Adaptec SCSI RAID

2100S Installation Guide

adaptec®

Regulatory Compliance Statements

Federal Communications Commission Radio Frequency Interference Statement

WARNING: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. However, if this equipment does cause interference to radio or television equipment reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.
- Use a shielded and properly grounded I/O cable and power cable to ensure compliance of this unit to the specified limits of the rules.

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

Adaptec, Inc. SCSI RAID Controller

FC Tested to Comply With FCC Standards

FOR HOME OR OFFICE USE

CE

European Union Compliance Statement

This Information Technology Equipment has been tested and found to comply with the following European directives:

EMC Directive 89/336/EEC, as amended by 92/31/EEC and 93/68/EEC

EN 50081-1 (1992)
EN55022 (1994) Class B
EN 50082-1 (1992)
EN61000-4-2 (1998)
EN61000-4-3 (1998)
EN61000-4-4 (1995)
EN61000-4-5 (1995) Surges

Australian/New Zealand Compliance Statement

This device has been tested and found to comply with the limits for a Class B digital device, pursuant to the Australian/New Zealand standard AS/NZS 3548 set out by the Spectrum Management Agency.

Canadian Compliance Statement

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matérial brouilleur du Canada.

Japanese Compliance (Voluntary Control Council Initiative)

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Introduction

In this Chapter

Read this First

Before you begin installing your new Adaptec controller, please take the time to read this chapter. This chapter is an important guide to the rest of the documentation and provides a summary of the installation process.

The term *RAID controller* used throughout this document applies to all Adaptec SCSI RAID controller products.

About the Documentation

The complete documentation set for the Adaptec SCSI RAID product line consists of five parts:

- *SCSI RAID Installation Guide* (this book), which contains information that helps you to configure and install your Adaptec SCSI RAID controller.
- *Storage Management Software User's Guide* which describes how to use the Storage Manager on ROM (SMOR) utility, Adaptec Storage Manager software, and the RAIDUTIL command line utility.
- *Storage Manager Online Help*, which contains information about using the Storage Manager software, using SCSI devices, and creating disk arrays. The Storage Manager online help information contains both topical and pop-up helps for Storage Manager, Adaptec products, and RAID concepts.

This *Installation Guide* contains four chapters and two appendices.

- Chapter 1, *Introduction* – This chapter provides an overview of the rest of the documentation and important notices.
- Chapter 2, *About Your New Controller* – This chapter describes the features of the Adaptec SCSI RAID controllers, and the add-on modules that you can use with your controller.
- Chapter 3, *Installing Your Controller* – This chapter provides instructions about setting up device IDs and termination, assembling the controller modules, using cache memory modules, selecting the proper cables, and installing the controller into your system.
- Chapter 4, *Installing Adaptec SCSI RAID Software* – This chapter provides instructions for installing Adaptec device drivers and Storage Manager for all supported operating systems. After the hardware is configured and the disk arrays created, you can install the operating system, Adaptec SCSI RAID drivers and the full, OS-specific version of Storage Manager.
- Appendix A, *Product Diagrams* – This appendix provides outline drawings of the Adaptec SCSI RAID circuit boards. These drawings assist you in locating the various components on the boards.

- Appendix B, *Troubleshooting* – This appendix is a list of common problems and suggested solutions.

System Requirements

Adaptec Storage Manager software and device drivers require approximately 4 MB of disk space. A mouse and SVGA color monitor are required.

All Adaptec SCSI RAID controllers are PCI 2.2 compliant and are designed to operate in host systems that comply with revision 2.1 and 2.2 of the PCI Local Bus Specification. Adaptec SCSI RAID controllers are also multifunction PCI devices. The host system must be able to properly configure multifunction PCI devices, where one of the devices is a bridge.

You must use cables designed for Ultra160 SCSI and active termination for your SCSI bus.

Safety Information

Throughout this *Installation Guide* are various notices that indicate procedures or practices that can result in loss of data, damage to equipment, or personal injury. Be sure to read the following sections for additional information regarding electrical shock hazards and preventing damage from electrostatic discharge.

The following symbols accompany Notes, Cautions, and Warning notices.

These notices can be identified as shown by the following examples:

Note: This is used to emphasize important information or procedures that should be followed, but if ignored would not result in permanent damage to equipment or software.

Caution: This is used to emphasize a procedure that, if not followed, can cause malfunction of the equipment or software, or result in loss of data.

WARNING: This is used to indicate hazards or unsafe practices which could result in personal injury or product-property damage.

Working with Electricity

Any device that uses electricity must be treated with caution. Follow these guidelines to ensure general safety:

- Keep the chassis area clear and dust-free during and after installation.
- *Do not* perform any action that creates a potential hazard to people or makes the equipment unsafe.
- Before working on the system, unplug the power cord.
- Disconnect all power before doing the following:
  - Installing or removing a chassis
  - Working near power supplies
- *Do not* work alone when potentially hazardous conditions exist.
- Never assume that power has been disconnected from a circuit. Always check.
- Look carefully for possible hazards in your work area, such as moist floors, ungrounded power extension cables, or missing safety grounds.

Preventing Electrostatic Discharge

Caution: Electrostatic discharge (ESD) can damage electronic components and equipment. ESD occurs when electronic components are improperly handled and can result in complete or intermittent failures. Always follow ESD-prevention procedures when removing and replacing components.

Use the following guidelines to prevent ESD damage:

- Always use an ESD wrist or ankle strap and ensure that it makes skin contact.
- Connect the equipment end of the strap to an unpainted metal chassis surface.
- If no wrist strap is available, ground yourself by touching the metal chassis.
- When installing a component, use any available ejector levers or captive installation screws to properly seat the bus connectors in the backplane or card slot. These devices prevent accidental removal, provide proper grounding for the system, and help to ensure that bus connectors are properly seated.
- When removing a component, use any available ejector levers or captive installation screws to release the bus connectors from the backplane or card slot.
- Handle adapter cards by available handles or edges only. Avoid touching the printed circuit boards or connectors.
- Place a removed component board-side-up on an antistatic surface or in an approved antistatic container.
- If you plan to return the component to Adaptec, immediately place it in a static shielding container.
- Avoid contact between printed circuit boards and clothing. The wrist strap only protects components from ESD voltages on the body; ESD voltages on clothing can still cause damage.

2

About Your New Controller

In this Chapter

Introduction

Adaptec SCSI RAID products incorporate the latest intelligent controller technology to deliver optimum performance for desktop systems, file servers or multiuser host systems.

Note: ECC-protected cache is available only if you use Adaptec Cache Memory Modules or qualified ECC memory from a manufacturer listed on the Adaptec Web site.

- Adaptec SCSI RAID controllers support RAID 0, 1, 5 and multilevel RAID (0/1 and 0/5).The controllers support a maximum of 128 MB of onboard cache. Error Correcting Code (ECC) protection for cache memory is available when Adaptec memory is installed.
- Adaptec Cache Memory Modules provide 32 MB, 64 MB, or 128 MB of ECC-protected SDRAM disk cache for SCSI RAID controllers.

Adaptec SCSI RAID Feature Overview

Adaptec SCSI RAID controllers include:

- Support for I_2O OSMs provided by major operating system vendors; Adaptec provides drivers for most operating systems.
- See *Chapter 4* for a list of drivers supplied by Adaptec.
- Certifications for major operating systems, including Novell NetWare, Microsoft Windows NT and Windows 2000.
- Support for a variety of SCSI devices, including hard disk, tape, CD-Recordable, CD-ROM, Magneto-Optical drives, jukeboxes and scanners.
- Local and remote configuration, array status, and I/O monitoring using Adaptec Storage Manager or Storage Manager Pro software.
- Operating system independent configuration and RAID creation using the Storage Manager on ROM (SMOR) utility.
- Support for SCSI-1, SCSI-2, and SCSI-3 devices with active termination.

- ASPI protocol support for third-party applications and utilities.
- Flash ROM for easy upgrades of controller firmware, I_2O BIOS and SMOR.
- Event logging and broadcasting, including messaging for alphanumeric pagers.
- You can increase your storage capacity while your system remains online by adding one or more drives to a RAID 0 or RAID 5 array with the NTFS file system. Refer to the *Storage Management Software User's Guide* for specific information.
- Predictive caching which analyzes disk read requests made by the host to determine whether they are part of a pattern. If a pattern is detected, the controller uses the pattern to predict which data the host is likely to request in the near future, then reads this data into the cache.
- Intelligent hot spare which automatically replaces a failed drive with a designated hot spare drive. When multiple hot spares are available on a controller, the intelligent hot spare algorithm picks the best one based on capacity and bus location. RAID 1 and RAID 5 arrays are rebuilt automatically using the new drive.

DC Power Requirements

Voltage: 5 V ± 5%
Ripple and Noise: 50 mV peak-to-peak maximum

Component	Current (typical)
2100	1.5A
Memory Module	0.1A

Environmental Specifications

Note: Forced airflow is recommended but not required.

Ambient Temp (operating): 0°C to 50° C

Relative Humidity (operating): 10% to 90% noncondensing

Altitude (operating): 3,000 meters (10,000 feet)

Cache Memory

Note: You must have a minimum of 32 MB of cache installed. If ECC protection is required you must use Adaptec Cache Memory Modules or qualified memory from a manufacturer listed on the Adatpec Web site.

Adaptec SCSI RAID controllers support up to 128 MB of cache SDRAM memory in the controller.

If you use non-Adaptec memory in the controller, the memory must be 100 MHz SDRAM, 168-pin DIMMs. Capacities can be 32 MB, 64 MB, or 128 MB. Third-party ECC DIMMs must be from a qualified manufacturer. Go to www.adaptec.com for a list of memory types and manufacturers that have been approved by Adaptec.

2100S Features

Adaptec SCSI RAID 2100S controllers are designed to provide high performance solutions for workstations and servers in environments where cost is a factor.

2100S controller features include:

- One Ultra160 SCSI channel with internal and external connectors
- i960RS processor (80 MIPs)
- Up to 128 MB onboard cache

- Hardware RAID 0, 1, 5, and support for striping multiple arrays as a single logical drive (RAID 0/1 and 0/5)
- Intelligent Hot Spare capability
- Support for SAF-TE and SES
- 32-bit PCI bus

  Complies with PCI Local Bus Specification, revision 2.2. PCI clock speeds up to 33 MHz are supported.

Cache Memory Module

Adaptec SDRAM memory provides 32 MB, 64 MB, or 128 MB of high-speed disk cache for Adaptec SCSI RAID controllers. The cache is protected by ECC to automatically repair errors in the data. The green ECC Enabled LED is lit when ECC memory is installed. Refer to *Appendix A* for the location of this LED.

Adaptec SCSI RAID Controller LEDs

Adaptec SCSI RAID controllers provide nine LEDs that let you visually monitor controller activity. Several different controller states are indicated by the LED as outlined in the following sections. Two additional LEDs indicate the status of the cache memory on the controller. See *Appendix A* for the location of the LEDs on your controller.

LED Display During Power-up

During its power-up sequence, the controller passes through the following states in sequence, as indicated by the LEDs:

Note: The address translation unit (ATU), PCI bridge, and cache module (if installed) must be configured and enabled before the I_2O initialization can be completed. If any one of these components are not configured or become disabled during the Fast Idle phase, the pattern will return to the respective wait pattern for the affected component.

Condition	LED Display
Memory Mapped I/O	LEDs 6 and 7 and LEDs 5 and 8 flash alternately while the controller waits for the host computer to initialize the ATU on the PCI bus.
Bridge	LEDs 5 and 7 and LEDs 6 and 8 flash alternately while the controller waits for the host computer to initialize its PCI-to-PCI bridge.
Fast Idle	The controller enters a fast idle pattern while waiting for the I_2O initialization commands after the address translation unit (ATU) and PCI bridge have been enabled.

LED Display During Controller Idle

When no commands are in progress and all bus activity has ceased, the controller enters the idle state. This is indicated by a rotating pattern in LEDs 1 through 8.

LED Display During Controller Active

When the power-up sequence is complete, viewing the LEDs can help you determine the operating status of the controller. These LED patterns are also useful for troubleshooting. Refer to *Appendix B* for more information on interpreting LED patterns.

LED	Function
1	*Heartbeat*. Indicates that controller interrupts are enabled and that the controller is alive. During controller activity, this LED flashes four times a second.
2	Indicates the occurrence of a non-maskable interrupt (NMI) to the I/O processor on the controller.
3	Indicates the controller's internal operating system is in its idle loop.
4	Indicates that the controller's internal operating system is processing an interrupt.
5	Reserved for future use.
6	Indicates that the cache controller is using DMA to perform a data transfer.
7	Indicates the controller is generating parity information for a RAID 5 array (hardware XOR).
8	Indicates that there is a command on the SCSI bus.
IRQ	Lit only when the controller activates an interrupt on the host PCI bus.

Cache Status LEDs

Two LEDs on the Adaptec SCSI RAID controller indicate the status of the onboard cache RAM. Refer to *Appendix A* for the location of the LEDs on your controller.

The green ECC Enabled LED is lit when the installed DIMMs are ECC memory modules. This indicates that the controller data cache is ECC protected.

- The red ECC Error LED is lit when a correctable or non-correctable error has been detected in one of the ECC DIMMs. After the error has been corrected, the LED will be on until the controller is powered down. Cache failure information is recorded in the controller error log and can be viewed using the Event Log window in Storage Manager.

3

Installing Your Controller

In this Chapter

Installation Overview

The process of installing a Adaptec SCSI RAID controller consists of the following steps:

1. Configure device IDs, cables, and termination for SCSI devices in the host system.
2. Install the controller and storage devices in the appropriate enclosures. Attach all cables between the controller and the storage devices.
3. Run Storage Manager on ROM (SMOR) by pressing **Ctrl+A** during system boot to configure the controller's SCSI termination and verify proper hardware configuration. You

can also use SMOR to configure your storage subsystem and disk arrays.

4 If you are setting up the computer system for the first time, install the operating system on one of the controller's disk drives or arrays.

5 Install any required operating system drivers and Storage Manager. During this process, you should also install any driver updates for your Adaptec controller. Refer to Chapter 4 for additional information.

6 Storage Manager for Microsoft Windows is on the Adaptec SCSI RAID CD.

The Adaptec SCSI RAID CD also has a version of Storage Manager for SCO UNIX (Motif version). Refer to Chapter 4 for additional information.

Configuration

SCSI devices must be configured prior to use. This configuration process includes enabling or disabling SCSI termination for the devices and setting the SCSI IDs for each device.

Narrow and Wide SCSI

The SCSI devices you will be installing can be either Narrow (8-bit) or Wide (16-bit) SCSI devices. Wide SCSI disk drives allow data to be transferred at twice the rate of 8-bit devices. Some SCSI devices such as tape and CD-ROM drives still use an 8-bit interface. The Wide SCSI bus is backward compatible with Narrow SCSI devices, allowing both types of SCSI devices to be used on the same controller.

Note: If you use 8-bit and 16-bit devices on a single 16-bit SCSI cable, Wide devices must be at the physical end of the bus. This ensures that the 16-bit signals are correctly terminated.

Attaching a single-ended SCSI device to an LVD bus will cause the bus to run at Ultra SCSI speed (20 MHz) for all devices.

Configuring Cables

Caution: The SCSI I/O ports supply 5V DC and are capable of delivering approximately 2A DC current. Ensure that the interconnecting cables used are adequate for this amount of current.

Adaptec SCSI RAID controllers have Wide SCSI busses with one internal and one external SCSI connector for each bus.

Internal and external SCSI cables, connector adapters, and terminators can be purchased from a supplier of your choice or directly from Adaptec through our online web store at www.adaptec.com.

Configuring SCSI Termination

The devices on each physical end of a SCSI cable must be terminated. Depending upon how you configure your system, you will either terminate two SCSI devices, or the SCSI controller and one peripheral SCSI device.

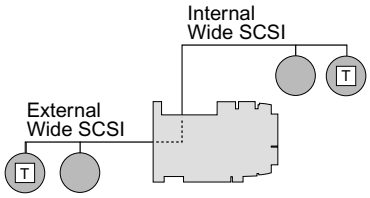
SCSI termination for Adaptec SCSI RAID controllers is configured through the SMOR utility or from the Configure Host Bus Adapter window in Storage Manager. The controller has four possible termination settings.

Setting	Function
Auto	The default setting. This setting can be used for all cabling conditions, except where two Narrow (8-bit) cables are attached or both a Narrow and Wide cable are used. For this case, use High Only.
Disabled	Turns off controller termination unconditionally.
Enabled	Turns on controller termination unconditionally.
High Only	Terminates only the additional signals that are used on Wide SCSI devices. This allows a Narrow cable or a Wide and Narrow cable to be simultaneously attached to the controller.

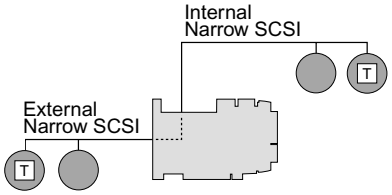
High Only termination is available only for devices on Bus 0. Devices on the second bus (Bus 1) must have 16-bit termination.

By using a 68-pin to 50-pin SCSI cable adapter, an 8-bit SCSI device can be attached to a Wide SCSI cable along with Wide SCSI devices. However, the device at the end of the cable must be a Wide SCSI device so that all SCSI signals are terminated. For internal and external cables where one cable is an 8-bit (Narrow) SCSI cable, set the controller termination to High Only.

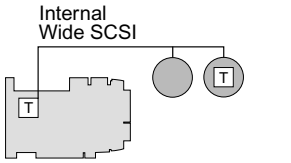
The following illustrations show various SCSI cabling examples. Terminate your SCSI devices as shown in the examples, ensuring that only the devices at the ends of the cables are terminated.

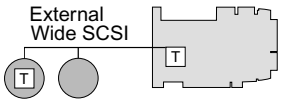


Controller
Termination = **Auto**

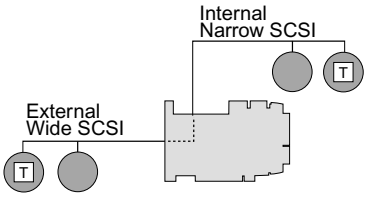


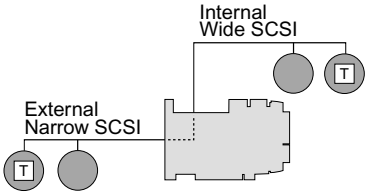
Controller
Termination = **High Only**





Controller
Termination = **Auto**





Controller
Termination = **High Only**

T = Terminated

Configuring Device IDs

The SCSI specification allows up to 7 SCSI devices (and a controller) to be connected to a single 8-bit SCSI bus. A Wide SCSI bus can support up to 15 devices and the controller.

All SCSI devices, including the controller, must be assigned a unique SCSI ID. SCSI IDs, which are typically set using jumpers or switches on peripheral devices, can be assigned any number from 0 to 7 for 8-bit SCSI devices or 0 to 15 for Wide SCSI devices.

Set the SCSI ID of each SCSI device attached to the controller to a unique ID number between 0 and 6. The Adaptec SCSI RAID controller is set to ID 7 by default (most SCSI controllers use ID 7). Wide SCSI devices can also use SCSI IDs 8 through 15. SCSI IDs can be duplicated on the same controller if the devices using the same ID are not attached to the same bus.

If necessary, the Adaptec SCSI RAID controller ID can be changed to any ID 0 – 7. You can use SMOR or the Configure Host Bus Adapter window in Storage Manager to change the controller SCSI ID.

Note: Changing the controller ID is not recommended. You should leave the Adaptec SCSI RAID controller set at SCSI ID 7.

Installation

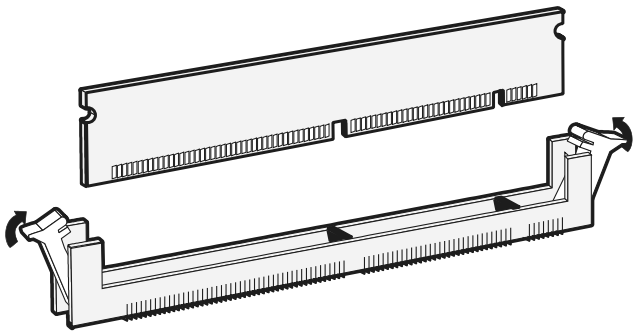
The following sections describe how the components of your Adaptec SCSI RAID controller are assembled. Use these instructions in the event you need to add or remove a component.

Installing Cache Memory Modules

Adaptec SCSI RAID controllers support up to 128 MB of cache using onboard memory sockets. See *Cache Memory* on Page 2-4 for specific information about memory modules for cache memory.

To install Cache Memory Modules:

1. Install the modules in the sockets as shown starting with socket 1. Refer to Appendix A for socket location.
2. To confirm that the modules are properly installed, start SMOR and select the controller to display the amount of cache memory reported.



Installing the Controller

1. Connect the computer's disk activity LED cable to connector P6 on the controller. See Appendix A, *Assembly Drawings* for the location of this connector.
2. Pins 1 and 3 of P6 are connected to +5V and pins 2 and 4 are connected to GND. Ensure that the positive lead of the LED cable (usually a red wire or marked with a red stripe) is attached to pin 1 or 3 and the negative lead (usually a black wire) is attached to pin 2 or 4.

3 If you are using the internal SCSI cable, connect this cable to the controller.

4 Install the controller in an available 32- or 64-bit PCI bus slot and secure the controller bracket to the host system cabinet with the screw provided.

5 In a system with multiple controllers, the controller that has the lowest BIOS ROM address (typically, the lowest numbered PCI slot) will become the booting controller.

6 Connect any external cables to the controller.

Note: If you have disk drives attached to a SCSI controller with a Symbios chipset, use SMOR to set the Bootable Devices option to **Disable**.

Determining the Booting Controller

Adaptec SCSI RAID controllers are shipped with an Adaptec I_2O BIOS ROM enabled for PCI assignment. This ROM BIOS intercepts and processes Int13 BIOS calls with an embedded DOS driver.

The Adaptec I_2O BIOS ROM can be disabled or the address changed automatically by the system's Plug-and-Play BIOS. In systems with multiple Adaptec controllers, the first Adaptec I_2O controller found during boot loads its BIOS and installs all of the Adaptec hardware on the system. Any additional Adaptec I_2O controllers that are found automatically detect the presence of the first controller and disable their BIOS code. The disk controller that has the lowest BIOS ROM address (typically, the lowest PCI slot number) will become the booting controller.

Ensure that the Adaptec ROM occupies the lowest address if you want the Adaptec controller to be the booting controller in a system with controllers from multiple manufacturers.

Some system BIOS manufacturers select the smallest add-in BIOS as the first candidate, therefore slot selection has no effect on which adapter BIOS loads first. In this case, you need to disable the BIOS on selected adapters to control which adapter is the boot controller. This procedure can also be helpful in situations where it is physically difficult to manage the slot order.

Controller IRQ and Address

During the host system boot process, the host system BIOS should automatically configure the Adaptec I_2O BIOS interrupt level (IRQ) and memory location for all Adaptec PCI controllers in the system. If problems occur, refer to Appendix B for additional help.

NVRAM Reset

Adaptec SCSI RAID controllers retain their setup parameters even when powered off. These parameters are stored on the controller in an area of nonvolatile memory (NVRAM). There is a possibility that, through improper configuration, the controller can be put into a state where it hangs the system during boot. If this happens, the parameters stored in the NVRAM can be restored to their default settings by the following procedure:

1. Turn off power to the system.
2. Place a shorting jumper across pins 1 and 2 of P4 on the controller. Refer to Appendix A for the location of P4 on your controller.
3. Power on the system and wait until the LEDs 3, 5, 7, and 8 on the controller begin flashing.
4. Turn off power to the system and remove the jumper.
5. Restart the host system. If the system restarts normally, the controller can now be configured using SMOR or Storage Manager.

If the system fails to boot, refer to Appendix B for additional information.

4

Installing Adaptec SCSI RAID Software

In this Chapter

Windows 2000

The following sections describe procedures for installing Adaptec SCSI RAID controllers under Windows 2000. Three installation scenarios are described:

Upgrading Windows NT to Windows 2000

Note: You only have a brief opportunity (five seconds) to press F6 during the install startup. A prompt will appear at the bottom of the screen when the **F6** key is active. If you do not press **F6** at this time, you must restart the Windows 2000 install process to complete this procedure correctly.

1. Before beginning the upgrade, create a driver diskette from the Adaptec CD. To create a driver diskette:
   a. Insert blank, formatted diskette in your floppy disk drive.
   b. Copy all the files in the \DISK1W2K subdirectory to the diskette.
2. Remove the diskette and start Windows NT 4.0.
3. Run the w2kprep.exe utility from the driver diskette you created in step 1.
4. Insert the Windows 2000 CD and run the setup.exe program on the CD. Setup will copy some files then reboot the system.
5. When the system is restarting, a blue screen will appear after the hardware detection message. When prompted to install a third-party driver, press **F6**.
6. When prompted, insert the I_2O driver diskette into the floppy disk drive and select **Adaptec I2O RAID Host Adapter Driver for Windows 2000**. Press **Enter** and follow the instructions displayed.

Installing on a New System

Note: You only have a brief opportunity (five seconds) to press F6 during the install startup. A prompt will appear at the bottom of the screen when the **F6** key is active. If you do not press **F6** at this time, you must restart the Windows 2000 install process to complete this procedure correctly.

1. Before beginning the installation, create a driver diskette from the Adaptec CD. To create a driver diskette:
   a. Insert a blank, formatted diskette in the floppy disk drive.
   b. Copy all the files in the \DISK1W2K subdirectory to the diskette.
   c. Remove the Adaptec CD from the CD-ROM drive and put the Windows 2000 CD in the drive. Reboot the system to begin the Windows 2000 installation.
2. When the Windows 2000 installation starts, a blue screen will appear after the hardware detection message. When prompted to install a third-party driver, press **F6**.
3. When prompted, insert the I_2O driver diskette into the drive and select **Adaptec I2O RAID Host Adapter Driver for Windows 2000**. Press **Enter** and follow the instructions.
4. When Windows 2000 starts for the first time it will start a New Hardware Wizard. Click **Next,** then select **Search for suitable driver for my device** and click **Next** again.
5. Insert the Adaptec driver diskette into the floppy disk drive. Select the floppy diskette and click **Next**. The wizard should find the *Adaptec SCSI RAID Adapter.*
6. Click **Next** and follow the instructions to complete this part of the installation.

   Completing the installation requires that the system shutdown and restart. When the restart is complete, continue with the following steps to complete the installation.

Adding to an Existing System

1. Follow the instructions in Chapter 3 for installing the Adaptec SCSI RAID controller in your system.
2. Create a driver diskette from the Adaptec CD. To create a driver diskette:
   a. Insert a blank, formatted diskette in your floppy disk drive.
   b. Copy all the files in the \DISK1W2K subdirectory to the diskette.
3. When you start Windows 2000 the Found New Hardware Wizard will start for a SCSI/RAID Controller. Insert the Adaptec driver diskette into the floppy disk drive. Select the floppy diskette as the source, then click **Next**.
4. Click **Next** in the next two windows that appear.
5. Follow the on-screen instructions to complete the Adaptec SCSI RAID installation.

Windows NT 4.0

There are three driver installation scenarios for Windows NT 4.0:

- *Installing a New System* on page 4-5
- *Upgrading an Existing System* on page 4-6
- *Adding to an Existing System* on page 4-7. (To be used in addition to a currently installed Adaptec SCSI RAID controller.)

Each of these cases requires a slightly different procedure. Be sure you select the correct procedure and follow the procedure carefully. If you need additional assistance, contact your technical support representative.

The Adaptec SCSI RAID driver for Windows NT 4.0 provides support for both disk drives and other SCSI devices, such as CD-ROMs and scanners.

Note: If you choose the Microsoft I_2O OSM in place of the Adaptec driver, you will not be able to use Storage Manager or any SCSI device other than a hard disk drive.

- The Windows NT 4.0 OSM is not compatible with Windows 2000.
- If you are installing Windows NT from an IDE CD-ROM, press **F6** as soon as the NT Detect screen appears during the installation process. This will cause the installation program to prompt for installation of a mass storage driver earlier in the install process and ensure that the disk drives attached to the controller are available when required.

Installing a New System

This procedure describes how to install an Adaptec SCSI RAID controller and Windows NT 4.0 on a new system. If Windows NT is to coexist with another operating system, that operating system must be installed before you install Windows NT. During the Windows NT installation, you will need one blank 3.5 inch high-density diskette to create an Emergency Repair Disk.

To install an Adaptec SCSI RAID controller and Windows NT 4.0 into a new computer system, follow the steps below:

1. Install the Adaptec SCSI RAID controllers and storage devices according to the instructions in Chapter 3.
2. Boot your system and run SMOR to verify your configuration. Create your disk arrays now. Each array will appear to the operating system as a single logical drive.
3. Create an Adaptec driver diskette from the Adaptec CD. To create a driver diskette:
   a. Insert a blank, formatted diskette in your floppy disk drive.
   b. Copy all the files in the \DISK1 subdirectory to the diskette.
4. Ensure that the Windows NT CD is in the CD-ROM drive. Boot the system from the Windows NT Setup Disk 1.
5. Insert the additional setup disks when prompted.

6. Press **S** to skip Setup's mass storage detection. Press **S** to Specify Additional Devices. Select **Other**, then insert the Adaptec driver diskette for Windows NT.
7. Select **Adaptec I2O RAID Host Adapter Driver for NT 4.0**.
8. Press **Enter** and continue with the installation as described in the Windows NT documentation.

Alternatively, if you have a SCSI storage controller from another manufacturer or other hardware that requires the use of Windows NT mass storage detection, follow the steps below:

1. Install the Adaptec SCSI RAID controllers and storage devices according to the instructions in Chapter 3.
2. Boot your system and run SMOR to verify your configuration. Create your disk arrays now. Each array will appear to the operating system as a single logical drive.
3. Ensure that the Windows NT CD is in the CD-ROM drive. Boot the system from the Windows NT Setup Disk 1.
4. Insert additional Windows NT setup disks when prompted.
5. Press **Enter** to perform Setup's mass storage detection.
6. After Windows NT detects any controllers for which it has built-in drivers, you are prompted to either press **S** to specify additional controllers or press **Enter** to continue Windows NT installation without specifying additional controllers.
7. Press **S** to Specify Additional Devices. Select **Other**, then insert the Adaptec driver diskette for Windows NT.
8. Select **Adaptec I2O RAID Host Adapter Driver for NT 4.0**.
9. Press **Enter** and continue with the installation according to the instructions in the Windows NT documentation.

Upgrading an Existing System

Note: If you have already installed an Adaptec SCSI RAID controller into your system and want to change drivers, refer to *Adding to an Existing System* on page 4-7 instead of this procedure.

To upgrade an existing Windows NT 4.0 system to an Adaptec SCSI RAID controller, follow the steps below:

1. Create an Adaptec driver diskette from the Adaptec CD. To create a driver diskette:
   a. Insert a blank, formatted diskette in your floppy disk drive.
   b. Copy all the files in the \DISK1 subdirectory to the diskette.
2. From the Control Panel, select the **SCSI Adapters** icon. Then select the **Drivers** tab and click **Add.**
3. Insert the Adaptec driver diskette, then click **Have Disk.**
4. Select **Adaptec I2O RAID Host Adapter Driver for NT 4.0.**
5. After the driver is loaded, shut down the system. Replace the existing controller with the Adaptec SCSI RAID controller.
6. Boot the system.
7. If you are removing the old controller, you should also remove the old driver.

Adding to an Existing System

To add an Adaptec SCSI RAID controller to an existing Windows NT 4.0 system, do the following:

1. Create an Adaptec driver diskette from the Adaptec CD. To create a driver diskette:
   a. Insert a blank, formatted diskette in your floppy disk drive.
   b. Copy all the files in the \DISK1 subdirectory to the diskette.
2. From Control Panel, select the **SCSI Adapters** icon. Then select the **Drivers** tab and click **Add**.
3. Insert the Adaptec I_2O drivers diskette, then click **Have Disk**.
4. Select **Adaptec I2O RAID Host Adapter Driver for NT 4.0**.
5. After the driver is loaded, shut down and power off the system.
6. Install the new Adaptec SCSI RAID controller into the system, leaving the existing controller installed.

7 Power on the system and boot Windows NT.

Adding to an Existing System (Microsoft OSM)

Note: If you use the Microsoft I_2O OSM in place of the Adaptec driver, you will not be able to run Storage Manager or any SCSI device other than a hard disk drive.

To add an Adaptec SCSI RAID controller to an existing Windows NT 4.0 system using the Microsoft Windows NT OSM, do the following:

1 Obtain a copy of the self-extracting file for the Microsoft I_2O drivers and extract the drivers to a directory or diskette.

2 From Control Panel, select the **SCSI Adapters** icon. Then select the **Drivers** tab and click **Add**.

3 When the Install Driver dialog box appears, select **Have Disk**.

4 Insert the Microsoft Windows NT OSM I_2O driver diskette or type the path to the directory to which you unzipped the driver files.

5 Select **Microsoft I_2O Drivers**.

6 After the driver is loaded, shut down the system. Add the new Adaptec SCSI RAID controller to the system, leaving the existing controller installed.

7 Boot the system.

The Microsoft I_2O OSM driver supports only disk drives. If you want CD-ROM, tape, scanner, or other SCSI device support on your Adaptec SCSI RAID controller under Windows NT, you must use the Adaptec I_2O driver.

Additionally, the Microsoft I_2O OSM driver for Windows NT does not inherently support bootable controllers. If you want to boot the Adaptec SCSI RAID controller with the Microsoft I_2O OSM, do the following:

1. Install Windows NT 4.0 with the Adaptec Windows NT 4.0 I2O driver.
2. After Windows NT is installed, remove the Adaptec Windows NT 4.0 driver from the SCSI Adapters list.
3. Install the Microsoft Windows NT I_2O OSM driver. The I_2O BIOS ROM on the Adaptec SCSI RAID controller will manage the Windows NT 4.0 boot process up to the point where the Microsoft driver loads.

Windows 95/98

The Adaptec SCSI RAID driver for Windows 95/98 provides support for both disk drives and other devices, such as CD-ROMs and scanners.

There are several driver installation scenarios under Windows 95 and Windows 98:

- *Installing Windows 98 (Full Install Version)* on page 4-9
- *Installing Windows 95 (OEM SR2 – Version 950b)* on page 4-11
- *Adding to an Existing Windows 95/98 System* on page 4-13
- *Upgrading Windows 95 to Windows 98 (Upgrade Version)* on page 4-15

Each of these cases requires a slightly different procedure. However, all the procedures require an Adaptec driver diskette. Use the following procedure to create the driver diskette before continuing:

1. Insert a blank, formatted diskette in your floppy disk drive.
2. Copy all the files in the \DISK1 subdirectory to the diskette.

Installing Windows 98 (Full Install Version)

This section describes the steps to install Windows 98 (Full Installation Version) on one disk drive or array group using an Adaptec SCSI RAID host controller. Ensure that your hard drives, arrays, CD-ROM drive, and any other SCSI device attached to the host controller are recognized by SMOR before proceeding.

Do the following to install Windows 98 (Full Installation Version):

1. Boot the system from a bootable DOS diskette.
2. Run fdisk and create a Primary DOS Partition of an appropriate size.
3. Mark the Primary DOS Partition *Active*.
4. Reboot the system from the DOS diskette.
5. Perform a system format (format c: \s).
6. Run the setupcd.exe program on the Adaptec Windows 95/98 driver diskette. This program creates an autoexec.bat file and config.sys file with support for your CD-ROM drive.
7. Ensure that the mscdex.exe program is in your boot path or the root directory of the C drive.
8. Remove the boot diskette from the floppy disk drive and reboot the system from the C drive.
9. Insert the Windows 98 Full Installation CD in the CD-ROM drive.
10. Enter the drive letter assigned to the CD-ROM and run setup (for example, **d:\setup**).
11. Follow the Windows 98 installation prompts.
12. During one of the device detection boot processes, Windows 98 will identify a PCI Card device. Click **Next** and display the list of drivers from a specific location.

Note: If you are not prompted for a PCI Card or the Device Manager shows PCI Card with a yellow exclamation mark in the Other Devices list, you might need a patch for your motherboard chipset to recognize multifunction bridge controllers. Contact your motherboard vendor and apply the patch. After the patch is installed and the system is restarted, Windows 98 will repeat the device discovery process. If you are installing the operating system, go back to Step 12 and continue the procedure. If you are adding an Adaptec SCSI RAID controller to an existing configuration, go to Step 3 on page 4-14 and continue with the procedure.

13 Select **Have Disk** and insert the Adaptec driver diskette when prompted. The system will then reboot back into Windows 98.

Note: If more than one Adaptec SCSI RAID controller is installed in the computer, repeat Step 12 and Step 13 for each controller**.**

Device Manager (in Control Panel–System) should now show an *Adaptec I2O RAID Host Adapter* in the SCSI Controllers section.

You can use a text editor to remove the following entries from your config.sys file:

device=i2oddl.sys

device=dptcdrom.sys

You can also use a text editor to remove the mscdex entry from your autoexec.bat file. When you complete the installation procedure these config.sys and autoexec.bat file entries are no longer needed.

Installing Windows 95 (OEM SR2 – Version 950b)

This section describes the steps to install Windows 95 (OEM SR2 Version) on one disk drive or array group using an Adaptec SCSI RAID controller. Ensure that your disk drives, arrays, CD-ROM drive, and any other SCSI devices attached to the controller are recognized by SMOR before proceeding.

Do the following to install Windows 95 (OEM SR2 Version) with an Adaptec SCSI RAID controller:

1 Boot DOS from a bootable DOS diskette.

2 Run fdisk and create a Primary DOS Partition of an appropriate size.

3 Mark the Primary DOS Partition *Active*.

4 Reboot the system from the DOS diskette.

5 Perform a system format (format c: \s).

6. Run the setupcd.exe program on the Adaptec Windows 95/98 driver diskette. This program will create an autoexec.bat and config.sys to support your CD-ROM drive.
7. Ensure that the mscdex.exe program is in your boot path or the root directory of the C drive.
8. Reboot the system from the C drive.
9. Insert the Windows 95 OEM SR2 CD in the CD-ROM drive.
10. Enter the drive letter assigned to the CD-ROM and run setup (for example, d:\setup).
11. Follow the Windows 95 installation prompts.
12. When Windows 95 is fully installed, start Device Manager (in Control Panel –System) and look for a PCI Card entry under the Other Devices category. There may be multiple entries if you have multiple Adaptec SCSI RAID host controllers installed. There may also be an entry for PCI Memory Controller.
13. Select **PCI Card** and select **Update Driver** from the Driver tab.

Note: If you are not prompted for a PCI Card or Memory Controller Driver or if the Device Manager shows PCI Card with a yellow exclamation mark in the Other Devices list, you might need a patch for your motherboard chipset to recognize multifunction bridge controllers. Contact your motherboard vendor and apply the patch. After the patch is installed and the system is restarted, Windows 95 will repeat the device discovery process. If you are installing the operating system, go back to Step 12 and continue the procedure. If you are adding an Adaptec SCSI RAID to an existing configuration, go to Step 3 on page 4-14 and continue the procedure.

14. Insert the Adaptec driver diskette into the floppy drive and let Windows search for the drivers.
15. Windows should identify the PCI Card as *Adaptec I2O RAID Host Adapter*. Select **Finish**. At this point, you might need to

force Windows 95 to copy the driver from drive A rather than the CD-ROM drive.

16 Select **Cancel** for testing the Device ROM.

17 If the Other Devices category shows a PCI Memory Controller, select it and select **Update Driver** from the Driver tab.

18 Let Windows search for the drivers on the Adaptec Windows 95/98 diskette.

19 Windows should now identify the PCI Memory Controller as Adaptec I_2O Memory Controller. Select **Finish**. At this point, you might need to force Windows 95 to copy the driver from drive A rather than the CD-ROM drive.

20 If there are multiple Adaptec SCSI RAID controllers, repeat Step 12 through Step 19 for each Adaptec SCSI RAID controller in the computer. The system should ask you to reboot when this action is completed.

21 Device Manager should now show an *Adaptec I2O RAID Host Adapter* in the SCSI Controllers section.

You can use a text editor to remove the following entries from your config.sys file:

```
device=i2oddl.sys

device=dptcdrom.sys
```

You can also use a text editor to remove the mscdex entry from your autoexec.bat file. When you complete the installation procedure these config.sys and autoexec.bat file entries are no longer needed.

Adding to an Existing Windows 95/98 System

This section describes the steps to install an Adaptec SCSI RAID controller to an existing Windows 95/98 configuration. Ensure that your hard drives, arrays, CD-ROM drive, and any other SCSI device attached to the controller are recognized by SMOR before proceeding.

Do the following to install an Adaptec SCSI RAID controller in an existing Windows 95/98 system:

1. Install the Adaptec SCSI RAID controller in the system and start Windows 95/98. If Windows prompts for a driver to support a PCI Card, go to Step 7.
2. If Windows did not discover the devices during boot, start Device Manager (Control Panel – System) and look for a PCI Card entry in the Other Devices category. There may be multiple entries if you have multiple Adaptec SCSI RAID controllers installed. There may also be an entry for PCI Memory Controller.

Note: If you are not prompted for a PCI Card or Memory Controller Driver, open the Device Manager. If Device Manager displays PCI Card with a yellow exclamation mark in the Other Devices list, you might need a patch for your motherboard chipset to recognize multifunction bridge controllers. Contact your motherboard vendor and apply the patch. After the patch is installed and the system is restarted, Windows 95 will repeat the device discovery process. If you are installing the operating system, go to Step 12 on page 4-10 and continue the procedure. If you are adding an Adaptec SCSI RAID to an existing configuration, go to Step 3 and continue the procedure.

3. Select **PCI Card** and select **Update Driver** from the Driver tab. Insert the Adaptec Windows 95/98 diskette into the floppy drive and let Windows search for the drivers.
4. Windows should now identify the PCI Card as Adaptec I2O RAID Host Adapter. Select **Finish**. At this point, you might need to force Windows 95 to copy the driver from drive A rather than the CD-ROM drive.
5. Select **Cancel** for testing the Device ROM.
6. If the Other Devices category shows a PCI Memory Controller, select it and select **Update Driver** from the Driver tab.
7. Let Windows search for the drivers from the **Adaptec** Windows 95/98 driver diskette.
8. Windows should now identify the PCI Memory Controller as Adaptec I_2O Memory Controller. Select **Finish**. At this point,

you may need to force Windows 95 to copy the driver from drive A rather than the CD-ROM drive.

9 If there are multiple Adaptec SCSI RAID controllers in the computer, repeat Step 3 through Step 8 for each Adaptec SCSI RAID controller. You may be asked to reboot when this action is completed. Device Manager should now show an *Adaptec I2O RAID Host Adapter* in the SCSI Controllers section.

Upgrading Windows 95 to Windows 98 (Upgrade Version)

If the Adaptec SCSI RAID controller is properly installed and recognized under Windows 95 before starting the Windows 98 upgrade, no further configuration is necessary. Perform the Windows 98 upgrade and the functionality of the Adaptec SCSI RAID controller will be retained.

If the controller is being added in addition to the upgrade, follow the procedure in *Installing Windows 98 (Full Install Version)* on page 4-9.

SCO UNIX

Note: When assigning numbers to controllers, SCO starts with zero. Storage Manager numbers controllers starting with one.

An Adaptec SCSI RAID controller driver disk image for SCO UNIX OpenServer 5 (3.2V5.x) is on the CD-ROM included with your Adaptec SCSI RAID controller. A second disk image can be created that contains a Motif version of Adaptec Storage Manager for SCO UNIX OpenServer 5.

The disk images are used to create the Adaptec SCO UNIX OpenServer 5 driver and Storage Manager Motif diskette. To do this, you can use the dd command to copy the disk images directly from the CD-ROM to a floppy diskette. Alternatively, you can use the SCO freeware DOS program RAWRITE.EXE to create the diskettes.

The following disk images are on the Adaptec CD:

SCO OpenServer 5 I2O driver - \DISK4

SCO OpenServer 5 Motif Storage Manager - \DISK5

Installing SCO UNIX OpenServer 5

This section describes the steps to install SCO UNIX 3.2V5.0X (OpenServer 5) on a single drive or array group.

1. For SCO UNIX 3.2V5.04 or later, boot the system with the Boot Diskette. Enter the following string at the boot prompt:

   defbootstr link=dpti5

2. When prompted for the SCO BTLD diskette (Adaptec volume), insert the Adaptec BTLD diskette into the floppy drive.
3. Insert the N1 or Boot diskette again when prompted.
4. If you are installing SCO UNIX 3.2V5.0.x., during the Hardware Roster, the following line should appear:

   ```
   % adapter type=dpti ha=0 id=7, PCI
   ```

5. Continue the installation according to the SCO documentation.

Adding to an Existing SCO UNIX OpenServer 5 System

When adding an Adaptec controller to an existing SCO UNIX configuration, perform the following steps:

1. Install the Adaptec controller.
2. Boot SCO UNIX.
3. After SCO UNIX has booted, place the Adaptec SCO driver diskette in the floppy drive.
4. Run the installpkg utility.

   ```
   mount /dev/fd0 /mnt

   installpkg -d /mnt
   ```

5. SCO UNIX will read the diskette and prompt you to enter the package name to be installed, enter dpti5.
6. Rebuild the kernel after the package is installed. Shutdown and reboot the system to install the new kernel and add devices on the controller.

SCO UnixWare 7

1. Install the Adaptec SCSI RAID controller as in Chapter 3.
2. Obtain the latest I_2O supplement for UnixWare 7 from SCO (it should be ptf7067e or higher).
3. Copy or download the ptf file to the /tmp directory. Use the pkgadd utility to install the I_2O supplement by entering the command:

   ```
   pkgadd -d /tmp/ptf7067e.s
   ```

4. Follow the on-screen prompts to install the SCO UnixWare I_2O supplement.
5. Shutdown and reboot the system.

Note: Upon reboot several warning messages may appear and scroll off the screen quickly. These will not occur after diskadd is run and can be ignored.

6. Use the diskadd utility to add drives or arrays that are attached to an Adaptec SCSI RAID controller.
7. Run the sdiconfig –l utility in a terminal window or non-GUI screen. This will list all controllers recognized by the operating system and any attached devices. Use this listing to determine the proper ID to use for the diskadd utility.

The diskadd command to add devices on a secondary controller is:

```
diskadd cCbBtTdD
```

Where:

- C specifies the ID for the controller in the system.
- B is the controller bus number (from 0 - 7) to which the disks are attached.
- T is the target controller number (ID). The value of T can be 0 - 31.

- D is the Logical Unit Number (LUN) of the disk device, from 0 - 31.

See the diskadd(1M) man page for more information.

For example, if a new drive or array is on the Adaptec controller, on channel 0, with an ID of 0, the command would be:

```
diskadd c1b0t0d0
```

Novell NetWare

You must use the procedures in the following sections to install an Adaptec SCSI RAID controller for Novell NetWare, especially as a booting controller. There are specific steps that must be completed to ensure that NetWare will recognize the Adaptec controller and any attached devices.

The Adaptec CD contains:

- Device drivers for NetWare 4.2 and 5.x.
- Modules that allow you to monitor and configure a NetWare server using Storage Manager on a remote client workstation.

Note: The following Novell Support Packs are the minimum level required before installing Adaptec SCSI RAID software and drivers:

Support Pack 8a for NetWare 4.2
Support Pack 5 for NetWare 5.0
Support Pack 1 for NetWare 5.1

After you have installed the I_2O drivers you can use the normal NetWare procedures for modifying disk partitions, hot fixes, or volume maintenance.

You can use SMOR to create disk arrays before installing NetWare or the Adaptec software. After the Adaptec driver and software are installed you can use RAIDUTIL to create or modify disk arrays or add hot spare drives. If you install remote communication support for Storage Manager, you can use Storage Manager from a client workstation to manage the storage subsystem.

Note: NetWare 4.2 requires the following command when you mount the CD-ROM: `cdmount volname /x=usr` where *volname* is the volume name for the CD-ROM.

NetWare 4.2 – Boot Controller

This procedure is for installing an Adaptec SCSI RAID controller as the boot device in a NetWare 4.2 server.

1. Create the NetWare 4.2 driver diskette from the Adaptec CD. Extract the contents of

   \DISK7

   to a floppy diskette.

2. Install the Adaptec SCSI RAID controller as the primary controller and attach the disk drives or storage subsystem.

3. Ensure that you are using a CD-ROM that is not attached to the Adaptec controller.

4. Create a directory on the C drive named nwupdate.

5. Insert the diskette that you created into the floppy disk drive and install I2O and Block Storage support only.

6. Copy a:\nw42 to c:\nwupdate

7. Start the NetWare installation program from the CD-ROM. Use the Custom Installation option.

8. On the Server Drivers - Summary menu, highlight **Disk and CDROM Drivers** and press **Enter.**

9 Highlight **Select an Additional Driver** and press **Enter**.

   a Select i2opci.nlm and press **Enter.**

   b Enter the slot number.

   c Highlight **Save Parameters and Continue**. Press **Enter.**

10 Answer **Yes** when prompted to select an additional driver.

11 Select bkstrosm.ham and press **Enter**.

   a Enter the slot number.

   b Highlight **Save Parameters and Continue**. Press **Enter**.

12 Answer **No** when prompted to select an additional driver.

13 Highlight **Continue Installation** and press **Enter**.

14 Verify that bkstrosm.ham is listed after i2opci.nlm in your startup.ncf file.

Continue with the NetWare 4.2 installation according to the Novell documentation.

NetWare 4.2 – Secondary Controller

This section describes how to integrate an Adaptec SCSI RAID controller into a new or existing Novell NetWare 4.2 system as a secondary controller. Ensure that your NetWare version is at the minimum patch level specified by Novell.

To integrate an Adaptec controller into an existing Novell NetWare 4.2 system, do the following:

1 Create the NetWare 4.2 driver diskette from the Adaptec CD. Extract the contents of

   \DISK7

   to a floppy diskette.

2 Shutdown the server and switch off the power. Install the Adaptec controller and any attached storage devices as a secondary disk subsystem. Note the slot used by the controller, you will need this information later in the install process.

3. Power on the server and use SMOR to configure the storage subsystem. Press **Ctrl+A** during boot to start SMOR.
4. Start NetWare. When the console prompt appears type `load install` and press **Enter**.
5. Select **Install a Product** and press **Enter**.
6. Select **Install a Product Not Listed** and press **Enter**.
7. Insert the diskette you created into drive A and install I_2O and Block Storage support only.
8. Accept the defaults for the remaining options.
9. Return to the main install screen and select **NCF Options.**
10. Select **Edit startup.ncf**.
11. Ensure that i2opci.nlm is listed after bkstrosm.ham.
12. Shutdown and restart the server.

NetWare 5 – Boot Controller

Use the following procedure to install support for an Adaptec SCSI RAID controller during installation of NetWare 5. The controller should be installed at the beginning of the procedure so that it can be detected by the install routine.

1. Create the NetWare 5 driver diskette from the Adaptec CD. Extract the contents of

   \DISK6

   sub-directory to a floppy diskette.
2. Install the Adaptec controller as the primary controller and attach the disk drives. You can use SMOR to create disk arrays or Hot Spare drives when you boot the system.
3. Install and configure a secondary controller (non-I_2O SCSI or IDE) for the CD-ROM drive and any other storage devices such as a tape drive.
4. Create a directory on the C drive named nwupdate.
5. Insert the Adaptec NetWare diskette into the floppy disk drive.

6 Copy a:\nw5 to c:\nwupdate.

7 Start the NetWare installation program from the CD-ROM. Use the Custom Installation option.

8 On the Server Drivers - Summary menu, highlight **Disk and CDROM Drivers** and press **Enter**.

9 When prompted select i2opci.nlm and bkstrosm.ham as disk drivers.

10 Complete the NetWare installation according to the Novell documentation.

11 Verify that i2opci.nlm is listed after bkstrosm.ham in your startup.ncf file.

12 Install the latest support pack for NetWare 5.0.

Note: Installing a NetWare Support Pack will overwrite the I_2O drivers supplied by Adaptec. If you encounter problems after installing the Support Pack, you can restore the Adaptec files by copying them from the Adaptec NetWare disk.

NetWare 5 – Secondary Controller

This section describes how to integrate an Adaptec SCSI RAID controller into a new or existing Novell NetWare 5 system as a secondary controller. Ensure that your NetWare version is at the minimum patch level specified by Novell.

To integrate an Adaptec controller into an existing Novell NetWare 5.0 system, do the following:

1 Create the NetWare 5 driver diskette from the Adaptec CD. Extract the contents of

\DISK6

sub-directory to a floppy diskette.

2 Shutdown the server and switch off the power. Install the Adaptec controller and any attached storage devices as a secondary disk subsystem. Note the slot used by the controller, you will need this information later in the install process.

3. Power on the server and use SMOR to configure the storage subsystem. Press **Ctrl+A** during boot to start SMOR.
4. Start NetWare and insert the Adaptec NetWare 5 diskette in the floppy disk drive.
5. When the console prompt appears type `load nwconfig` and press **Enter**.
6. Select **Driver**.
7. Select **Disk Driver**.
8. Install i2opci.nlm and bkstrosm.ham. You will need to specify a:\nw5 as the location for the files.
9. Ensure that i2opci.nlm is listed after bkstrosm.ham in your startup.ncf file.

Installing Storage Manager

Windows 95/98/NT 4

1. Copy the contents of the \DISK1 sub-directory on the Adaptec CD to a floppy and label it *Disk 1*. Then copy the contents of the \DISK2 sub-directory on the Adaptec CD to another floppy and label it *Disk 2*.
2. Insert the floppy labeled *Disk 1* and run SETUP.EXE from the floppy.
3. Follow the on-screen prompts and insert *Disk 2* when prompted to complete the installation.

Windows 2000

1. Copy the contents of the \DISK1W2K sub-directory on the Adaptec CD to a floppy and label it *Disk 1*. Then copy the contents of the \DISK2 sub-directory on the Adaptec CD to another floppy and label it *Disk 2*.
2. Insert the floppy label *Disk 1* and run SETUP.EXE from the floppy.
3. Follow the on-screen prompts and insert *Disk 2* when prompted to complete the installation.

If you will use remote communications, be sure to select the **Communication Server** option. The default selections are to install only the latest driver and the RAID Engine.

If you are using Windows NT 4.0/Windows 2000, do the following after Storage Manager is installed to ensure optimum performance:

1. Start Storage Manager and double click on the controller icon to display the Host Bus Adapter Info window.
2. Select **Configure** to display the Configure Host Bus Adapter (HBA) window.
3. Select **Caching**. When the HBA Caching Configuration dialog appears, ensure **Advisory** is selected for both settings.
4. Select **OK** to exit the dialog and save the changes.
5. Reboot the host system to enable the new settings.

Note: If you reset the NVRAM on the controller, any changes to your cache settings return to the factory default.

NetWare Remote Communication Support

1. Copy the contents of the \DISK6 sub-directory on the Adaptec CD to a floppy diskette.
2. Enter the following command at the prompt:

   a:\dptinst.nlm

You will be prompted to select whether to load the remote communication support immediately or delay loading until the server is restarted.

Note: If you choose to wait until the server restarts, you will not be able to monitor the Adaptec subsystem from a remote client until the server is shut down and restarted. Otherwise, the remote communication support is loaded and available as soon as you exit the install program. If you choose “auto-load communications module through AUTOEXEC.NCF,” you must unload the DPTCOM module and load it again, otherwise the communication module must load manually.

SCO UNIX

Note: The Motif version of Storage Manager for SCO UNIX will not display colors correctly if your video display adapter is set to display more than 256 colors.

1. To install the Adaptec Motif Storage Manager for SCO UNIX, use the dd command to copy the disk image directly from \DISK5 on the Adaptec CD to a floppy diskette. Alternatively, you can use the SCO freeware DOS program RAWRITE.EXE to create the diskettes.
2. Insert the diskette created in step 1 in the floppy drive and type the following command:

   ```
   mount /dev/fd0 /mnt

   installpkg -d /mnt
   ```

3. Answer the questions when prompted to complete the installation.

SCO UnixWare 7

To install Storage Manager for UnixWare 7

1. Use the dd command to copy the disk image directly from \DISK3 on the Adaptec CD to a floppy diskette. Alternatively, you can use the SCO freeware DOS program RAWRITE.EXE to create the diskettes.
2. Insert the diskette created in step 1 in the floppy drive and type the following command:

   ```
   mount /dev/fd0 /mnt

   pkgadd -d /mnt
   ```

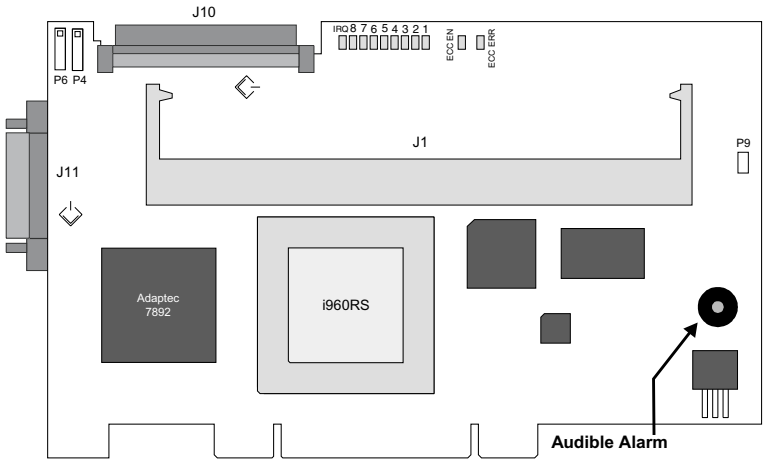
3. Follow the prompts to complete the installation.

A

Product Diagrams

In this Appendix

2100S SCSI RAID Controller



	Pins 1-2 NVRAM clear
P4	Pins 3-4 Misc (Reserved, do not use)
P6	Disk activity LED connector
	Pins 1-2 Retry (Reserved, do not use)
P9	Pins 3-4 Reset (Reserved, do not use)
J1	168-pin DIMM socket
1...8, IRQ	Adapter activity LEDs
J10	Internal Ultra160 Wide SCSI connector (Bus 0)
J11	External Ultra160 Wide SCSI sonnector (Bus 0)

B

Troubleshooting

This appendix provides answers to many Frequently Asked Questions (FAQ). If a situation occurs that is not covered in this appendix, or if the recommendations here do not correct the problem, contact your technical support representative.

Problem	When the Adaptec I_2O BIOS displays the peripheral devices at system boot, a device fails to appear.
Solution	The following conditions can cause this to occur: ■ The device ID might be set to the same ID as the Adaptec controller (ID 7). Ensure that all devices have a unique ID. ■ The device might not be powered on. ■ The device is not connected to the SCSI cable or the connection is loose.

Problem	In addition to the Adaptec SCSI RAID controller, the system contains another manufacturer's SCSI controller and hangs during boot.
Solution	■ The other controller fails to correctly implement extended BIOS data area (EBDA) usage rules. Use SMOR to try a different setting for the EBDA Relocation parameter or rearrange the controller slot assignments. ■ If your system BIOS supports configuring the boot order, you can also try changing those settings.

Problem	The system contains another manufacturer's SCSI controller in addition to the Adaptec SCSI RAID controller. During boot, messages from each controller's BIOS appear, but one controller cannot communicate with its attached drives.
Solution	■ The other controller fails to properly implement EBDA usage rules. Use SMOR to try a different setting for the EBDA Relocation parameter or rearrange the controller slot assignments. ■ If your system BIOS supports configuring the boot order, you can also try changing those settings.

Problem Windows NT displays a blue screen error message that references the system video controller.

Solution The video controller fails to properly implement EBDA usage rules. Use SMOR to enable the **EBDA Relocation** option.

Problem The controller fails to respond and the IRQ LED (and possibly other LEDs) remains lit. See Appendix A, for the location of the LEDs on your controller.

Solution The IRQ LED indicates that the controller IRQ assignment is pending. This usually indicates an IRQ conflict with another card. Ensure that each card is set to a unique IRQ.

Problem The controller does not respond and one of the following LED patterns occurs at power-up:

- LEDs 6 and 7 alternating with LEDs 5 and 8
- LEDs 5 and 6 alternating with LEDs 7 and 8
- LEDs 5 and 7 alternating with LEDs 6 and 8

Solution

- These patterns indicate that the controller is not being configured by the motherboard BIOS. Adaptec SCSI RAID 2100 and 3200 controllers require a motherboard BIOS that supports multifunction devices, where one of the devices is a PCI bridge. All Adaptec SCSI RAID controllers require a BIOS that supports large memory-mapped address ranges.
- Refer to the Adaptec SCSI RAID read.me file on the Adaptec CD for information about motherboard compatibility and a list of motherboards that Adaptec has tested with Adaptec SCSI RAID products.

Problem

The controller fails to respond and one of the following patterns of LEDs flash once per second at power-up:

- **None:** 7, 6, 5, 2, 1
- **High:** 7, 6, 5, 3, 1
- **Mismatch:** 7, 6, 5, 3, 2
- **Invalid:** 7, 6, 5, 3, 2, 1

Solution

These patterns indicate a problem with the memory modules on the controller.

- **None:** Either no memory modules were detected on the controller, or there is no module in socket 1.
- **High:** Too much memory has been detected on a controller. Remove memory so that the total is less than or equal to 128 MB.
- **Mismatch:** Memory modules of mixed sizes have been detected or a SIMM slot was skipped. All installed modules must be the same size and must be filled sequentially.
- **Invalid:** A memory module smaller other than 32, 64, or 128 MB has been detected. Use only 32, 64 or 128 MB capacity memory modules.

Problem

The controller fails to respond and various LEDs in the 1–4 range flash once per second.

Solution

This pattern indicates an internal microprocessor trap occurred in the controller. Remove all attached devices, cables, and option modules and retry. If the trap error disappears, reconnect the cables and devices, one device at a time, until the faulty device, cable, or module is isolated. If the error persists, contact Adaptec Technical Support.

Problem Pressing **Ctrl+A** to access SMOR does not work or the information displayed is garbled.

Solution If this happens, use the following procedure to restore the parameters in the NVRAM to their default settings:

1 Turn off power to the system.

2 Place a shorting jumper across pins 1 and 2 of P4 on the controller.

3 Power on the system and wait until the LEDs 3, 5, 7, and 8 on the controller begin flashing.

4 Turn off power to the system and remove the jumper.

You can now reconfigure the controller using SMOR or Storage Manager.

Problem During the installation of SCO UNIX with an Adaptec PCI controller the following message appears:

Warning: SCSI controller cannot install interrupts vecno=xx, type = 2, IPL=5 Vector xx is private.

Solution SCO UNIX reserves certain interrupts for its internal use. This error indicates that the Adaptec controller has been assigned one of these reserved interrupts. Assign a different interrupt to the controller and start the installation again.

Problem You want the system to boot from a drive that is not attached to an Adaptec controller. However, during boot, the Adaptec I_2O BIOS message appears first which indicates that a drive attached to an Adaptec controller will be the boot drive.

Solution Use SMOR to disable the **Boot Enable** parameter for that controller. This will prevent the Adaptec controller from being used as the booting controller for system.

Problem The Adaptec SCSI RAID controller I_2O BIOS reports the drive as a disk instead of a drive.

Solution This typically happens when a drive that is attached to a Adaptec SCSI RAID controller has been formatted with a sector size other than 512 bytes. Use Storage Manager or SMOR to reformat the drive with 512-byte sectors.

Other causes include:

- The drive is not responding.
- The drive is the 25th or higher logical drive attached to the controller.

Note: Using SMOR to disable the Boot Enable parameter, as in the previous problem, can result in the same symptoms. If you require access to disk drives connected to the Adaptec SCSI RAID controller during the boot process, do not disable the Boot Enable parameter.

Problem Although the SCSI devices can be accessed by the Adaptec SCSI RAID controller, the fault LEDs on the devices in a RAIDstation storage cabinet do not flash during boot-up and the Adaptec SCSI RAID controller does not detect drive swaps or cabinet failures.

Solution These symptoms indicate that the RAIDstation storage cabinet status signals are not being properly received by the Adaptec SCSI RAID controller.

- For SAF-TE or SES: this can result from a failed enclosure monitoring module in the subsystem cabinet.

Problem After updating the Adaptec SCSI RAID controller firmware or BIOS and rebooting, the adapter does not respond.

Solution The update may have been unsuccessful. The controller is now in a state in which it hangs the system during boot. If this happens, the parameters in the NVRAM can be restored to their default settings using the following procedure:

1 Turn off power to the system.

2 Place a shorting jumper across pins 1 and 2 of P4 on the controller.

3 Power on the system and wait until the LEDs 3, 5, 7, and 8 on the controller begin flashing.

4 Turn off power to the system and remove the jumper.

You can now reconfigure the controller using SMOR or Storage Manager.

Problem After updating the Adaptec SCSI RAID controller firmware or BIOS and rebooting, LEDs 1 and 5 or 2 and 5 flash once per second.

Solution These patterns indicate that the adapter startup code detected a firmware checksum error or a flash error. Attempt the firmware update procedure again by using the procedure in the following Problem description to recover from this condition.

Problem A firmware upgrade is unsuccessful, causing the controller to hang.

Solution The new firmware can be temporarily disabled and the upgrade attempted again by following the steps below:

1 Power-off the system.

2 Remove any Bus Expansion Modules from the controller.

3 Place shorting jumpers across pins 1 and 2 and pins 3 and 4 of P9 on the controller.

4 Insert the SMOR boot disk and power on the system. This will start SMOR.

Note: The SMOR boot disk image is available from the Adaptec Technical Support site. The download file contains the disk image and instructions for use.

5 Use SMOR to update the firmware. You must restore all three components of the flash ROM, firmware, I_2O BIOS, and SMOR.

6 Power-off the system and return the jumpers to their original positions.

7 Reattach the expansion module to the controller card and insert the card in a host system PCI slot.

Remove the SMOR boot disk from your floppy disk drive and power-up the system.

Problem After an upgrade of the I_2O BIOS only, pressing **Ctrl+A** at the system prompt displays the message Card not configurable.

Solution Perform a full firmware upgrade for SMOR to correct this condition.

Problem	The floppy disk drive cannot be accessed after installing a Adaptec controller.
Solution	Use SMOR to enable the **EBDA Relocation** option.

Problem	The controller's audible alarm is sounding during normal operation.
Solution	This indicates a drive has failed. Start Storage Manager, or restart the host system and run SMOR to identify the failed drive. The alarm will stop when Storage Manager or SMOR finishes the initial system scan. Replace the failed drive and start a rebuild operation for the array.