 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 drivers in the SCO UNIX kernel. Your Symbios Logic Boot Time Loadable Driver (BTLD) diskette contains three packages:

- bhba is the driver for SCO UNIX 3.2v4x
- slha is the driver for SCO UNIX OpenServer
- CAM3 is the SCSI configuration tool

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 (IDE, ESDI, or ST506), 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. The CAM3 SCSI configuration tool simplifies adding SCSI peripheral device support into the operating system.

SCO UNIX 3.2v4x provides installation diskettes labeled N1, N2, and M1. Additional software is provided on CD-ROM, tape cartridge, or diskettes. These media, along with the Symbios Logic BTLD diskette, are needed to perform a new installation of your bhba driver onto a boot drive.

SCO OpenServer provides only one installation diskette, labeled Boot Disk. This diskette, along with your Symbios Logic BTLD diskette (containing your slha driver), and other software media, are used during a SCO OpenServer installation.

Figure 5-1
Symbios Logic Installation Tools
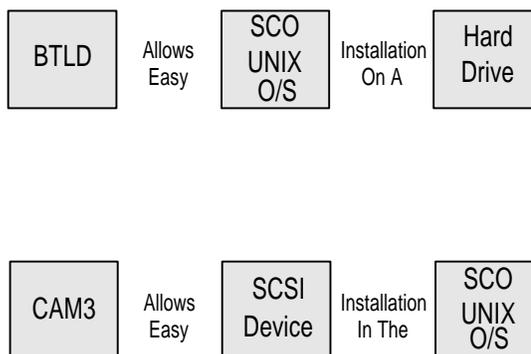
The following sections provide instruction on configuring the SCO UNIX kernel with your Symbios Logic driver, installing SCO UNIX onto a hard drive, and adding SCSI peripheral devices. These instructions assume you are familiar with UNIX system administration.

Features

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

● Provides easy SCSI device support installation with the Symbios Logic CAM3 SCSI configuration tool

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

● Supports synchronous negotiation (including fast 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

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

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

Procedure 1
Existing System Installation

If you plan to attach SCSI devices to a Symbios Logic host adapter while using a non-SCSI hard drive (IDE, ESDI, ST506) as the boot hard drive already containing a SCO UNIX system, execution of Procedure 1 is all that is necessary. This installs the Symbios Logic 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 Logic driver on a SCSI or non-SCSI boot drive.

Procedure 2
New System Installation

If you plan to perform a new SCO UNIX installation that includes the proper Symbios Logic driver, then follow Procedure 2. Procedure 2 uses a Boot Time Loadable Driver (BTLD) to provide a user friendly method for installing SCO UNIX onto a hard disk drive.

Each of these procedures is described in detail below. Symbios Logic recommends that you complete the entire installation in one session. You should have sufficient time (possibly over an hour) available to complete this without interruption.

The Symbios Logic CAM3 SCSI Configuration Tool

Both installation procedures may use the Symbios Logic CAM3 SCSI configuration tool to load your Symbios Logic SCSI driver into the SCO UNIX kernel. This utility is provided on the Symbios Logic BTLD diskette for SCO UNIX. The CAM3 main menu presents the following options:

The CAM3 Main Menu Options

1 Configure the Symbios Logic SCSI Device Driver

2 Add or Remove Specific Devices

3 Relink Unix

4 Remove All SCSI Devices

5 Show Current SCSI Configuration

Some of these options are referred to in the following procedures. After completion of either installation procedure, you may invoke CAM3 again from the UNIX prompt by typing:

```
mkdev cam3
```

In this way, you may use CAM3 to make subsequent changes to the system configuration.

Installing Your SCO UNIX Driver

Procedure 1 Existing System Installation

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 Logic 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   Symbios Logic recommends creating a second copy of the UNIX kernel. Log in as root and issue the command:

    ```
    cp /unix /unix.good
    ```

    This creates a second copy of the UNIX kernel under the name /unix.good.

    Note: If any problems arise with the new UNIX kernel being built, this procedure ensures that a valid copy of the UNIX kernel will be available.

    To access this valid UNIX kernel, type at the colon after the boot message:

    ```
    unix.good
    ```

2   Install your Symbios Logic driver.

    a   Insert the Symbios Logic BTLD diskette in the drive and type:

        ```
        installpkg
        ```

Press the Enter key to continue.

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

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

```
bhba
```

if your SCO UNIX is release 3.2v4x, or slha if your SCO UNIX is OpenServer. Press the Enter key to continue.

d If a driver is already present from a previous installation, a prompt inquires about replacing it. Replace it if there is reason to believe it is corrupted, or if you are installing a newer version.

e To execute CAM3, remove the Symbios Logic diskette from the drive (since CAM3 is now installed on the hard drive), then type:

```
mkdev cam3
```

Press the Enter key to continue.

f The CAM3 main menu is displayed. To check what SCSI devices are installed, type 5 and press Enter to show the current SCSI configuration. If you are only updating the Symbios Logic driver, skip to step 6 to rebuild the kernel.

g From the CAM3 main menu, select option 1 to configure your Symbios Logic driver. Three options are displayed:

1 Configure Symbios Logic Host Adapter Software

      2   Remove Symbios Logic Host Adapter Software from System Configuration

      3   Return to Main Menu

h   To configure your Symbios Logic host adapter software select 1 from this menu.

i   A prompt is displayed to set the interrupt line to be used by the host adapter. The Symbios Logic driver performs dynamic interrupt mapping. Therefore, type 0 (zero) and press Enter. To exit this process, press Enter, or type q and press Enter.

    Note: If the system indicates that the proper interrupt lines for the SCSI host adapter are not available, review the section under Troubleshooting concerning possible kernel rebuild problems and edit the sdevice entries to eliminate the conflict.

3   Adding a SCSI Disk Drive.

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

    a   Select option 5 from the CAM3 main menu to show the SCSI configuration. Note each host adapter number assigned to a Symbios Logic host adapter. You need this information throughout this installation procedure.

    b   From the CAM3 main menu, select option 2 to add or remove specific devices. A list appears showing the current configuration followed by a menu of these options:

Add or Remove Specific Devices Menu Options

1 Reconfigure Sdsk (Disk Drive)

2 Reconfigure Stp (Tape Drive)

3 Reconfigure Srom (CD-ROM)

4 Invoke the SCO low level SCSI Configuration script

5 Return to the previous menu

To add a SCSI disk drive, select option 1 to reconfigure Sdsk, and press Enter.

c Read the explanatory text that appears and follow the prompts. Press Enter at the next two prompts to scroll through the explanatory text. A prompt appears to add another SCSI disk. Type y and press Enter. Select option 2 to add a drive to the Symbios Logic host adapter 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:

```
bhba
```

if your SCO UNIX is release 3.2v4x, or

```
slha
```

if your SCO UNIX is OpenServer.

Press Enter.

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

   If this is the first Symbios Logic host adapter 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 prompts for the host adapter identifier of the preceding step.

f With SCO OpenServer, the system prompts for the bus number of the disk drive. Since Symbios Logic host adapters support one bus per adapter, press Enter to get the default of zero, or type 0 (zero) and press Enter.

   With SCO 3.2v4x, this prompt does not appear. Proceed to the next step.

g 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.

h The system prompts for the LUN (Logical Unit Number) of the disk 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 if the
    displayed values are correct. Type n if the values
    are incorrect, and retry from step 3d.

  j A prompt appears to create a new kernel. Type n
    (this is done later) and press Enter.

4 Adding a SCSI Tape Drive.

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

  a Select option 5 from the CAM3 main menu to
    show the SCSI configuration. Note the host
    adapter number of each Symbios Logic host
    adapter. You need this information throughout
    this installation procedure.

  b From the CAM3 main menu, select option 2 to
    add or remove specific devices. A list appears
    showing the current configuration followed by a
    menu of choices. To add a SCSI tape drive, select
    option 2 and press Enter.

  c Instructions on using a SCSI tape drive are
    displayed. Press Enter at the next three prompts to
    scroll through the explanatory text and start the
    mkdev tape utility for installing a tape drive.

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

  e 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.

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

g   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:

```
bhba
```

if your SCO UNIX is release 3.2v4x, or

```
slha
```

if your SCO UNIX is OpenServer.

Press Enter.

h   The system prompts for which host adapter supports the tape drive. Type the correct host adapter number and press Enter.

If this is the first Symbios Logic host adapter 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 prompts for the host adapter identifier of the preceding step.

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

With SCO 3.2v4x, this prompt does not appear. Proceed to the next step.

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

k The system prompts for the LUN (Logical Unit Number) 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.

l A list is displayed showing the special devices created. Press Enter, and a list is displayed showing 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.

m A prompt appears to create a new kernel. Type n (as this is done later) and press Enter to return to the CAM3 main menu.

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 Select option 5 from the CAM3 main menu to show the SCSI configuration. Note the host adapter number of each Symbios Logic host adapter. You need these throughout this installation procedure.

b From the CAM3 main menu, select option 2 to add or remove specific devices. A list appears showing the current configuration followed by a menu of choices. To add a CD-ROM drive, select option 3 and press Enter.

c Instructions on using a CD-ROM drive are displayed. Press Enter two more times at the prompts to scroll through the explanatory text and start the mkdev CD-ROM utility for installing a CD-ROM drive.

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

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

f 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:

```
bhba
```

if your SCO UNIX is release 3.2v4x, or

```
slha
```

if your SCO UNIX is OpenServer.

Press Enter.

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

If this is the first Symbios Logic host adapter 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 prompts for the host adapter identifier of the preceding step.

h With SCO OpenServer, the system prompts for the bus number of the CD-ROM. Since Symbios Logic host adapters support only one bus per adapter, press Enter to get the default of zero, or type 0 (zero) and press Enter.

With SCO 3.2v4x, this prompt does not appear. Proceed to the next step.

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

j The system prompts for the LUN (Logical Unit Number) of the CD-ROM drive. Type 0 (zero) and press Enter.

k 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.

l A prompt appears to create a new kernel. Type n (this is done later) and press Enter.

6 Rebuilding the Kernel.

a The system now returns to the CAM3 main menu. Select option 3 to relink UNIX and press Enter.

b A prompt appears asking to rebuild the kernel. Type y and press Enter. The kernel is now linked, which takes a few minutes. Messages appear while the kernel is linking.

c When the kernel is rebuilt, the system prompts as to whether this kernel is to boot by default. Type y and press Enter.

d The system prompts whether to rebuild the kernel environment. Type y and press Enter. When the CAM3 main menu appears, type q and press Enter.

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

```
reboot
```

Press Enter.

f Press Enter at the Boot: prompt and the new kernel will load.

g Log in as usual.

Procedure 2 New System Installation

This procedure installs SCO UNIX onto a hard disk drive. This installation is necessary to build a new UNIX kernel that includes your Symbios Logic driver. For more details on UNIX installation refer to the SCO UNIX System Administrator's Reference manual.

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

a Insert the SCO UNIX installation diskette and reboot the system. For SCO 3.4v4x this diskette is labeled N1, for SCO OpenServer this diskette is labeled Boot Disk.

b   At the Boot: prompt type:

```
link
```

Press Enter.

c   At the next prompt type:

```
bhba
```

if your SCO UNIX is release 3.2v4x, or

```
slha
```

if your SCO UNIX is OpenServer.

Do not remove the diskette. Press Enter.

d   When prompted, replace the diskette with the Symbios Logic BTLD diskette, and press Enter.

When using the BTLD to install SCO UNIX, the CAM3 configuration tool is automatically installed.

e   Continue from this point as a normal installation according to the SCO UNIX documentation.

Note: For SCO 3.4v4x, you must include the Extended Utilities package during the installation. For SCO OpenServer, this is done automatically.

f   Symbios Logic recommends creating a second copy of the UNIX kernel.

Log in as root and issue the command:

```
cp /unix /unix.good
```

This creates a second copy of the UNIX kernel under the name /unix.good.

> **Note:** If any problems arise with building the new UNIX kernel, this procedure ensures that a valid copy of the UNIX kernel is still available.
>
> To access this valid UNIX kernel, type at the colon after the boot message:
>
> ```
> unix.good
> ```

2 Install SCSI device support.

    a After rebooting the system, type:

```
mkdev cam3
```

       Press Enter to continue.

    b Continue from Procedure 1, step 2f.

Troubleshooting

The following conditions should exist after a successful installation:

- The directory etc/conf/sdevice.d should contain a file named bhba or slha, depending on your SCO UNIX version. This file contains the sdevice entries.
- The directory etc/conf/cf.d contains 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 a bhba or slha entry for each Symbios
  - The second field in the sdevice file should read "Y".
  - A bhba or slha entry should appear in the mdevice file.
  - A bhba or slha entry for each configured SCSI device should appear in the mscsi file.

● Directory etc/conf/pack.d/bhha or directory etc/conf/pack.d/slha should exist and contain the files Driver.o and space.c.

The following are some problems and their suggested solutions:

AN INTERRUPT CONFLICT MESSAGE APPEARS.

a In the sdevice file, check the fifth field of the bhba or slha entry for a conflict with that of any competing driver.

A SCSI DEVICE IS NOT FOUND.

a Reboot to observe the system configuration table when it appears.

b Look for bhba or slha entries for each SCSI device connected to a Symbios Logic host adapter.

c Check to see that the desired value for each field exists.

UNIX SYSTEM BEHAVES UNRELIABLY AFTER A CONFIGURATION CHANGE.

a Whenever the hardware or software configuration is altered, you must rebuild the kernel. Use the Relink UNIX option of the CAM3 configuration tool, or change to the directory /etc/conf/cf.d and type:

```
../link_unix
```

to rebuild the kernel.

DURING KERNEL REBUILD, AN ERROR
MESSAGE INDICATES THE CHARACTER DEVICE
NUMBER OF DEVICE cn CONFLICTS WITH THE
CHARACTER DEVICE NUMBER OF bhba OR slha.

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

b   Reboot the system.

DURING INSTALLATION, THE ROOT DISK IS
NOT FOUND, OR THE PARTITIONING OF THE
DISK FAILS.

a   If your boot drive is a SCSI disk, check that it is
assigned SCSI ID 0 (zero), and is configured to
host adapter 0 (zero), LUN 0 (zero).

b   If a SCSI tape drive is used in the initial
installation:

Check that the tape drive is assigned SCSI ID 2,
and that it is configured to host adapter 0 (zero),
LUN 0 (zero).

Check that the ID of the tape drive does not
conflict with any other SCSI device ID.

c   If a SCSI CD-ROM drive is used in the initial
installation:

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).

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

d   During installation, you are given the option of
retaining current partitions on the root hard disk.
For instance, you could have a DOS partition or a

user UNIX partition already established on the drive. Usually, these partitions are desired. However, the root and swap partitions are established during installation. If problems exist with these partitions, you may need to execute the DOS FDISK procedure to delete these partitions before installation.

Important Additional Information

How to Remove a SCSI Disk Drive From SCO UNIX

Use the following steps to remove a SCSI disk drive from SCO UNIX.

1 From the CAM3 main menu, select the option to add or remove specific devices. A list appears showing the current configuration followed by a menu of choices. To remove a SCSI disk drive, select option 4 and press Enter.

2 A user prompt to review SCSI ID information is displayed. After responding to the prompt, press Enter to start the mkdev .scsi utility for removing a SCSI disk drive.

3 The .scsi utility program menu appears. Select option 2 to remove a disk drive and press Enter.

4 The system prompts to remove a SCSI device. Select option 1 to remove a disk drive and press Enter.

5 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:

```
bhba
```

if your SCO UNIX is release 3.2v4x, or

```
slha
```

if your SCO UNIX is OpenServer.

Press Enter.

6   The system prompts for which SCSI host adapter
    supports the disk drive. Respond with the correct host
    adapter number, and press Enter.

    If this is the first Symbios Logic host adapter 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 prompts for the host adapter
    identifier of the preceding step.

7   With SCO OpenServer, the system prompts for the
    bus number of the disk drive. Since Symbios Logic
    host adapters support one SCSI bus per host adapter,
    press Enter to get the default value of zero.

    With SCO 3.2v4x, this prompt does not appear.
    Proceed with the next step.

8   The system prompts for the SCSI ID of the disk drive.
    Type the SCSI ID number and press Enter.

9   The system prompts for the LUN (Logical Unit
    Number) of the drive. Type the correct LUN and
    press Enter, or press Enter for the default value of 0
    (zero).

10 The system prompts to update the SCSI configuration
    file. Type y and press Enter. The system updates the
    SCSI configuration file and returns to the Main
    CAM3 Program menu.

11 A prompt appears to create a new kernel to effect the system configuration change. Type n (this is done later) and press Enter.

After all unwanted SCSI disk drives are removed, go to step 6, Rebuilding the Kernel, in Procedure 1.

Chapter 6

Device Drivers for UnixWare

Introduction

UnixWare 2.xx 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, multitasking capability, and multi-user capability. In addition UnixWare 2.xx 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 Logic SDMS C8xx driver allows SCO UnixWare (previously Novell UnixWare) operating systems to interface with SCSI devices connected to a Symbios Logic 53C8xx chipset and/or Symbios Logic 8xxxx 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 Logic SDMS C8xx driver.

Figure 6-1
Portable Device Interface (PDI)
Architecture
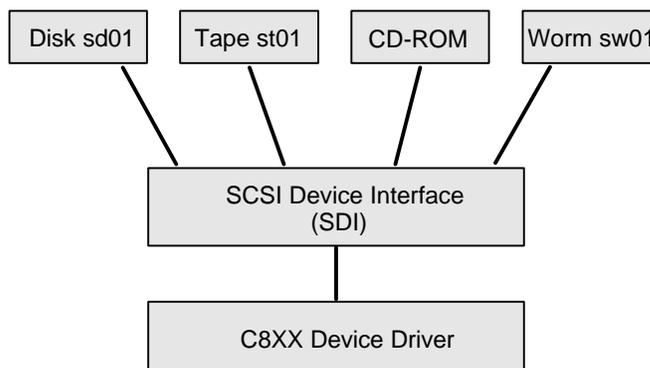
Features

● Allows easy installation using PDI - ID tools.

● Provides synchronous negotiation including Fast SCSI and Ultra SCSI (Fast-20)

● 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

● Supports request concatenation

● Multiprocessor support

Description

The Symbios Logic SDMS C8xx driver for SCO UnixWare operating systems is available on a 3.5 inch floppy diskette labeled SDMS PCI UnixWare (2.x). 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.

In addition, for SCO UnixWare 2.1 and later, the Host Adapter diskette contains the C8xx driver for use during initial installation of SCO UnixWare. If you have both the C8xx driver directly from Symbios Logic and also the driver bundled with the UnixWare Operating System, use the latest release of the C8xx driver.

Installing Your SDMS UnixWare Driver

Installing the Driver During UnixWare Installation

When performing the UnixWare installation, if the computer is set up to boot from the SCSI bus through a Symbios Logic 53C8xx 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.

   When the driver is loaded, a message "C8xx driver is loaded" appears on the screen.

   If you want to install other host adapter drivers, then insert the IHV HBA diskette provided with the UnixWare distribution package and press Enter.

4   Follow instructions on the screen or refer to the UnixWare Installation Handbook to complete the installation.

   NOTE: During the installation, if the driver does not find a hard disk on which to install the operating system, it aborts the process.

5 At the end of the installation you might see a prompt to reinsert the 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.

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

Updating UnixWare 2.xx With the C8xx Driver

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 Logic 53C8xx 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. To do so:

1 Log on as root.

2 At the shell prompt type

```
cp  /stand/unix  /stand/unix.good
```

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 as follows:

```
pkgadd -d diskette1
```

5 Select C8xx and press Enter. The C8xx driver gets loaded on the system.

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

```
cat 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 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.

Rebuild 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

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.good

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 7
Device Drivers for NetWare

Introduction

This chapter consists of two main sections:

● Symbios Logic NWPA driver for the Novell NetWare operating system.

● Symbios Logic DDFS drivers for the Novell Netware operating system.

Symbios Logic NWPA Driver

The Symbios Logic NWPA driver for the Novell NetWare operating system allows you to utilize a Symbios Logic SCSI controller or processor, controlled by a Symbios Logic SCSI BIOS, with NetWare. The Symbios Logic NWPA software, coupled with a Symbios Logic SCSI controller or processor and Novell or third party Custom Device Modules (CDMs), provide a SCSI solution within the NetWare environment.

A single driver is provided for the Novell NetWare 4.11 environment. This document explains how to install and use the Symbios Logic NWPA SCSI Host Adapter Module (HAM) driver for NetWare.

NWPA Features

● Provides synchronous negotiation, including Fast, Ultra SCSI (Fast-20), and Ultra2 SCSI (Fast-40)

● Supports multiple host adapters

- Supports multiple logical unit numbers (LUNS) with Novell's '/lun' switch
- Large LUN support (larger than 7.844 GBytes)
- Supports Disconnect/Reselect
- Supports scatter-gather
- Supports tagged command queuing
- Supports simple and ordered queue tags
- Supports shared interrupts
- Supports Wide SCSI (single-ended and differential)
- Supports NetWare 4.11 SFT-III
- Supports SDMS 4.XX BIOS
- Supports SDMS 3.XX BIOS with ASPI8XX.SYS
- Supports SDMS 4.XX DOS drivers
- Handles target initiated negotiation (wide and synchronous)

In conjunction with Novell software:

- Supports the ASPI interface via Novell's NWASPI.NLM
- Support for SCSI CD-ROM devices via Novell's SCSICD.CDM
- Support for removable media devices including SCSI MagnetoOptical, and Bernoulli devices via Novell's SCSIMO.CDM
- Support for SCSI-2 Tape devices via Novell's SCSI2TP.CDM

Note: Other third party CDMs may also support these devices.

NWPA Description

The Symbios Logic NWPA solution consists of the device driver, SYM8XXNW.HAM, and a NetWare 4.XX installation file SYM8XXNW.DDI. SYM8XXNW.HAM

is an NWPA Host Adapter Module (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 support their specific devices.

NWPA ASPI Support

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

Installing Your NWPA NetWare Drivers

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

You must load the Symbios Logic NWPA NetWare driver once, for each Symbios Logic controller present in the system.

Preparing Your System for NWPA Drivers

The Symbios Logic NWPA driver, SYM8XXNW.HAM, does not support the older Symbios Logic 3.XX DOS drivers (DOSCAM.SYS, MINICAM.SYS, CDROM.SYS, and SCSIDISK.SYS). Both the 3.XX BIOS (version 3.07.00) and 4.XX BIOS (version 4.02.02 or later) are supported, but we recommended that you use the 4.XX BIOS, if possible. If you are using the 3.XX BIOS, then you must also load ASPI8XX.SYS.

The following DOS drivers are supported:

> ASPI8XX.SYS
>
> SYMCD.SYS
>
> SYMDISK.SYS

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

1 Load FLASH8X5.EXE

2 Select the BIOS file 8XX_32.ROM or 8XX_64.ROM. You must use BIOS version 4.02.02 or later.

To Update DOS drivers:

1   Edit CONFIG.SYS.

2   If any of the following lines appear, delete them:

DEVICE=<path>\DOSCAM.SYS

DEVICE=<path>\MINICAM.SYS

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

DEVICE=<path>\SCSIDISK.SYS

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

DEVICE=<path>\ASPI8XX.SYS

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

For An Existing Installation Of NetWare With Symbios Logic DDFS NetWare Drivers Installed

If you currently have Symbios Logic DDFS NetWare drivers (SDMSNETx.DSK and optionally NETASPIx.NLM) installed on your system, then you must replace these files with SYM8XXNW.HAM.

1   Change to the directory where NetWare files are installed. This is NWSERVER for NetWare 4.11.

2   Copy the files in the NWPA subdirectory on the distribution disk to the NetWare directory on your hard drive.

3   Edit STARTUP.NCF (and/or AUTOEXEC.NCF if the SDMS drivers are loaded in AUTOEXEC.NCF). Delete any lines referring to SDMSNETx.DSK and/or NETASPIx.NLM.

4   Add one load line per Symbios Logic controller or host adapter present in the system, of the form: LOAD SYM8XXNW.HAM SLOT=<slot no> <options>

Note: The SLOT option is required for any load instance. To determine the slot numbers for the controllers or host adapters configured in your system, manually load the driver, without a SLOT= option. You are prompted with the slot numbers which are applicable to each Symbios Logic HA/controller detected.

For NetWare 4.11 New Installations

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

2   When the NetWare installation procedure prompts you for a Disk Driver, insert the Symbios Logic device drivers diskette into drive a: or b:. Then use the INS key to select an unlisted driver. A dialog box appears. If you are installing the driver from the a: drive, press Enter to continue. If you are installing the driver from the b: drive, press F3 (to specify the path to search for the driver), and enter the drive letter:

```
B:
```

The SYM8XXNW.HAM driver should appear as a selection. Select the driver.

3   Next you are prompted with the available command line options to load 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. Select any options needed for your particular installation.

4 Load a separate instance of the driver for every Symbios Logic 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.

6 When asked to edit the STARTUP.NCF file, make sure SYM8XXNW.HAM is loaded once per Symbios Logic controller or host adapter present in the system. Add a SLOT=<slot no> to each load line in the STARTUP.NCF, specifying the slot numbers written down in 5), one per load instance.

Reconfiguring Driver Options

To reconfigure driver options, you must follow these steps:

1 Unload the driver.

```
UNLOAD SYM8XXNW.HAM
```

This unloads all instances of the driver.

2 Reload each instance of the driver with the desired option settings.

```
LOAD SYM8XXNW.HAM SLOT=<slot no> <options>
```

3   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.

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.

Reconfiguring Driver Options

To reconfigure driver options, you must follow these
steps:

1   Unload the driver.

```
UNLOAD SYM8XXNW.HAM
```

This unloads all instances of the driver.

2   Reload each instance of the driver with the desired
     option settings.

```
LOAD SYM8XXNW.HAM SLOT=<slot no> <options>
```

3   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.

NWPA Command Line Options

The SYM8XXNW.HAM driver has many tuning parameters. Following is a list of tuning parameters available, including the default option and a list of valid options. Following each parameter is a description of when to use a parameter, and any impact its use may have on your 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 Verbose Mode command line option is desired the load command line should look like this:

```
load SYM8XXNW.HAM verbose=enable
```

IMPORTANT: **No spaces are allowed in specifying these command line options. Spaces are required between different command line options.**

Information Options

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.

Using the Verbose Mode Option

Command line option: verbose=<option>

Default value: disable

Valid options: enable, disable

Function: Display the current settings of all driver options.

This option shows all the command line option settings for this load of the driver.

NetWare NWPA Driver Customizable Options

Using the Slot Option

Command line option: slot=<option>

Default value: None

Valid options: 0-10099

Function: Specify the slot instance number of the Symbios Logic controller 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 Logic controller (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.

Using the Tagged Queuing Option

Command line option: qtags=<option>

Default value: enable

Valid options: enable, disable

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.

Using the Queue Tag Type Option

Command line option: qtag_type=<option>

Default value: ordered

Valid options: simple, ordered

Function: Specify the type of tagged commands the device is issued.

Possible Impact: Ordered type is required for certain devices to avoid I/O starvation.

This option is valid only when tagged queuing (qtags) is enabled, which it is by default. Simple qtags are typically the preferred tag type. It is sometimes necessary to use ordered tags on certain devices to avoid I/O starvation under extremely heavy I/O loads such as a NetWare remirror process.

Using the Synchronous SCSI Option

Command line option: sync=<option>

Default value: enable

Valid options: enable, disable

Function: Enable/Disable support of synchronous SCSI.

Possible Impact: No synchronous SCSI support available.

This option allows the user to enable/disable support of synchronous SCSI data transfers. Synchronous data transfers increase the I/O performance of a system, but there are a few non SCSI compliant devices which cause problems on a system.

Using the Fast-20 (Ultra SCSI) Synchronous SCSI Option

Command line option: Fast20=<option>

Default value: enable

Valid options: enable, disable

Function: Enable/Disable support of Ultra (Fast-20) SCSI or faster synchronous data transfers.

Possible Impact: No Ultra (Fast-20) or Ultra2 (Fast-40) sync SCSI support available.

This option allows the user to enable/disable support of Ultra (Fast-20) and Ultra2 (Fast-40) synchronous SCSI data transfers when using a Ultra or Ultra2 SCSI controller. If this option is disabled, and synchronous data transfer (sync) is enabled, the controller performs up to 10 Mega transfers/sec with any device capable of synchronous negotiations.

Using the Wide SCSI Option

Command line option: wide=<option>

Default value: enable

Valid options: enable, disable

Function: Enable/Disable support of wide SCSI.

Possible Impact: No wide SCSI support available.

This option allows the user to disable support of wide SCSI when using a wide SCSI controller. Set this option to 'disable' if a wide SCSI device is present on the system, but a narrow 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.

Using the Elevator Threshold Option

Command line option: elev=<option>

Default value: 7

Valid options: 0-250, or disable

Function: Specify the maximum number of I/Os the HAM should queue before allowing NWPA to filter and organize requests.

Possible Impact: You may affect performance by varying the elevator threshold value.

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.

Using the Scatter-Gather Option

Command line option: sg=<option>

Default value: enable

Valid options: enable, disable

Function: Enable/Disable the HAM's acceptance of scatter gather lists from NWPA.

Possible Impact: You may affect performance by enabling/disabling this option.

Scatter-Gather lists allow the driver to more efficiently transfer.

Using the LUNs Option

Command line option: luns=<option>

Default value: 32

Valid options: 1-32

Function: Specify the number of LUNs the host adapter/controller should scan for per SCSI id.

Possible Impact: Provides multi-LUN support via Novell generic CDMs. Can cause problems if non SCSI-2 compliant devices are present on the bus.

Limits the maximum number of LUNs that will be supported for each SCSI target device. To support more than one lun, the Netware '/lun' switch must also be used. The '/lun' switch will notify the generic CDM's which are provided by Novell, to scan all luns on all devices (i.e., luns 0-31). It is left to the user to insure that all devices on the bus are capable of properly accepting inquiries to each LUN scanned. Note that the default value for version 2.01 of SYM8XXNW.HAM was 'luns=1', while the default value is now 'luns=32' for versions 2.02 and later.

For example, to limit the scan to the first 8 luns, you would use: '/lun luns=8' on the command line when loading the driver. To limit the scan to only lun 0, no command line option is needed. To scan all luns, you would use: '/lun' on the command line when loading the driver.

Important Additional NWPA Information

For Information Pertaining to a Specific NWPA Driver

This document addresses options available on the Symbios Logic NWPA NetWare driver, versions 2.02.00 or later. For information pertaining to a specific driver, please do one of the following:

> For NetWare version 4.11, consult the SYM8XXNW.DDI file for options available for SYM8XXNW.HAM. This is accessed via the NetWare install utility.

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

DOS Access Dependencies

NetWare sometimes requires access to the DOS partition (perhaps to load a file, or to down the system). The SYM8XXNW.HAM driver supports several SDMS DOS configurations.

SYM8XXNW.HAM detects whether an SDMS 3.XX or 4.XX BIOS is present. It also detects if the SDMS 4.XX DOS driver ASPI8XX.SYS is loaded. If you are using the SDMS 3.XX BIOS, then ASPI8XX.SYS must also be loaded.

Note: SYM8XXNW.HAM does not support the SDMS 3.XX DOS drivers (DOSCAM, MINICAM).

If there are DOS partitions present on any device connected to a Symbios Logic controller, the SDMS

3.XX or 4.XX BIOS and/or SDMS ASPI8XX DOS driver is required for DOS support. The BIOS is either integrated into the system BIOS or resides with the controller itself.

Supported DOS Configurations

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

3.XX BIOS, ASPI8XX.SYS*

4.XX BIOS, No DOS Drivers

4.XX BIOS, ASPI8XX.SYS*

No SDMS BIOS, ASPI8XX.SYS*

In addition to ASPI8XX.SYS, you may optionally load SYMCD.SYS and/or SYMDISK.SYS for DOS CD-ROM and DOS MO support, respectively. An optional driver for CD-ROM support (SYMCD.SYS) works with these drivers in conjunction with MSCDEX.EXE. SYMCD.SYS and SYMDISK.SYS are NOT required for CD-ROM or MO support under NetWare.

When Using the 3.XX BIOS

If the 3.XX BIOS is present, you must load ASPI8XX.SYS in the CONFIG.SYS file.

When Using the 4.XX BIOS

If you are using a version of the 4.XX BIOS that supports non-volatile memory (NVM), you must disable SCAM on all Symbios host adapters via the config utility. If there is no NVRAM present, then any SCAM devices must be set to fixed IDs so that SCAM always assigns those IDs.

When Using ASPI8XX.SYS

If you are using ASPI8XX.SYS, you must disable SCAM when ASPI8XX.SYS is loaded on the command line. If you are using ASPI8XX.SYS with the 4.XX BIOS, you must first disable SCAM using the 4.XX config utility so that ASPI8XX.SYS accepts the /SCAM=OFF switch. For example in config.sys, use the following:

```
device=c:\symbios\aspi8xx.sys /SCAM=OFF<>
```

Supported DOS Drivers

The SDMS 3.XX BIOS and SDMS 4.XX BIOS are both supported by the SDMS 4.XX ASPI8XX 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. The following is a list of DOS drivers currently supported by the SYM8XXNW.HAM driver:

ASPI8XX.SYS ASPI8XX provides an interface which allows for support of non disk devices, and for DOS support of multiple Symbios Logic controllers. ASPI8XX is not required for NetWare support if you are not using the 3.XX BIOS. It is required for NetWare installation, if you are using a SCSI CD-ROM device that is attached to a Symbios Logic controller.

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

MSCDEX.EXE This driver (provided with DOS) is required in conjunction with SYMCD.SYS to install NetWare from a CD-ROM. Due to a bug in

MSCDEX.EXE, the name assigned to the CD-ROM device does not match the base name of any file installed from the CD-ROM. A recommended name to assign to the CD-ROM device is MSCD001.

SYMDISK.SYS   The SYMDISK.SYS driver provides support for removable media devices under DOS. While you may load this driver in the DOS environment, it 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   If you are using a 3.XX BIOS.

When Using No SDMS BIOS

The SYM8XXNW.HAM driver operates properly on a system when no SDMS BIOS or SDMS DOS drivers are present. In this case, DOS must reside on a device which is not connected to a Symbios Logic controller based host adapter. As an example, DOS could reside on an IDE drive.

Symbios Logic DDFS Drivers

The Symbios Logic DDFS drivers for the Novell Netware operating system allow you to utilize a Symbios Logic SCSI controller or processor, controlled by a Symbios Logic SCSI BIOS, with NetWare. The DDSF software, coupled with a Symbios Logic SCSI controller or processor, provides a SCSI solution within the NetWare environment.

Separate drivers are provided for Novell NetWare v3.12, and Novell NetWare version 4.xx. The following information explains how to install and use the DDFS SCSI drivers for NetWare.

DDFS Features

- Supports the ASPI interface
- Provides synchronous negotiation including Fast and Ultra (Fast-20) SCSI
- Supports multiple host adapters
- Supports multiple logical unit numbers (LUN)
- Large LUN support (larger than 7.844 GBytes) for devices with dedicated NetWare partitions and volumes
- Supports Disconnect/Reselect
- Supports scatter-gather
- Supports tagged command queuing
- Supports ordered queue tags
- Allows shared interrupts
- Supports Wide SCSI (single-ended and differential)
- Supports device exclusion

- Supports NW4.10 SFT-III
- Supports target initiated negotiation (wide and synchronous)
- Displays SCSI Additional Sense Code & Qualifier bytes
- Support for removable media devices including CD-ROM, Magneto Optical, and Bernoulli devices
- Supports retries on non-sequential access devices
- Extensive error reporting and handling for multi-LUN RAID support
- Supports 3.XX BIOS
- Supports 4.XX BIOS and ASPI drivers
- Power management supported via PMSCHED(a power management utility)

DDFS Description

There is a separate DDFS device driver and ASPI manager for each of two major releases of NetWare. For NetWare v3.12, the SDMS device driver is SDMSNET3.DSK, and the file NETASPI3.NLM is loaded if support for the ASPI interface is desired (this is required for devices such as tape drives). For NetWare v4.xx, the SDMS device driver is SDMSNET4.DSK, and the file NETASPI4.NLM is loaded if support for the ASPI interface is desired.

DDFS ASPI Support

The Symbios Logic ASPI interface is provided by the NETASPIx.NLM drivers. NetWare, or third party applications, may use this interface to communicate with any SCSI-2 device attached to a Symbios Logic controller, including SCSI-2 tape devices.

Installing Your DDFS NetWare Drivers

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

You can load these drivers only once. If changes are required (to reconfigure the driver options), you must remove the drivers and reload them with the new option settings. If these changes are permanent, and the drivers load automatically at server boot time, you must specify these options in the startup.ncf or autoexec.ncf file.

For An Existing Installation Of NetWare With SDMS Drivers Installed

If your current SDMS NetWare drivers are version 3.05.00 or older, they are named NCRSDMSx.DSK and ASPICAMx.NLM. Replace the NCRSDMSx.DSK and ASPICAMx.NLM drivers with the ones supplied on the new Symbios Logic device drivers diskette.

If you intend the driver to auto load on NetWare boot, it is necessary to edit the startup.ncf or autoexec.ncf file and replace the line:

```
LOAD NCRSDMSx.DSK <options>
```

with

```
LOAD SDMSNETx.DSK <options>
```

where

x is the version of NetWare you are using, and <options> are the command line options (if any) you intend to use.

If your current SDMS NetWare drivers are version 3.06.00 or newer, they are named SDMSNETx.DSK and NETASPIx.NLM. Replace the SDMSNETx.DSK and NETASPIx.NLM drivers with the ones supplied on the new Symbios Logic device drivers diskette.

No other actions are required to use these new drivers. You may want to review the command line options to insure you are using the best options for your configuration.

For NetWare v3.12 New Installations

Note: The SDMSNET3.DSK driver should work on a NetWare 3.11 server. However, this compatibility is neither tested nor supported.

1 Create a directory in which to install the NetWare file server. Change to that directory and copy all the files from the NetWare system disks into that directory.

2 Copy the file SDMSNET3.DSK from the Symbios Logic device drivers diskette into this directory. If ASPI support is desired, also copy NETASPI3.NLM.

3 To start NetWare and continue the installation, type:

```
SERVER
```

4 When prompted, enter the name of the file server and network (IPX) number. See the chapter on file server installation in the NetWare Installation Manual for restrictions and further information.

5 At the NetWare prompt, type:

```
LOAD SDMSNET3 <options>
```

This command loads the main driver. Without this command, NetWare is unable to access the hard disk drive. If ASPI support is desired, also type:

```
LOAD NETASPI3
```

6 To bring up the Installation menu, at the NetWare prompt type:

```
LOAD INSTALL
```

Continue with the installation according to the file server installation chapter in the Novell NetWare Installation Manual.

7 At the Available System Options menu, select the EDIT STARTUP.NCF option and check to see that the line LOAD SDMSNET3 is in the file. If not, add this line to the file. This eliminates the need to load drivers by hand every time the system is powered up. If the line appears more than once, remove the duplicate statements and all references to "port=xxxx", "slot=xxxx" and/or "mem=xxxx".

8 In addition, if ASPI support is required, add the line:

```
load NETASPI3.NLM
```

to the file after the line:

```
load SDMSNET3.DSK
```

For NetWare v4.xx New Installations

1 Begin the file server installation as per the instructions in the file server installation chapter in the Novell NetWare Installation Manual.

2   When the NetWare installation procedure prompts
you for a disk driver, insert the Symbios Logic device
drivers diskette into drive a: or b:. Then use the INS
key to select an unlisted driver. A dialog box appears.
If you are installing the driver from the a: drive, press
Enter to continue. If you are installing the driver from
the b: drive, press F3 (to specify the path to search for
the driver), and enter the drive letter:

```
B:
```

The SDMSNET4.DSK driver should appear as a
selection. Select the driver.

3   Next you are prompted with the available command
line options to load 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. Select any options needed
for your particular installation.

4   When asked to edit the STARTUP.NCF file, make
sure SDMSNET4 is loaded only once. If present,
remove the "port=xxxx slot=xxxx mem=xxxx"
options from the command line.

5   After the installation is complete, if ASPI support is
also desired, down the server and copy the
NETASPI4.NLM file to the appropriate server
directory. For NetWare 4.0x systems this directory is
SERVER.40 by default. For NetWare 4.1x systems
this directory is NWSERVER by default.

Edit the startup.ncf file and add the line:

```
load NETASPI4.NLM
```

to the file after the line:

```
load SDMSNET4.DSK
```

For NetWare v4.1x SFT-III Installations

1   Install your primary server following procedures for native 4.1x installations.

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 SDMSNET4.DSK driver from the primary server. Press F10 to accept.

4   If ASPI support is required for the secondary server, down the system after completing the SFT-III installation.

    Copy the NETASPI4.NLM file from the device drivers diskette to the NWSERVER directory on the secondary server.

    Edit the IOSTART.NCF file on both servers by adding the line:

```
load NETASPI4.NLM
```

    to the files after the line:

```
load SDMSNET4.DSK
```

For NetWare v4.1x NWOS2 Installations

This is not a supported configuration.

DDFS Command Line Options

The SDMSNET3.DSK and SDMSNET4.DSK drivers have many tuning parameters. Following is a list of tuning parameters available, including the default option and a list of valid options. Following each parameter is a description of when to use a parameter, and any impact its use/disuse might incur.

If an option is specified but the assignment is not valid, then the default value is used. The SDMSNET3.DSK and SDMSNET4.DSK drivers are referred to in the remainder of this section as SDMSNETx.DSK,

where

> x refers to the appropriate NetWare operating system version.

The options described below are used by placing the specified characters on the load command line for the SDMS driver. For example, if the Verbose Mode command line option is desired in NetWare 3.1X, the load command line should look like this:

```
load SDMSNET3 -v
```

IMPORTANT: No spaces are allowed in specifying these command line options. Spaces are required between different command line options.

Using the Verbose Mode Option

Command line option: -v

Function: Display the current settings of all driver options.

This option shows all the command line option settings for this load of the driver.

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.

Using the Tagged Queuing Option

Command line option: qtags=<option>

Default value: enable

Valid options: enable, disable

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 IO 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.

Using the Depth of Queue Tags Option

Command line option: qdepth=<option>

Default value: 10

Valid options: 0-128

Function: Set the depth of the queue for tagged queuing. This value designates the depth of the queue per LUN (I_T_L nexus). That is, this value designates the depth of the queue per device, or per LUN, if a device has multiple LUNs.

Possible Impact: Used to optimize the performance of tagged queuing.

This option is valid only when tagged queuing (qtags) is enabled, which it is by default. Values possible for this parameter range from 0 to 128. 0 is equivalent to qtags=disable. While the actual depth of the queue depends on the specific drive controller. For single drives, values of about 10-30 are typically optimal. Sometimes a greater number is optimal for peripherals such as disk arrays. You should experiment with various qdepth values to determine the optimal performance for their particular setup. The optimal qdepth value is based on different aspects of the system, including but not limited to: the processor, the available memory, the disk drives, and other peripherals.

Note: The driver supports a maximum of 128 qtags per controller at a given time. The driver may allocate fewer qtags per device if this limit is being reached.

Using the Queue Tag Type Option

Command line option: qtag_type=<option>

Default value: simple

Valid options: simple, ordered

Function: Specify the type of tagged commands the device is issued.

Possible Impact: Ordered type is required for certain devices to avoid IO starvation.

This option is valid only when tagged queuing (qtags) is enabled, which it is by default. Simple qtags are typically the preferred tag type. It is sometimes necessary to use ordered tags on certain devices to avoid IO starvation under extremely heavy IO loads such as a NetWare remirror process.

Using the Base Time-Out Option

Command line option: timeout=<option>

Default value: 30

Valid options: Any integer value 30 to 999999999

Function: Specify the minimum value (in seconds) for command time-out.

Possible Impact: Insure system integrity when using a slow device.

If a device is slow, you should increase this value to insure the device has adequate time to respond to a command issued to it before the command times out.

Using the Sorting of Read Requests Option

Command line option: sort=<option>

Default value: enable

Valid options: enable, disable

Function: Enable/disable sorting of read commands to be issued to devices.

Possible Impact: Enabling normally yields increased performance based on the target device controller.

If the devices connected to a host adapter are of a non-buffered architecture, such as the Symbios Logic 6298 disk array, then sorting of reads may result in a performance degradation, since the absence of cache provides no benefit for sorted requests. In this instance you should disable the sort option. On most disk drives, an on-board cache allows for reading ahead of data, and by sorting read requests, the probabilities of achieving a cache hit are greatly increased, thus increasing the overall performance of the driver.

Using the Shared Interrupts Option

Command line option: shared_int=<option>

Default value: disable

Valid options: enable, disable

Function: Support shared interrupts.

Possible Impact: Enabling may cause a performance degradation.

You should enable the shared interrupt option any time a PCI card other than a Symbios Logic controller is added to a system which assigns all PCI cards the same interrupt

value. The added card must support shared interrupts. The driver automatically handles the case of more than one Symbios Logic host adapter sharing an interrupt.

Using the Wide SCSI Option

Command line option: wide=<option>

Default value: enable

Valid options: enable, disable

Function: Enable/Disable support of wide SCSI.

Possible Impact: No wide SCSI support available.

This option allows the user to disable support of wide SCSI when using a wide SCSI controller. Set this option to "disable" if a wide SCSI device is present on the system, but a narrow 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/from the device is narrow (8 bit). The driver does not initiate a wide SCSI transfer request negotiation.

Using the Number of Error Recovery Retries Option

Command line option: max_retry=<option>

Default value: 5

Valid options: 0-50

Function: Set the maximum limit on the number of times to retry an IO on a non-sequential access device in the event of a SCSI error condition.

Possible Impact: Setting this to 0 prevents the driver from retrying an IO in the event of an error.

If SCSI error conditions occur on a non-sequential access device, the driver retries an IO operation the set number of times before giving up and returning the IO to the caller with a failed status. Possible callers are NetWare or an application via the CAM or ASPI interface. If this option is set to 0, IOs are not retried in the event of an error condition.

Note: Some SCSI error conditions (such as DATA PROTECT or ILLEGAL REQUEST) do not warrant a retry. Such conditions are reported but not retried, even for positive values of max_retry.

Using the Logging of SCSI Errors Option

Command line option: Log_ScsiErrors=<option>

Default value: Both

Valid options: Off/Console/Syslog/Both

Function: Specify where to log serious SCSI errors.

Possible Impact: Changing this option may result in loss of this information.

If SCSI error conditions occur, the driver normally attempts to log a SCSI Error Report describing the event to both the console and the system log file SYS:SYSTEM\SYS$LOG.ERR. This information is valuable in determining when a device is having problems. It can indicate when a device is beginning to fail, providing an opportunity to replace the device before complete failure. With this option you can choose to specify where these messages are logged: Console - the server console only; Syslog - the system error log; Both -

both the server console and the system error log; or Off - the error messages are not logged anywhere.

Note: This option affects the logging of serious SCSI errors only. Non-SCSI errors are still logged to both the console and system error log.

Using the Exclusion of Devices Option

Command line option: xcl=<device>[:device ...]

Default value: All devices recognized by the driver, i.e., no devices are excluded.

Valid options: p,i,l

(You may specify multiple devices with a colon separator) where p is the Path designator, and is in the range 0 -7, i is the SCSI ID designator, and is in the range 0 -31, l is the LUN designator, and in the range 0 -7. The LUN parameter is optional. You may exclude multiple devices so long as the string does not exceed 35 characters in length and devices are separated by colons.

Examples: xcl=1,2,3 to exclude LUN 3 of the device at SCSI ID 2 on Path 1. xcl=1,2,3:2,5 to exclude LUN 3 of the device at SCSI ID 2 on Path 1, and all LUNs on the device at SCSI ID 5 on Path 2.

Function: Allows for specifying that the driver not recognize certain devices.

Possible Impact: Cannot directly access devices via the SDMSNETx.DSK driver.

This option is available to exclude recognition and direct access of specific devices by the SDMSNETx.DSK drivers. These excluded devices are not registered with the operating system for use by the driver. Other applications/drivers can then take over the control of such

devices. This option is available for support of third party vendors who write their own SCSI control applications. You may exclude a maximum of five devices.

Using the Maximum Block Size for Concatenation Option

Command line option: max_kb=<option>

Default value: 32767

Valid options: 0-32767

Function: Set the maximum number of KB written to disk at one time.

Possible Impact: A high number may result in more data transferred in a single data phase.

Specify the maximum size block in Kilobytes which is written to disk in one data transfer phase. This ensures that when requests are concatenated, the maximum size of the concatenated request does not exceed the specified value. If individual requests are greater than this specified value, no action is taken.

Note: The following three options affect the amount of memory used by the driver. For information on how memory is allocated by the driver, and to get an approximate feel for the amount of memory which is saved by invoking these parameters, refer to Memory Allocation under Important Additional Information at the end of this section. If the product of max_hbas * max_id * max_lun is small (less than 100), system performance may suffer. These values determine the number of IO buffers allocated by the driver. Allocation of too few may degrade performance.

Using the Maximum Host Adapters Option

Command line option: max_hbas=<option>

Default value: 8

Valid options: 1-8

Function: Specify the maximum number of host adapters to support.

Possible Impact: If number is reduced, it may allow for reduction in the memory used by the driver. Reduction may also result in performance degradation.

This parameter is used to optimize the use of dynamically allocated memory by the driver. If your system has less than 8 Symbios Logic based PCI host adapters, including any Symbios PCI-SCSI controllers designed into the main board, this parameter allows you to reduce the total memory used for the driver.

Using the Maximum SCSI IDs Option

Command line option: max_id=<option>

Default value: 32

Valid options: 8-32

Function: Specify the maximum number of SCSI IDs each host adapter board should support.

Possible Impact: If number is reduced, may allow for reduction in memory used by the driver. Reduction may also result in performance degradation.

This parameter is used to optimize the use of dynamically allocated memory by the driver. If all the host adapters, including any SCSI controllers on the main board are connected to less than 31 devices, you can reduce the size

of the dynamically allocated memory by setting this value to the maximum number of devices on any of the SCSI controllers.

Using the Maximum LUNs Option

Command line option: max_lun=<option>

Default value: 4

Valid options: 1-8

Function: Specify the maximum number of LUNs each host adapter board should support per SCSI id.

Possible Impact: If number is reduced, may allow for reduction in memory used by the driver. Reduction may also result in performance degradation.

Use this parameter to optimize the use of dynamically allocated memory by the driver. If less than 8 LUNs are used per Symbios Logic based PCI host adapter SCSI id, this parameter allows a reduction in the total memory used for the driver.

The Power Management Utilities Used With DDFS

Power management support for NetWare is provided by two NLMs, PMMAKE.NLM and PMSCHED.NLM. Use one or both of these NLMs to activate power management of disk devices registered with the Netware operating system through the SDMSNETx.DSK driver.

PMSCHED.NLM allows manual control of power management to individual devices, while PMMAKE.NLM allows creation of a schedule for power management. You must not load these two utilities at the same time. If you plan to use power management regularly, you can have PMSCHED.NLM load from the AUTOEXEC.NCF file.

SDMS power management is supported only on disk devices. Some disk devices do not support power management. If such a device is detected, PMSCHED indicates the device is not power manageable. Command line options for the PMMAKE.NLM and PMSCHED.NLM utilities are described in this document.

Note: Power management of disk devices connected to Symbios Logic 8XX controllers and handled by SDMSNETx.DSK is NOT supported in the NetWare 4.10 SFT-III environment.

Installing the Power Management Utilities

Follow these steps to install the Power Management Utilities.

1   Copy PMMAKE.NLM and PMSCHED.NLM to the SYS:\SYSTEM directory of the NetWare server.

2   Create a subdirectory called SYS:\PM. This is the directory in which the schedule text and configuration files should reside.

Using the PMMAKE.NLM Utility

The PMMAKE.NLM utility is used to compile a power management schedule file from a standard text file, which you can create using the NetWare EDIT utility, or some other editor. Place the text file in the SYS:\PM directory on the server. The format for this text file is given below.

The syntax for the line that loads the PMMAKE utility is:

```
load PMMAKE <input filename> [<output filename>]
```

where

<input filename> is the full path name of the text file containing the power management scheduling directives. If the path is not specified, the NetWare search path is used.

<output filename> is the full path name of the output configuration (CFG) file produced. If the output file name is not specified, the output file produced is named PM.CFG, located in the SYS:\PM directory.

The format for the PMMAKE input (text) file is:

```
!<DAY INDICATOR>
BEGIN, <START TIME>, <DELAY TIME>, <DEVICE LIST>
END, <STOP TIME>, <DELAY TIME>, <DEVICE LIST>
```

where

DAY INDICATOR = SUN, MON, TUE, WED, THR, FRI, SAT

START TIME = 24 hour time format: 00:00 - 23:59

STOP TIME = 24 hour time format: 00:00 - 23:59

DELAY TIME = Time to wait during no activity on a device before spinning it down, in seconds 1 - 3600

DEVICE LIST = ALL or <DEVICE ID>
[, <DEVICE ID> ...]

DEVICE ID = BXXIXXLXX

BXX identifies the bus
IXX identifies the SCSI ID
LXX identifies the LUN (if zero you can omit)

You may omit bus identifiers after the first one. It is assumed that multiple sequential directives are on the same day until another day is specified. It is assumed that future devices are on the same bus until a new bus id is specified.

For example: B00I01L01, I02, I03, I04, B01I00, I01,I02

specifies

Devices ID 01 LUN 01, ID 2, ID 3, ID 4 on Bus 0
Devices ID 0, ID1, ID 2 on Bus 1

Here is a PMMAKE sample input file:

```
!SUN
BEGIN, 00:00, 10, ALL
END, 23:59, 10, ALL
!MON
BEGIN, 00:00, 10, ALL
END, 06:00, 10, B00I00
END, 06:30, 10, B00I01
```

```
BEGIN, 18:00, 10, ALL
END, 23:59, 10, ALL
!FRI
BEGIN, 00:00, 10, ALL
END, 06:00, 10, B00I00
END, 06:30, 10, B00I01
BEGIN, 17:30, 10, B00I01
BEGIN, 18:00, 10, B00I00
END, 23:59, 10, ALL
!SAT
BEGIN, 00:00, 10, ALL
END, 23:59, 10, ALL
```

Using the PMSCHED.NLM Utility

You must load the PMSCHED.NLM utility to activate power management for devices controlled by the SDMSNETx.DSK driver.

The syntax for the line that loads the PMMAKE utility is:

```
load PMSCHED [<schedule file>]
```

where

<schedule file> is the name of the power management configuration file to use. If no file is specified, PMSCHED looks for SYS:\PM\PM.CFG. If PM.CFG is not found, PMSCHED loads for manual operation of power management.

Manual Operation

In manual operation, power management is initially off on all devices, and gather / displaying of device statistics is on. PMSCHED.NLM allows manual enabling and disabling of power management on individual drives. You can also enable and disable statistics gathering, and clear statistics.

To toggle power management on and off for a device, highlight the device under PMSCHED.NLM and press the F3 key. A menu appears with these selections:

1 Toggle Power Management

2 Toggle Statistics

3 Reset Statistics

Highlight Toggle Power Management and press Enter. Toggling Power Management has no effect on the device statistics.

Scheduled Operation

Automatic scheduling of power management cycles is possible only when PMSCHED remains loaded. For scheduled operation, PMSCHED.NLM requires either:

> the file SYS:\PM\PM.CFG, created by PMMAKE.NLM,

or

> the name of the schedule file, created by PMMAKE.NLM, loaded with PMSCHED as a command line parameter.

Unloading the PMSCHED.NLM Utility

Unloading PMSCHED.NLM does not turn power management off. The state of power management on each device is maintained until the server is downed or PMSCHED.NLM is reloaded.

Device Statistics

Device statistics are gathered on all devices registered by SDMSNETx.DSK with the NetWare operating system. These statistics record the number of reads and writes performed on a device and, if the device is power manageable by the SDMS driver, the number of times the

device is spun up and spun down. Statistics are viewed, toggled on and off, or reset from the power management utility PMSCHED.NLM.

Important Additional DDFS Information

For Information Pertaining to a Specific Driver

This document addresses options available on the Symbios Logic DDFS NetWare drivers, version 3.06.00. For information pertaining to a specific driver, please do one of the following:

For NetWare version 4.XX, consult the SDMSNET4.DDI file for options available for SDMSNET4.DSK. This is accessed via the NetWare install utility.

For versions of the driver 3.05.00 and later, use the -? option on the command line of the SDMSNETx.DSK driver

About Memory Allocation

The driver allocates memory for certain structures based upon the maximum number of SCSI IDs (max_id), LUNs (max_lun), and paths (max_hbas) that are used in the system. The amount of memory allocated is based on the following formula: 414 bytes of memory are allocated for the structure, so

Memory Allocated = 414 * max_hbas * max_lun * max_id.

So for default allocations, the amount of memory allocated is:

Memory Allocated = 414 * 8 * 4 * 32 = 423,936 bytes (414 KB).

If, for example, only one host adapter is installed (or when using a Symbios Logic based PCI SCSI embedded

controller and no add-in host adapters), only one LUN per device is used, and the bus is narrow (up to 8 SCSI IDs), then by setting the appropriate command line options, the amount of memory allocated is:

Memory Allocated = 414 * 1 * 1 * 8 = 3,312 bytes (3.4 KB).

Optimal Use of DDFS Command Line Options

Peripheral Device Dependent Optimizations

Some devices support SCSI tagged queue commands very efficiently, while others show a significant loss of performance when the number of queued requests exceed a certain value. (qtags, qdepth, qtag_type)

Most disk drives have an onboard read cache that is used by the drive controller to read ahead data. The driver may take advantage of this cache by maximizing the cache hits and ensuring a higher data transfer rate. However, there are devices that do not have an on board cache, and implementation of the sorting algorithm results in greater processing overhead and loss of overall performance. (sort)

Devices differ in their response times to requests. To ensure that the driver can handle devices with various response times, an option to tune the time-out value is available. (timeout)

Flexibility

In order to allow flexibility in controlling devices in a system, an option is provided to determine which devices the driver needs to exclude from taking over control. This allows independent software vendors to provide value

added applications to directly control certain devices through the ASPI or CAM interface. (xcl)

Serious SCSI errors are logged to both the console and system error log by default. If a device is going bad, these errors may provide forewarning to replace the device before complete failure. However, you may turn off the logging of these errors to either or both of these locations. (Log_ScsiErrors)

For embedded systems, or other systems with fixed configurations, you can limit the amount of dynamically allocated memory by choosing to set maximum limits on the number of host adapters, devices, and logical units to support. The number of allocated buffers for processing IOs is reduced, which could adversely affect performance. (max_hbas, max_id, max_lun)

Overall System Timing

A driver designed for a networked file server environment has to optimize performance in tandem with the other components of the system. To avoid monopoly on the I/O bus, you can configure the size of the blocks for transfer across the SCSI bus. This ensures that other components get fair access to the I/O bus. (max_kb)

DOS Access Dependencies

NetWare sometimes requires access to the DOS partition (perhaps to load a file, or to down the system). The SDMSNETx.DSK driver supports several SDMS DOS configurations.

SDMSNETx.DSK detects whether an SDMS 3.XX or 4.XX BIOS is present on the system in addition to the Symbios Logic ASPI8XX.SYS driver.

If there are DOS partitions present on any device connected to a Symbios Logic controller, an SDMS 3.XX

BIOS or 4.XX BIOS is required for DOS support. The BIOS is either integrated into the system BIOS or resides with the controller itself.

Supported DOS Configurations

The following are the DOS configurations supported by the SDMSNETx.DSK driver:

3.XX BIOS, ASPI8XX.SYS

4.XX BIOS, ASPI8XX.SYS

3.XX BIOS, ASPI8XX.SYS, SYMCD.SYS, MSCDEX.EXE

4.XX BIOS, ASPI8XX.SYS, SYMCD.SYS, MSCDEX.EXE

3.XX BIOS, No DOS Drivers

4.XX BIOS, No DOS Drivers

When Using An SDMS 3.XX BIOS

If an SDMS 3.XX BIOS is present, you may load an optional Symbios Logic ASPI driver (ASPI8XX.SYS) in the CONFIG.SYS file. An optional driver for CD-ROM support (SYMCD.SYS) works with these drivers in conjunction with MSCDEX.EXE.

Supported DOS Drivers

The SDMS NetWare drivers in a 3.XX BIOS environment only support ASPI8XX configurations. The following is a list of DOS drivers currently supported by the SDMSNETx.DSK driver:

ASPI8XX.SYS   The DOS ASPI Manager interface, ASPI8XX.SYS DOS driver in conjunction with the SDMSNETx.DSK driver is currently the only supported DOS ASPI configuration in a Netware environment.

SYMCD.SYS The SYMCD.SYS driver is an ASPI based CD-ROM driver. It requires the ASPI8xx.SYS driver to be loaded.

MSCDEX.EXE   This driver (provided with DOS) is required in conjunction with SYMCD.SYS to install NetWare from a CD-ROM. Due to a bug in MSCDEX.EXE, the name assigned to the CD-ROM device not match the base name of any file installed from the CD-ROM. A recommended name to assign to the CD-ROM device is MSCD001.

Note: The NetWare drivers can function independently of any DOS drivers, with the exception of installation of NetWare from CD-ROM. Performance is impacted on DOS accesses, but if memory is premium, this option is available.

DOS Drivers Not Supported

The following SDMS DOS drivers are not supported in the NetWare Environment.

> ASPICAM.SYS
>
> SCSIDISK.SYS
>
> SYMDISK.SYS
>
> DOSCAM.SYS
>
> MINICAM.SYS
>
> CDROM.SYS

When Using An SDMS 4.XX BIOS

The SDMS 4.XX BIOS supports two different configurations, default Boot configuration and NVRAM configuration. Both configurations are supported.

Default Configuration

In default boot configuration, the 4.XX BIOS supports up to two Symbios Logic 8XX controllers. Disk devices are supported by the BIOS. Other SCSI devices are not supported without additional DOS drivers.

NVRAM

If NVRAM is present on a controller with a 4.XX BIOS, the SDMSNETx.DSK NetWare drivers use the on-board parameters to configure the Symbios Logic 8XX controllers.

Supported DOS Drivers

Currently only the ASPI8XX.SYS driver is supported in a NetWare configuration utilizing a 4.XX BIOS.

When Using No SDMS BIOS

The SDMSNETx.DSK driver operates properly on a system when no SDMS BIOS is present. In this case, DOS must reside on a device which is not connected to a Symbios Logic controller based host adapter. As an example, DOS could reside on an IDE drive.

Chapter 8

Device Drivers for Windows NT
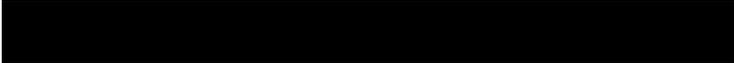
Table of Contents
Device Drivers for Windows NT

Introduction for Windows NT 3.5x/4.x

Windows NT 3.5x/4.x 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 the Microsoft Windows NT 3.5x/4.x documentation for details). I/O requests in Windows NT 3.5x/4.x are handled by an I/O manager. 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 3.5x/4.x. 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 Logic/Microsoft provide a miniport driver, called SYMC8XX.SYS, to complete the path to a Symbios Logic controller or processor with an optional SDMS SCSI BIOS. The following sections describe this driver and its installation.

Figure 8-1
SCSI I/O Flow in Windows NT

```
┌──────────────┐  ┌──────────────┐  ┌──────────────┐
│ WINDOWS NT   │  │ WINDOWS NT   │  │ WINDOWS NT   │
│ DISK         │  │ CD_ROM       │  │ OTHER        │
│ CLASS DRIVER │  │ CLASS DRIVER │  │ CLASS DRIVER │
└──────────────┘  └──────────────┘  └──────────────┘
                 ┌──────────────┐
                 │ WINDOWS NT   │
                 │ PORT DRIVER  │
                 └──────────────┘
              ┌──────────────────────┐
              │ SDMS MINIPORT DRIVER │
              └──────────────────────┘

              ┌──────────────────────┐
              │ Symbios Logic SCSI Chip │
              └──────────────────────┘
```
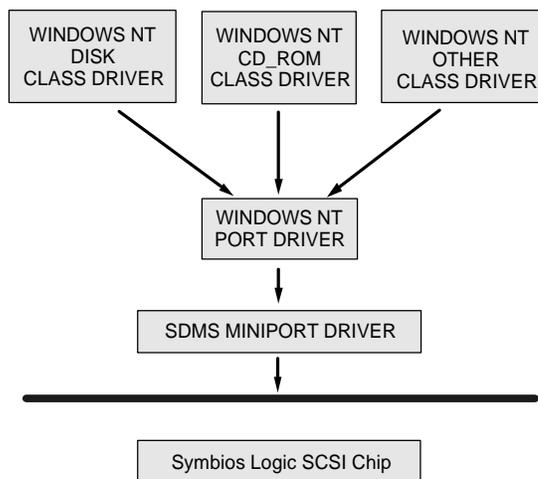
Features

- Synchronous negotiation (including Fast/Ultra SCSI)
- Wide negotiation
- Tagged command queuing
- Supports multiple host adapters
- Supports multiple Logical Unit Numbers (LUNs)
- Disconnect/Reselect
- Scatter-Gather
- Differential support
- Supports SCSI pass-through functionality
- BUS device reset
- Scan order change (scans the bus from SCSI ID 0 to MAX SCSI ID [7 or 15])
- Supports disk array configurations with no LUN 0
- Supports disk array configurations with non-contiguous LUNs

- Ultra SCSI (Fast 20) support (20 MB/s narrow, 40 MB/s wide)
- Target initiated negotiation support
- Auto request sense
- Renegotiation of wide/sync parameters on request sense commands
- Maximum 256K block size support
- Full NVRAM support (wide/sync parameters, SCSI ID)

Description

SYMC8XX.SYS is designed to Microsoft's specification for miniport drivers. This driver allows connection of SCSI devices including disk drives, CD-ROMs, and tape drives for PCI-based machines. To support a new SCSI device the Windows NT 3.5x/4.x 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 are required. This driver is only supported under Windows NT 3.5 and later versions (including NT 4.0). It does not run under earlier versions of 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 in to the port driver.

The SYMC8XX.SYS driver supports Ultra SCSI protocol, providing twice the raw data transfer rate of Fast SCSI for disk drives and Symbios Logic host adapters that support Ultra SCSI. However, Ultra SCSI requires more stringent SCSI bus cabling setups than Fast SCSI.

Installing Your SYMC8XX.SYS Driver

Preparing a Symbios Driver Diskette

Copy the files listed below to the root directory of a clean floppy diskette, and use this Symbios Driver diskette during installation:

SYMC8XX.SYS

SYMC8XX.TAG

OEMSETUP.INF

TXTSETUP.OEM

New System Installation

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

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

2   Press Enter when the Welcome to Setup screen appears.

3   On the Setup Method screen, choose Custom Setup by pressing C. (If Express Setup is chosen, the installation program scans for SCSI adapters and finds the Symbios Logic 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 installation completes, change the driver. To change the driver, see the "Existing System Installation" section.)

4   Press S to skip mass storage device detection. (If Enter is pressed, the installation program scans for SCSI adapters and finds the Symbios Logic 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 installation continue. When the installation completes, change the driver. To change the driver, see the "Existing System Installation" section.)

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 Manufacturer-supplied hardware support disk, insert your Symbios Driver diskette and press Enter.

8   The Symbios Logic PCI (53C8XX) Miniport driver, Symbios Logic PCI <53C8XX>, is shown highlighted. Press Enter to proceed.

9   NT should now recognize the Miniport driver 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 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 NT and log on as Administrator.

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

3 Double-click on SCSI Adapters.

4 Click the Drivers tab. If NCRSDMS.SYS, NCRC810.SYS, NCRC8XX.SYS, or SYMC8XX.SYS drivers are listed, select the driver(s) and choose Remove 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 is displayed.

6 Click the Have Disk button.

7 When prompted, insert your Symbios Driver diskette. For the path to the files, leave a:\ and select OK.

8   On the Select Manufacturer Driver menu, the Miniport driver, Symbios Logic PCI (53C8XX), is shown highlighted. 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, leave a:\ and select Continue.

10   A System Settings Change message displays "You must restart your computer before the new settings take effect. Do you want to restart your computer now?" Choose OK to restart and reboot NT. If you choose Cancel, remember that you must restart before the new driver is loaded.

11   Rebooting loads your new Miniport driver.

Windows NT 3.5x

1   Boot 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 SYMC8XX.SYS drivers are
     listed, select the driver(s) and choose Remove 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.
     For the path to the files, leave a:\ and select OK.

8   On the Select OEM Option menu, the Miniport
     driver, Symbios Logic PCI (53C8XX), is shown
     highlighted. If it is not highlighted, select it. Choose
     OK.

9   On the Select SCSI Adapter Option menu, choose
     Install with the SYMBIOS LOGIC Inc. PCI
     (53C8XX) driver highlighted.

     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 11.

10 For the path to the OEM SCSI Adapter files, leave a:\
and select Continue.

11 On the SCSI Adapter Setup menu, choose Close.

12 Rebooting loads your new Miniport driver.

Disk Mirroring

Note: This section only applies to Intel x86-platforms
where Symbios Logic's 4.x PCI SCSI BIOS is used.

Symbios Logic's 4.x PCI SCSI BIOS loads only one
image in the memory when the system boots regardless if
single or multiple host bus adapters (HBAs) are used in
the system. All the disk drives on any HBAs will be
recognized through the INT 13h function call. Because of
this implementation, disk mirroring under NT needs to
be done via the following instructions which might be
different from Microsoft's documentation.

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

1 Format a floppy disk under NT using either Windows
Explorer or the format option in My Computer. This
allows the floppy boot block to print to the NTLDR
program.

2 From the root directory of the primary partition, copy
NTLDR, NTDETECT.COM, and BOOT.INI to the
formatted floppy disk which will become the FT
floppy.

3 Temporarily remove the read-only attribute of the BOOT.INI 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 INT 13 chain - 80h).

The drive number of the mirrored partition can be found during system bootup of Symbios Logic's 4.x PCI SCSI BIOS when the primary partition doesn't 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 drive)

For example, let's say there are two Symbios Logic's 8xx HBAs in the system. The first HBA, HBA #0 which is the boot path, has two SCSI hard drives on ID 0 and ID 5.

The second HBA, HBA #1, has two SCSI hard drives on ID 2 and ID 4. Assuming that SCSI bus scan starts from ID 0 and goes up, the drive number of INT 13h will look like this:

HBA #0, ID 0= BOOT (which is 80h)
HBA #0, ID 5= 81h
HBA #1, ID 2= 82h
HBA #1, ID 4= 83h

Now NT is installed on the boot drive, HBA #0 ID 0, and a mirrored partition is established on HBA #1 ID 2. If the primary partition fails, for example due to a power failure, then the drive number of INT 13h will change:

HBA #0, ID 5= BOOT (which is 80h)
HBA #1, ID 2= 81h
HBA #1, ID 4= 82h

Therefore, the following line should be used in the BOOT.INI to boot from the mirrored partition, HBA #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.

Command Line Options

There are no command line options with the Windows NT device driver.

Troubleshooting

DURING INSTALLATION, NO SCSI DEVICES ARE FOUND.

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

b Insure 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.

b This error is sometimes caused by a virus infecting 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.

This error is usually caused by older SCSI devices
incorrectly indicating to NT that they support
multiple LUNs. Contact the device manufacturer for
a firmware upgrade.

PROBLEMS WITH CERTAIN SCSI DEVICES
WHEN USING AN ULTRA SCSI ADAPTER

Some SCSI devices do not function properly when the
adapter attempts to negotiate Ultra SCSI transfer
rates. If a device is not operating properly, check the
transfer speed setting using the PCI BIOS
Configuration Utility (press Control-C when the
Symbios Logic PCI BIOS banner is displayed during
the system boot process). Devices that don't support
Ultra SCSI should be set to a maximum of 10 MB/sec
for narrow (8 bits), 20 MB/sec for wide (16 bits).

PROBLEMS WITH ULTRA SCSI (FAST 20)
DEVICES USING ULTRA SCSI PROTOCOL

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

b Disable Ultra SCSI support for all devices via the 4.x
PCI BIOS Configuration Utility (press Control-C
when the Symbios Logic 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 Logic host adapter User's
Guide for information on Ultra SCSI cabling
requirements.

Glossary

A

Active Termination The electrical connection required at each end of the SCSI bus, composed of active voltage regulation and a set of termination resistors. Ultra and Ultra2 SCSI require active termination.

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

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. It is slower than synchronous data transfer.

B

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 disk with all the necessary files to set the computer into operation.

Bootable solution   A SCSI implementation that allows booting from a SCSI device. This requires a resident ROM.

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.

C

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.

Concatenated Driver   A SCSI driver with a SCSI BIOS added on to it. Sacrifices SCSI drive bootability in favor of connectivity and lower cost.

Configuration   Refers to the way a computer is set up; the combined hardware components (computer, monitor, key board, and peripheral devices) that make up a computer system; or the software settings that allow the hardware components to communicate with each other.

CPU   Central Processing Unit. The "brain" of the computer that performs the actual computations. The term Micro Processor Unit (MPU) is also used.

D

Device Driver   A program that allows a microprocessor (through the operating system) to direct the operation of a peripheral device.

Differential SCSI   A hardware configuration for connecting SCSI devices. It uses a pair of lines for each signal transfer (as opposed to single-ended SCSI which references each SCSI signal to a common ground.)

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.

Driverless Solution   A SCSI implementation, supported by the SCSI BIOS alone, that provides adequate features for a limited system (hard disks only).

E

EISA   Extended Industry Standard Architecture. An extension of the 16-bit ISA bus standard. It allows devices to perform 32-bit data transfers.

External SCSI Device   A SCSI device installed outside the computer cabinet. These devices are connected in a continuous chain using specific types of shielded cables.

F

Fast-20   An extension of the SCSI-3 standard that expands the bandwidth of the SCSI bus, allowing faster synchronous transfer rates (approximately double).

Fast-40   The SCSI trade association (STA) supports the use of "Ultra2 SCSI" over the term "Fast-40". Please see Ultra2 SCSI.

Fast SCSI   A standard for SCSI data transfers. It allows a transfer rate of up to 10 MBytes/sec over an 8-bit SCSI bus and up to 20 MBytes/sec over a 16-bit SCSI bus.

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.

H

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

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

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

Host   The computer system in which a SCSI host adapter is installed. It uses the SCSI host adapter to transfer information to and from devices attached to the SCSI bus.

Host Adapter A circuit board or integrated circuit that provides a SCSI bus connection to the computer system.

I

Internal SCSI Device A SCSI device installed inside the computer cabinet. Internal SCSI devices are connected in a continuous chain using an unshielded ribbon cable.

IRQ Interrupt Request Channel. A path through which a device can get the immediate attention of the computer's CPU. The PCI bus assigns an IRQ path for each SCSI host adapter.

ISA Industry Standard Architecture. A type of computer bus used in most PC's. It allows devices to send and receive data 16-bits at a time.

K

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

L

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.

M

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

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

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

N

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.

O

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.

P

Parity Checking   A way to verify the accuracy of data transmitted over the SCSI bus. One bit in the transfer is used to make the sum of all the 1 bits either odd or even (for odd or even parity). If the sum is not correct, an error message appears.

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 test various system components before booting can proceed.

Processor   A computer hardware component that performs computations directed by software commands.

Q

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

R

RAM   Random Access Memory. The computer's primary working memory in which program instructions and data are stored and are accessible to the CPU. Information can be written to and read from RAM. The contents of RAM are lost when the computer is turned off.

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.

S

SCAM   SCSI Configured AutoMatically. A method to automatically allocate SCSI IDs via software when SCAM compliant SCSI devices are attached.

Scatter/Gather   A device driver feature that lets the host adapter modify a transfer data pointer so that a single host adapter transfer can access many segments of memory. This minimizes interrupts and transfer overhead.

SCSI Small Computer System Interface. A specification for a high performance peripheral bus and command set. The original standard is referred to as SCSI-1.

SCSI-2 The current SCSI specification which adds features to the original SCSI-1 standard.

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

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

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

SDMS SCSI Device Management System. A Symbios Logic software product that manages SCSI system I/O.

Single Ended SCSI A hardware specification for connecting SCSI devices. It references each SCSI signal to a common ground. This is the most common method (as opposed to differential SCSI which uses a separate ground for each signal).

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.

T

Tape drive   A storage device designed to back up data from another storage device onto magnetic tape at a high rate of speed. Data is stored sequentially (no random access).

U

Ultra SCSI   A standard for SCSI data transfers. It allows a transfer rate of up to 20 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".

V

Virtual Memory   Space on a hard disk that can be used as if it were RAM.

W

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

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

WORM   Write Once Read Many. An optical storage
device, like CD-ROM, used to permanently store data.

Glossary

SYMBIOS
LOGIC™

PCI SCSI Device Management System SDMS 4.0   User's Guide