

HostRAID

User's Guide

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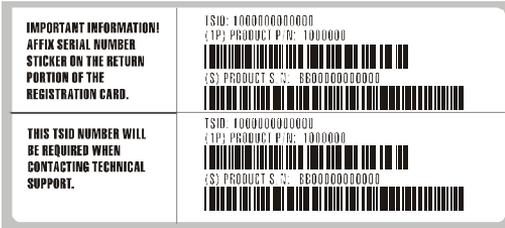
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Introduction

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HostRAID™ is a product that adds entry-level RAID functionality to SCSI ASICs and SCSI cards. With HostRAID you can add reliable performance and full data protection for storage systems using SCSI controllers.

HostRAID provides:

- an easy to use BIOS based setup and rebuild utility called *SCSISelect*®.
- an alert utility for Microsoft Windows® that provides automatic error notification, warnings, and task information.

Features

HostRAID offers the following basic and advanced features:

- Bootable array support
- Support for up to 2 RAID arrays per channel in these combinations:
 - One RAID 0 with 3 or 4 drives
 - Two RAID 0s with two drives each
 - One RAID 0 with two drives and one RAID 1
 - Two RAID 1s with or without a spare each
- Support for Ultra320 products
 - Adaptec SCSI Card 39320D, 39320, 29320, 29320LP
 - AIC-7902
- Support for all major SCSI peripherals
- Complete RAID configuration and management utility in the BIOS
- Support for transparent array (data) migration to Adaptec Intelligent RAID cards
- Support for Auto Rebuild (if there is a spare)
- Support for Auto Verify
- Support for Check Pointing

System Requirements

The minimum system requirements for HostRAID are:

- A Pentium II, 266 MHz Processor or higher system that supports PCI/PCI-X
- A minimum of one SCSI drive for HostRAID without RAID capabilities
- A minimum of two SCSI drives for HostRAID with RAID capabilities
- CD-ROM or DVD-ROM drive
- Floppy disk drive
- 64 MB or more of system memory
- 5 MB of free hard disk space

Operating Systems

HostRAID supports these operating systems:

- Microsoft Windows[®] 2000
- Microsoft Windows NT[®] 4.0
- Microsoft Windows XP[®]

Defining RAID

RAID (Redundant Array of Independent Disks) offers data protection, outstanding data availability, excellent performance, and high capacity. A RAID is defined as:

- **Unified array**—Two or more hard drives are grouped to appear as one single device to the host system while operating independently of one another.
- **Fault-tolerant redundancy**—If one drive fails no data is lost. (RAID 0 is an exception to this definition because RAID 0 is not fault tolerant. See [Supported RAID Levels on page 1-4.](#))

Supported RAID Levels

HostRAID includes a BIOS Configuration Utility for boosting disk performance and data protection. HostRAID supports the following RAID levels:

- **RAID 0, Striping**—Two or more drives that can read and write data in parallel. Offers higher performance than a single drive, but no fault tolerance. RAID 0 arrays do not store redundant data; if any disk in the array fails, all data is lost.
- **RAID 1, Mirroring**—Data is mirrored on one pair of disks providing 100 percent redundancy. Offers complete fault tolerance. If one disk fails, data is still available. Increases read performance through load balancing. Adaptec recommends using the same size disks, but if you use a disk with less disk space, the actual data capacity of the array equals the smaller capacity disk.

Using the SCSISelect Utility to Manage Arrays

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The SCSISelect Utility is a BIOS based configuration utility included with your SCSI Card. With SCSISelect, you can create and maintain RAID arrays when you enable the HostRAID settings. This chapter explains how to use the SCSISelect Utility to enable HostRAID and create RAID arrays on your system. Use HostRAID to provide the proper level of fault tolerance and event notification for your system.

HostRAID supports the following RAID levels:

- **RAID 0**—Striping mode for boosting performance.
- **RAID 1**—Mirroring mode for data security.

For more information on supported RAID levels, see [Defining RAID on page 1-4](#).

Using the SCSISelect Utility

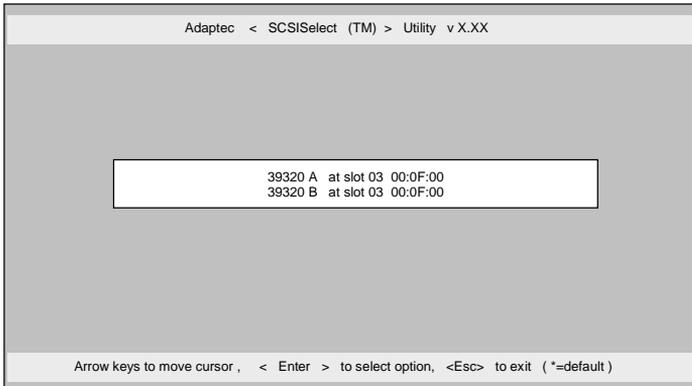
Using SCSISelect Menus

To select a SCSISelect menu option, move the cursor to the option with the arrow keys (↑ ↓), then press **Enter**. In some cases, selecting an option displays another menu. You can return to the previous menu at any time by pressing **Esc**.

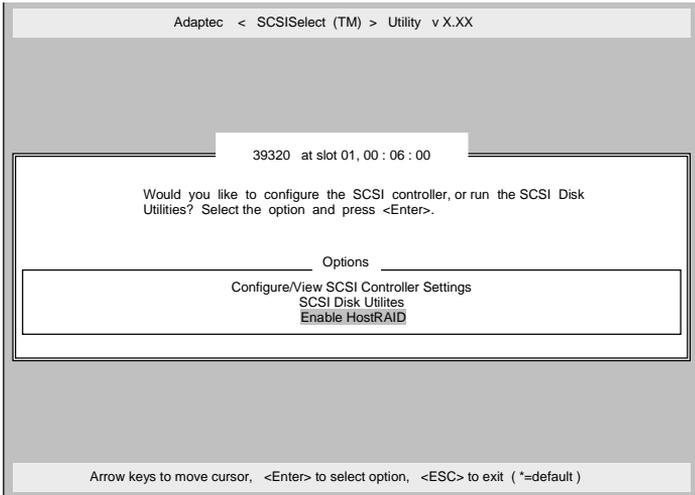
Starting SCSISelect

To start SCSISelect, follow these steps:

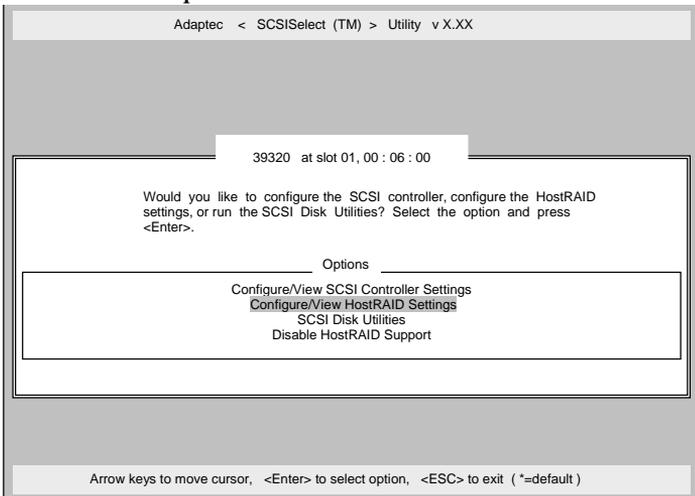
- 1 Press the **Ctrl-A** keys simultaneously when the following prompt appears when you turn on or restart your system:
Press <CTRL>< A> for SCSISelect (TM) Utility!
- 2 From the device menu that appears, select a channel and press **Enter**.



- From the Main Options menu, select **Enable HostRAID** and press **Enter**.



- From the Main Options menu, select **Configure/View HostRAID** and press **Enter**.



Note: HostRAID must be enabled for the Configure/View HostRAID option to appear on the Main Options menu.



Note: For information on Configuring SCSI Controller Settings or using SCSI Disk Utilities, see the *Adaptec Ultra320 SCSI Cards User's Guide*.

After scanning the device is completed, the Main menu appears. The Main menu displays the following information:

- **ID**—indicates ID number of hard drive.
- **Type**—indicates available non-array hard drive or RAID type:
 - Striped (R0)
 - Mirrored (R1)
 - Hard Drive
- **Vendor**—indicates vendor of hard drive.
- **Product**—indicates model of hard drive or name of built array.
- **Size**—indicates size of hard drive.
- **Status**—indicates available RAID status:
 - **Free**—available drive
 - **Optimal**—no defect
 - **Degraded**—one drive in a mirrored array is in failed status, and a Rebuild option is available.
 - **Dead**—One drive in a RAID 0 array is in failed state or missing.
 - **Building**—the drive is a target of an ongoing Rebuild operation
 - **Verifying**—checking the data integrity of redundant data stored on fault-tolerant arrays

Viewing Array

To view an array, select the array and press **Enter**. A detailed view of the hard drives will appear. From this window you can see the status of the individual hard drives. The status you might see are:

- **Optimal**—no defect
- **Building**—the drive is a target of an ongoing Rebuild operation
- **Verify**—checking the data integrity of redundant data stored on fault-tolerant arrays

Missing drive information indicates that a member is missing and the array is not optimal

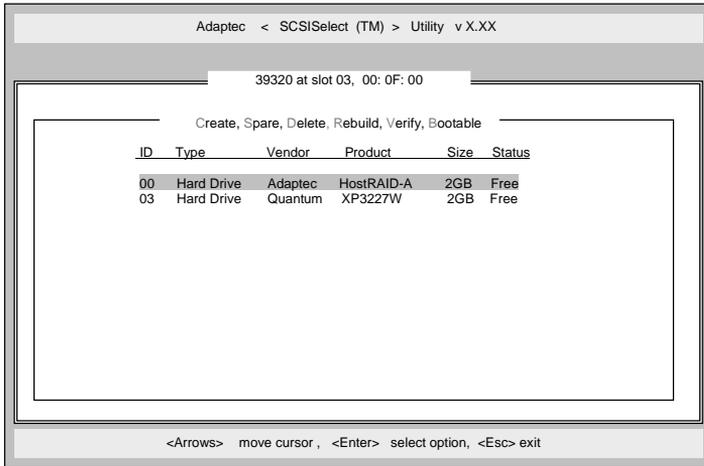
Exiting the *SCSISelect* Utility

To exit *SCSISelect*, press **Esc** until a message prompts you to exit. Select **Yes** to exit, then press any key to restart the system. Any changes you made in *SCSISelect* take effect after the system restarts.

Creating Arrays

Before creating the array, make sure the disks for the array are connected and installed in your system, then follow these steps:

- 1 Start *SCSISelect*.
- 2 From the Main menu, press **C** to create a RAID array.



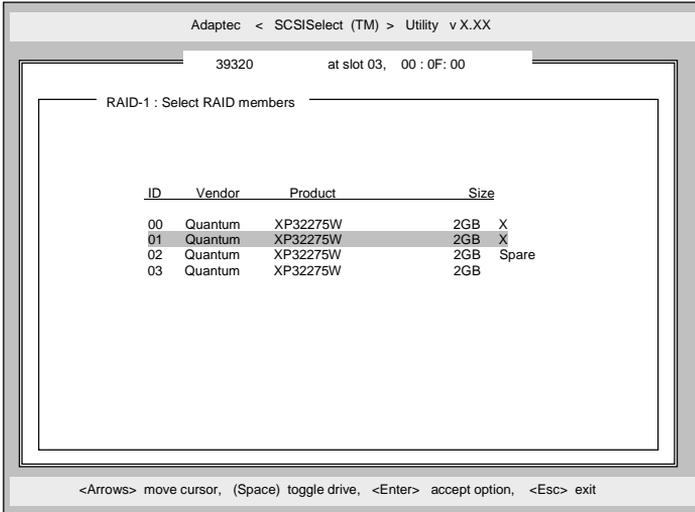
Note: You *must* have at least two hard drives to create an array.



Note: If the hard drive you select is already part of an array configuration, it will not be available for selection.

- 3 Select the RAID type you want to build. As you highlight the selections you will get an allowance message regarding minimum and maximum drives and spares per drive. Press **Enter**.

- From the Select RAID Member menu, press the **Spacebar** to select the hard drives you want to use in the array. An X will appear next to the drives you have selected. By pressing the **Spacebar** twice, Spare will appear next to the drives selected if the spare is allowed. Press **Enter**.



The allowance messages for the different RAID types are as follows:

- **RAID-0**

 - Minimum 2 drives and maximum 4 drives

- **RAID-1**

 - Minimum 2 drives and maximum 2 drives with 1 spare

- **Spare**

 - One spare per RAID 1 array

Creating RAID 0 Arrays

To create a RAID 0 array, follow these steps:

- 1 From the Select RAID Type window, select **RAID-0** and press **Enter**.



- 2 Select the hard drives you want to use and press **Enter**.
- 3 Select the stripe size and press **Enter**. You can select from 16K, 32K, or 64K. If a partition exists on any of the selected drives, you will get a message that the partition will be deleted. Select **Yes** to continue, or **No** to cancel
- 4 When the Create Array? message appears, select **Yes** and press **Enter** to create a RAID 0 array. After your array is created, you will automatically return to the Main menu.

Creating RAID 1 Arrays

There are two ways to create a RAID 1 array. You can create a new RAID 1 array or you can migrate from an existing single drive to a RAID 1 array. To create a RAID 1 array using either option, follow these steps:

- 1 From the Select RAID Type window, select **RAID-1**. Select the hard drives you want using the spacebar to toggle, and press **Enter**. The RAID-1 Build Option window appears.
- 2 Select an option and press **Enter**.

The options you can choose are:

- **Create new RAID-1**—is the default option.
- **Copy from (11) to (12)**—copy from a source drive to a target drive if the source is equal to or smaller than the target.
- **Copy from (12) to (11)**—copy from a source drive to a target drive if the source is equal to or smaller than the target.



Note: If a valid partition table or boot block is detected in the target drive, you will get a warning message that the information will be destroyed.

- 3 With RAID 1 you can create a spare drive. This option allows you to select the hard drive to be used as a spare for a Mirror Disk array. To create a spare, you can create it during the creation of an array or you can add a spare later to an existing RAID 1 array. Only one spare drive is allowed.

To create a spare during array creation, follow these steps:

- a In the Select RAID Type window, press the **Spacebar** twice. The word Spare will appear next to the drive you have selected.

This only applies for the first two drives that you select. If two drives are already selected (marked with an X), the third drive you try to select will automatically be marked as a Spare.

- b Press **Enter** to accept your options.

To add a spare to an existing RAID 1 array, see [Adding a Spare Drive on page 2-11](#).

After entering your options, if a partition exists on any of the selected drives, you will get a message that the partition will be deleted. Select **Yes** to continue, or **No** to cancel.

- 4 When the Create Array? message appears, select **Yes** and press **Enter** to create a RAID array. If you select **No**, the RAID creation will terminate and you will return to the Main menu.
- 5 After your array is created, you will be prompted with the Driver Background Task Priority for the Build or Rebuild process. Select the Driver Background Task Priority and press **Enter**. The progress bar will appear showing the percentage completed in the create process. To stop the process and return to the Main menu, press **Esc**.

Driver Background Task Priority is how much priority the background tasks of Build, Verify, or Rebuild get while the driver handles I/Os from the operating system. You can select from the following driver priority levels:

- **High**—background tasks execute most of the time. This will slow down the main system. This is needed when Rebuild is ON and you want your RAID to become fault tolerant faster than serving the data to different applications.
- **Medium**—is equal division of time to serve foreground I/Os versus background Verify or Rebuild tasks.
- **Low**—the background tasks are not of most importance. The background tasks may take a significant length of time to run if multiple applications are running on your system.

Deleting Arrays

To delete an array, follow these steps:

- 1 From the Main menu, select the array you need to delete by moving the cursor, then press **Enter**.
- 2 Press **D**. The following message appears:
Delete Array?
- 3 For RAID 0, go to Step 4. For RAID 1, select one of these options, then continue to Step 4:
 - **Drive ID 1**—deletes out all data on the drive 1
 - **Drive ID 2**—deletes out all data on the drive 2
 - **Drive ID 1 & 2**—deletes all data on both drives
 - **None**—breaks the array but keeps any existing data on both drives
- 4 Press **D**. The following message appears:
Delete Array?
- 5 Select **Yes** and press **Enter**. The following message appears:
Are you sure?
- 6 Select **Yes** and press **Enter**. If you select **No**, you will return to the Main menu.

Adding a Spare Drive

With RAID 1 you have the option to create a maximum of one spare drive. To create a spare, you can create it during the creation of an array or you can add a spare later to an existing RAID 1 array.



Note: The spare drive must be of equal or greater size than the array size. For example, if your RAID array is 36Gb, but your spare drive is 18Gb, you will not be able to select the drive as a spare.

To create a spare during array creation, follow these steps:

- 1 In the Select RAID Type window, press the **Spacebar** twice. The word Spare will appear next to the drive you have selected.
- 2 Press **Enter** to accept your options.

To add a spare to an existing RAID 1 array, follow these steps:

- 1 Select the array then press **Enter**.
- 2 Press **Spare** then press **Enter**. The following options appear:
Add Spare
Delete Spare (only available if a spare already exists)
- 3 Select a drive and press **Enter**. Select **Yes** when the following message appears:
Are you Sure?
Yes/No

Rebuilding Arrays



Note: Rebuilding applies to Fault Tolerant arrays (RAID 1) only.

If an array Build process (or initialization) is interrupted or critical with one member missing, you must perform a Rebuild to get the array to Optimal status. For a critical array Rebuild operation, the optimal drive is the source drive.



Note: If no spare exists and a hard disk drive fails, you need to create a spare before you can rebuild an array. See [Adding a Spare Drive on page 2-11](#) before continuing your Rebuild.

For RAID 1 , you can rebuild an array by following these steps:

- 1 From the Main menu, select array for Rebuild and press **Enter**.
- 2 Press **Rebuild**.
- 3 Select the Driver Background Task Priority for the Rebuild and press **Enter**.

See [Creating RAID 1 Arrays on page 2-9](#) for more information on driver priority levels.

- 4 If your array rebuilds successfully, the following message appears:

Build/Rebuild Completed.

Press **Esc** to return to the Main menu.

Press **Enter** and you will return to the Main menu.



Note: During the Rebuild process, you can stop the Rebuild by pressing **Esc**. You will get a pop-up window displaying Stop Build? If you select **Yes**, you will return to the Main menu. HostRAID will set a check point when you exit Rebuild. See [Check Point on page 2-15](#) for more information.

Verifying Data Integrity

To verify data integrity, your RAID 1 must be at Optimal status. To verify data integrity, follow these steps:

- 1 From the Main menu, select array, press **Enter**, then press **V**.
- 2 Select **Yes** and press **Enter**. If you select **Yes**, next select the Driver Background Task Priority and press **Enter**. If you select **No**, you will return to the Main menu.

See [Creating RAID 1 Arrays on page 2-9](#) for more information on driver priority levels.



Note: During the Verify process, you can stop the Verify by pressing **Esc**. You will get a pop-up window displaying Stop Verify? If you select **Yes**, you will return to the Main menu. HostRAID will set a check point when you exit Verify. See [Check Point on page 2-15](#) for more information.

- 3 You will get a message asking if you want to automatically fix errors. Press **Yes** to AutoFix. This will execute a comparison of mirrored drives, a copy from the primary drive to secondary drive when miscompare occurs, a log of errors, and a report at the end of the verification process.

If you select **No**, Verify will execute a comparison of mirrored drives, a log of errors, and a report at the end of the verification process.



Note: To fix errors found (if any), run Verify again with **Autofix=Yes**.

After you select your verification option, the following message appears:

Depending on your disk capacity, verifying may take several minutes to several hours. Are you sure?

- 4 When your Verify is completed, you will get a verification message and log. Press **Esc** to exit.
- 5 Press **Enter** and you will return to the Main menu.

Bootable Array

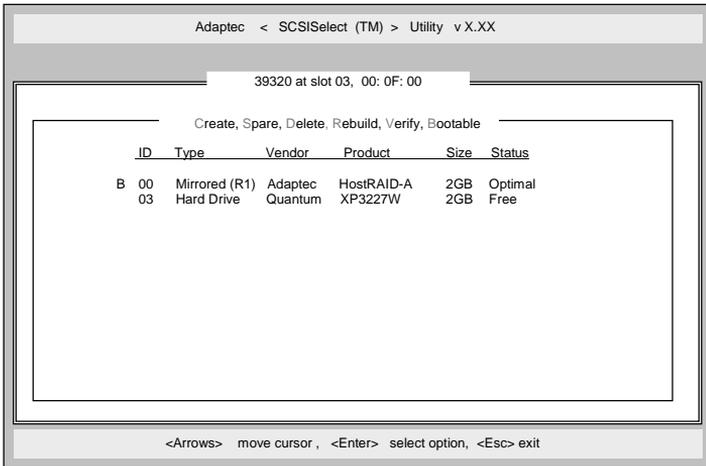
To create a bootable array, follow these steps:

- 1 From the Main menu, select array, press **Enter**, then press **Bootable**.
- 2 Select **Mark Bootable** and press **Enter**.



Note: Mark Bootable gives boot priority to the array regardless of the SCSI ID priority.

A B will appear next to the drive ID to indicate it as bootable.



Check Point

HostRAID has a check point feature that enables you to exit the SCSISelect utility when an operation (for example, Verify, or Rebuild) is in progress. The HostRAID driver will continue the operation where SCSISelect left off and SCSISelect will continue the operation where the HostRAID driver left off if an operation was started from the driver.

Installing the Software Driver for Windows NT 4.0

In this Chapter

<i>Installing the Driver for Windows NT 4.0</i>	3-2
<i>Windows NT 4.0 Installation and Configuration Notes</i>	3-5

This chapter explains how to install the Adaptec HostRAID software driver (a320raid.sys) for Windows NT 4.0. Before installing the driver, make sure you have completed the following:

- Installed the Adaptec Ultra320 SCSI card in your system. (See the SCSI controller hardware documentation for more information.)
- If you want to start from the RAID, create the RAID using the *SCSISelect* Utility. By pressing **Ctrl-A** keys simultaneously when the Adaptec BIOS banner comes up, will allow you to do *SCSISelect* from BIOS. See [Chapter 2, *Using the SCSISelect Utility to Manage Arrays*](#) for more information.

Installing the Driver for Windows NT 4.0

To begin driver installation, see either [Installing the Driver When Installing Windows NT 4.0 on page 3-2](#) or [Installing the Driver When Windows NT 4.0 is Already Installed on page 3-3](#).

Installing the Driver When Installing Windows NT 4.0

To install the a320raid.sys driver when you are installing Windows NT 4.0, follow these steps:



Note: During Windows NT 4.0 installation, if your system configuration has multiple arrays and/or single drives, Windows NT 4.0 limits the size of the system partition you can create to 1 GB.

- 1 Start your system with the Windows NT 4.0 Boot disk in the floppy disk drive or the Windows NT 4.0 Boot CD in the CD-ROM drive.



Note: If there is DOS installed and you are trying to install Windows NT 4.0, then it may also be necessary to edit the config.sys file to include command lines for your CD-ROM drive. See the system documentation for more information.

- 2 When the following message appears onscreen, press the **F6** key.
Setup is inspecting your computer system's hardware...
If you are installing from CD, skip to [Step 4](#). If you are installing from floppy disk, continue to [Step 3](#).
- 3 *For Windows NT 4.0 Boot disk installation only:* When prompted, insert disk #2 in your floppy disk drive. After a few moments you will see a blue screen. Continue with [Step 4](#).
- 4 Press **S** to specify an additional device.
- 5 Press **Enter** to select **Others**; insert the Adaptec HostRAID RAID Controller driver disk in your floppy disk drive and press **Enter**.

- 6 The screen displays the adapter drivers supported on the disk. Select **Adaptec HostRAID U320 RAID driver for Windows NT 4.0** and press **Enter**.
- 7 If you want to add drivers (other than for HostRAID), press **S** and repeat [Step 5](#) for each additional adapter and insert the appropriate disk provided by the hardware manufacturer.
- 8 Press **Enter** to continue with the Windows NT 4.0 operating system setup. Follow the instructions onscreen and in the Windows NT 4.0 documentation to complete the installation.
- 9 When Windows NT 4.0 installation is complete, install the HostRAID Alert Utility. See [Chapter 6, Using the HostRAID Alert Utility](#) for more information.

Installing the Driver When Windows NT 4.0 is Already Installed

To update or install the a320raid.sys driver if Windows NT 4.0 is already installed, follow these steps:

- 1 Start Windows NT 4.0.
- 2 Click the **Start** button on the Windows NT 4.0 task bar, and then point to **Settings**.
- 3 Click the **Control Panel**.
- 4 Double-click the **SCSI Adapters** icon.
- 5 Click the **Drivers** tab, and then click the **Add** button.
- 6 In the Install Driver window, click the **Have Disk** button.
- 7 Insert the Adaptec HostRAID RAID Controller driver disk in your floppy disk drive. Enter the following path to the installation files and then click **OK**.
`a:\nt4`
- 8 In the Install Driver window, Click **OK**.
- 9 You must restart your computer for the changes to take effect. Click **Yes** to restart your computer.
- 10 When driver installation is complete, install the HostRAID Alert Utility. See [Chapter 6, Using the HostRAID Alert Utility](#) for more information.

Changing Boot Controllers

If you want to reconnect your bootable hard disk drive from the SCSI controller to the HostRAID controller, you must:

- 1 Start Windows NT 4.0 and install the driver from the Adaptec HostRAID Driver Set disk. See [*Installing the Driver When Windows NT 4.0 is Already Installed*](#) on page 3-3.
- 2 Shut down Windows NT 4.0 and turn off your system.
- 3 Switch the bootable hard disk drive from the old SCSI controller to the HostRAID controller.
- 4 Power on your system.

Windows NT 4.0 Installation and Configuration Notes

If Windows NT 4.0 Setup Hangs

During Windows NT 4.0 installation, the system may hang while the Windows NT 4.0 Setup floppy disk is being used to copy the device driver. A workaround is to start from a DOS boot disk, create a DOS partition on the array using fdisk, and then install Windows NT 4.0 on the array.

Windows NT 4.0 Disk Administrator

When creating a new array on a system running under Windows NT 4.0, the array is not listed as *usable* in the Windows NT 4.0 Disk Administrator until it is initialized. This is normal Windows NT 4.0 functionality.

Boot Order In Windows NT 4.0 versus RAID Management

During Windows NT 4.0 installation, Windows NT 4.0 does not show the devices in the boot order. Instead, it shows the arrays with the lower ID first. To minimize confusion during Windows NT 4.0 installation, try one of the following:

- Disconnect all devices other than members of the boot array, so that only one logical device is present in the Windows NT 4.0 installation. Reconnect all other devices after Windows NT 4.0 is successfully installed.
- Configure the boot array in the system BIOS or with *SCSISelect* so that the lowest ID is a member of the boot array.

Installing the Software Driver for Windows 2000

In this Chapter

Installing the Device Driver for Windows 2000 4-2

Windows 2000 Installation and Configuration Notes 4-5

This chapter explains how to install the Adaptec HostRAID software driver (a320raid.sys) for Windows 2000. Before installing the driver, make sure you have completed the following:

- Installed the Adaptec Ultra320 SCSI card in your system. (See the SCSI controller hardware documentation for more information.)
- If you want to start from the RAID, create the RAID using the *SCSISelect* Utility. By pressing **Ctrl-A** keys simultaneously when the Adaptec BIOS banner comes up, will allow you to do *SCSISelect* from BIOS. See [Chapter 2, Using the SCSISelect Utility to Manage Arrays](#) for more information.

Installing the Device Driver for Windows 2000

To begin driver installation, see either, [Installing the Driver For a Fresh Installation of Windows 2000 on page 4-2](#), or [Installing the Driver When Windows 2000 is Already Installed on page 4-3](#).

Installing the Driver For a Fresh Installation of Windows 2000

- 1 Start your system with the Windows 2000 Boot CD in the CD-ROM drive.



Note: When using a CD-ROM drive to install Windows 2000 from the bootable CD, make sure Bootable CD-ROM support is enabled. This is done through the System BIOS Setup Utility.

- 2 Press **F6** when this message is displayed:
Press F6 if you need to install third-party SCSI or RAID drivers
- 3 Press **S** = Specify Additional Device.
- 4 Insert the Adaptec HostRAID RAID Controller driver disk when the setup prompts you to insert the manufacturer supplied disk into drive A, and then continue.
- 5 The screen displays the adapter drivers supported on the disk. Select **Adaptec HostRAID U320 RAID driver for Windows 2000** and continue with the rest of the Windows 2000 installation.
- 6 Your system will restart once more to finish setting up Windows 2000.
- 7 When driver installation is complete, install the HostRAID Alert Utility. See [Chapter 6, Using the HostRAID Alert Utility](#) for more information.

Installing the Driver When Windows 2000 is Already Installed

To update or install the a320raid.sys driver if Windows 2000 is already installed, follow these steps:

- 1 Start Windows 2000.

Windows 2000 will automatically discover the new hardware and start the Found New Hardware Wizard to guide you through the device driver installation.

- 2 At the Welcome to the Found New Hardware Wizard window, select **Next**.
- 3 On the Install Hardware Device Drivers screen, select **Display a list of the known drivers for this device**, and click **Next**.
- 4 On the Hardware Type screen, select **SCSI and RAID controllers**, and click **Next**.
- 5 On Select a Device Drivers screen, select the **Have Disk** button. You will be prompted to insert the manufacturer supplied disk. Insert the Windows 2000 Driver Disk for HostRAID in your floppy disk drive and enter the following path:

```
a:\win2000
```

Click the **OK** button.

- 6 Select **Adaptec HostRAID U320 RAID Driver for Windows 2000** from the list, then click the **Next** button.
- 7 On the Update Driver Warning window, click **Yes** to continue the installation.
- 8 Click the **Next** button again to confirm the installation of the driver. You may be prompted with this warning message:
"The software you are about to install does not contain a Microsoft Digital Signature ..."
Ignore the warning and click **Yes** to continue the installation.
- 9 When the driver is copied on the hard disk drive, click **Finish**.
- 10 You will be prompted to restart the computer. Select **Yes**.
- 11 After restarting the system, install the HostRAID Alert Utility. See [Chapter 6, Using the HostRAID Alert Utility](#) for more information.

Changing Boot Controllers

If you want to reconnect your bootable hard disk drive from the SCSI controller to the HostRAID controller, you must:

- 1 Install the HostRAID controller into your system without attaching any devices to it. See the controller documentation for more information on installation.
- 2 Install the driver from the Adaptec HostRAID Driver Set disk. See [Installing the Driver When Windows 2000 is Already Installed on page 4-3](#).
- 3 Shut down Windows 2000 and turn off your system.
- 4 Switch the bootable hard disk drive from the old SCSI controller to the HostRAID controller.
- 5 Power on your system.

Windows 2000 Installation and Configuration Notes

Windows 2000 Disk Management

When creating a new array on a system running under Windows 2000, the array is not listed in Windows 2000 Disk Management until the array is initialized. This is normal Windows 2000 functionality.

Boot Order In Windows 2000 vs. the *SCSISelect* Utility

During Windows 2000 installation, Windows 2000 does not show the devices in the boot order. Instead, it shows the arrays with the lower ID first. To minimize confusion during Windows 2000 installation, try one of the following:

- Disconnect all devices other than members of the boot array, so that only one logical device is present in the Windows 2000 installation. Reconnect all other devices after Windows 2000 is successfully installed.
- Configure the boot array in the system BIOS or with *SCSISelect* so that the lowest ID is a member of the boot array. See the system documentation for more information.

Installing the Software Driver for Windows XP

In this Chapter

<i>Installing the Device Driver for Windows XP</i>	5-2
<i>Windows XP Installation and Configuration Notes</i>	5-4

This chapter explains how to install the Adaptec HostRAID software driver (a320raid.sys) for Windows XP. Before installing the driver, make sure you have completed the following:

- Installed the Adaptec Ultra320 SCSI card in your system. (See the SCSI controller hardware documentation for more information.)
- If you want to boot from the RAID, create the RAID using the *SCSISelect* Utility. By pressing **Control-A** keys simultaneously when the Adaptec BIOS banner comes up, will allow you to do *SCSISelect* from BIOS. See [Chapter 2, *Using the SCSISelect Utility to Manage Arrays*](#) for more information.

Once Windows XP and the driver are installed, install the HostRAID Alert Utility. With this utility you can get automatic notifications and suggestions whenever there is some change in configuration, like drive is degrading, drive goes down, or array becomes critical. See [Chapter 2, Using the SCSISelect Utility to Manage Arrays](#) for more information.

Installing the Device Driver for Windows XP

To begin driver installation, see either, [Installing the Driver For a Fresh Installation of Windows XP on page 5-2](#), or [Installing the Driver When Windows XP is Already Installed on page 5-3](#).

Installing the Driver For a Fresh Installation of Windows XP

- 1 Start your system with the Windows XP Boot CD in the CD-ROM drive.



Note: When using a CD-ROM drive to install Windows XP from the bootable CD, make sure Bootable CD-ROM support is enabled. This is done through the System BIOS Setup Utility.

- 2 Press **F6** when this message is displayed:
Press F6 if you need to install third-party SCSI drivers
- 3 Insert the Adaptec HostRAID RAID Controller driver disk when the setup prompts you to insert the manufacturer supplied disk into drive A, and then continue.
- 4 The screen displays the adapter drivers supported on the disk. Select **Adaptec HostRAID U320 RAID driver for Windows XP** and continue with the rest of the Windows XP installation.
- 5 Your system will restart once more to finish setting up Windows XP.
- 6 When the Windows XP installation is complete, install the HostRAID Alert Utility. See [Chapter 6, Using the HostRAID Alert Utility](#) for more information.

Installing the Driver When Windows XP is Already Installed

To update or install the a320raid.sys driver if Windows XP is already installed, follow these steps:

- 1 Start Windows XP.

Windows XP will automatically discover the new hardware and start the Found New Hardware Wizard to guide you through the device driver installation.

- 2 At the Welcome to the Found New Hardware Wizard window, select **Install from a list or specific location (Advanced)**, then click **Next**.
- 3 Select **search removable media (floppy, CD-ROM...)**, then insert the Windows XP Driver Disk for HostRAID into your floppy disk drive and click **Next**.
- 4 Select Adaptec HostRAID U320 RAID Driver for Windows XP from the list, then click the **Next** button.
- 5 Click the **Next** button again to confirm the installation of the driver. You may be prompted with this warning message:
"The software you are installing has not passed Windows Logo testing to verify its compatibility with Windows XP."
Click **Continue Anyway** to continue the installation.
- 6 When the driver is copied on the hard drive, click **Finish**.
- 7 You will be prompted to restart the computer. Select **Yes**.
- 8 After rebooting the system, install the HostRAID Alert Utility. See [Chapter 6, Using the HostRAID Alert Utility](#) for more information.



Note: The HostRAID Alert Utility must be installed in order to automatically receive error and event notification.

Changing Boot Controllers

If you want to reconnect your bootable hard drive from the SCSI controller to the HostRAID controller, you must:

- 1 Install the HostRAID controller into your system without attaching any devices to it. See the controller documentation for more information on installation.
- 2 Install the driver from the Adaptec HostRAID Driver Set disk. See [Installing the Driver When Windows XP is Already Installed on page 5-3](#).
- 3 Shut down Windows XP and turn off your system.
- 4 Switch the bootable hard drive from the old SCSI controller to the HostRAID controller.
- 5 Power on your system.

Windows XP Installation and Configuration Notes

Windows XP Disk Management

When creating a new array on a system running under Windows XP, the array is not listed in Windows XP Disk Management until the array is initialized. This is normal Windows XP functionality.

Boot Order In Windows XP vs. the SCSISelect Utility

During Windows XP installation, Windows XP does not show the devices in the boot order. Instead, it shows the arrays with the lower ID first. To minimize confusion during Windows XP installation, try one of the following:

- Disconnect all devices other than members of the boot array, so that only one logical device is present in the Windows XP installation. Reconnect all other devices after Windows XP is successfully installed.
- Configure the boot array in the system BIOS or with *SCSISelect* so that the lowest ID is a member of the boot array. See the system documentation for more information.

Using the HostRAID Alert Utility

In this Chapter

<i>Starting the HostRAID Alert Utility</i>	6-2
<i>Using the HostRAID Alert Utility</i>	6-2
<i>Interpreting and Responding to Event Messages</i>	6-5

This chapter describes the functions of the HostRAID Alert Utility. This utility is an automatic pop-up application that provides error notification, warnings, and task information.

The HostRAID Alert Utility provides the following features:

- Alerts you that an error has taken place
- Provides information on RAID processes
- Provides continuous alert of error until error is resolved and description of where the error has occurred, including the drive number and name
- Provides event log by the operating system event log

Starting the HostRAID Alert Utility

To start the HostRAID Alert Utility, follow these steps:

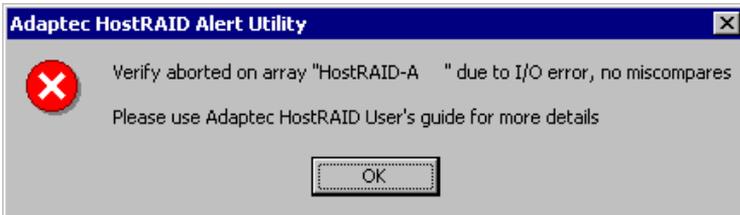
- 1 Install the Adaptec HostRAID device driver for your system.
- 2 Insert the HostRAID Alert Utility CD-ROM in your CD-ROM drive.
- 3 Double-click the **setup.exe** file.
- 4 Follow the instructions on-screen to complete your installation.

Using the HostRAID Alert Utility

Once the HostRAID Alert Utility is installed on your operating system, it will automatically notify you of RAID task completion with a pop-up message window. See the following example:



If a critical event occurs, the HostRAID Alert Utility will notify you with the following types of messages:



For fixing specific errors, see the corresponding section of the *HostRAID User's Guide* for more information.

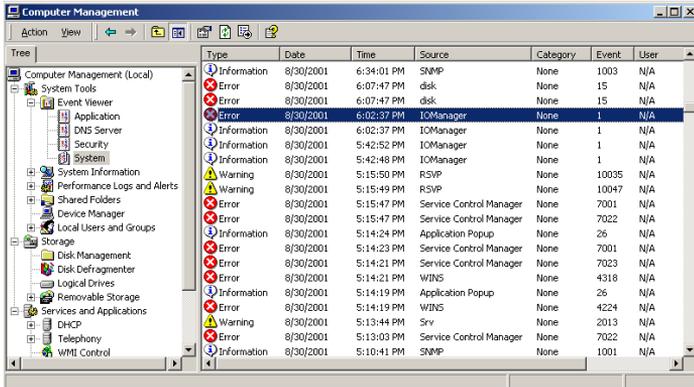
Along with a dialog box message, the  icon will automatically appear in your status bar (or status tray) whenever there is a critical event. The icon will continue to appear in your status bar until the critical event is resolved.

Viewing the Critical Event

To view the critical event:

- 1 Double-click the  icon.

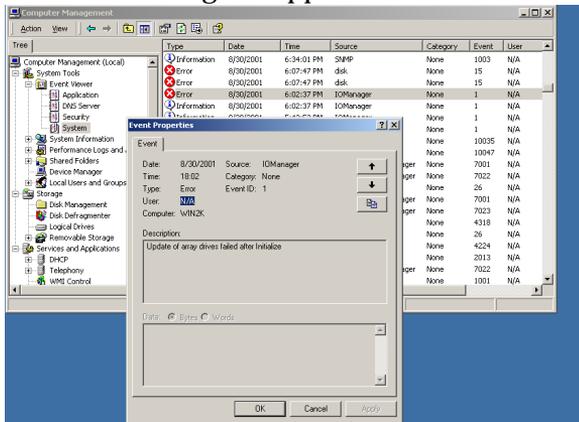
The system event log appears.



View the event information for one or all systems in order of occurrence. New entries appear on the list as the system events occur, and a date and time is listed for each event. A color-coded symbol to the left of the message indicates the type of event it is and an indicator of its severity. See [Interpreting and Responding to Event Messages](#) on page 6-5 for more information.

- 2 To view detailed information about the event, select the event and double-click the entry.

The Event Detail dialog box appears.



- 3 Click **Close** when you are finished viewing the Event Detail dialog box.



Note: The Adaptec Alert Utility icon will remain in your status bar until you resolve the critical event.

Removing the HostRAID Alert Utility Tray Icon

To remove the HostRAID Alert Utility tray icon:

- 1 Right-click the  icon.
A drop down menu appears.
- 2 Select **Close**.

3 A warning message appears:

Are you sure you want to remove HostRAID Alert Utility from the system tray?

Click **Yes**.



Note: If you choose to close the tray icon after you view a critical event without resolving the critical event, you will not get another alert notification for that instance. However, if a new critical event occurs, you will automatically get a new alert notification.

Interpreting and Responding to Event Messages

Server events can have three different severity levels, as described in the following table. The symbol will be different depending on the operating system.

Symbol	Severity Level	Description
 Red dot	Critical Error	Indicates an array or system problem requiring immediate action. For example, a fault-tolerant array with a failed disk. See Event Messages on page A-2 for more information.
 Yellow dot or Yellow triangle	Warning	Indicates an array or system problem requiring attention such as a paused channel. If no spare is available to replace the failed disk, take action immediately before another disk fails. See Event Messages on page A-2 for more information.
 Blue or white dot	Informational	Contains information about a normal operation, such as creating a new array, adding a spare, or verifying an array. See Chapter 2 for more information.



Troubleshooting

In this Appendix

General Troubleshooting Procedures

A-1

General Troubleshooting Procedures

The following tips are general troubleshooting procedures:

- Check that the Adaptec SCSI card is seated evenly all the way into the PCI/PCI-X slot.
- Check that the PCI expansion slot is 5V and compliant with PCI/PCI-X and supports Bus Mastering.
- Check that the Adaptec SCSI card is detected during startup. If it is not detected, try to move it to another free PCI/PCI-X slot.
- Check that all SCSI devices and the Adaptec SCSI card are assigned unique SCSI IDs.
- Check that all SCSI cables and power cables are connected.

Event Messages

The HostRAID Alert Utility enables you to receive event messages that can either provide information or warn you of a critical event. The following are event messages you can receive, their descriptions, and actions you might need to take.

Message: **Opcode <xx> request failed Sensekey=<ss>, AddsenseCode=<asc>**

Description: Some internal command has failed.

Action: If there is no other symptom in the system, please report this message to the customer support.

Message: **Unsafe shutdown detected on array <arrayname>**

Description: This message will come only at the time of system startup and is informational in nature. HostRAID will start an automatic verify on the mirrored pairs to see if they are not fully synchronized. Mismatches will be automatically fixed.

Action: Nothing. Please remember to follow the regular shutdown procedure next time.

Message: **Recovered error: Bad block repaired on array <arrayname> [bus, ch, id, lun]**

Description: Though the RAID is still not critical, this should be taken as a warning. The numbers in the bracket identify the member who had to recover from a media error.

Action: If message recurs on the same member, look for a replacement for that member before it goes down and makes the RAID critical. If it shows on different members, look for corrections on cables and connectors.

Message: **Device failure predicted on array <arrayname> [bus, ch, id]**

Description: This is a SMART error reported by the drive. Though the RAID is still not critical, this should be taken as a warning. The numbers in bracket identify the member.

Action: If message recurs on the same member, look for a replacement for that member before it goes down and makes the RAID critical.

Message: **Member is down on array <arrayname> [bus, ch, id]**

Description: This member has a failure and cannot recover. So the RAID has now become critical.

Action: It is strongly recommended that you replace the failed drive at your earliest convenience. After you insert a new drive at the same bus or channel, you may need to start the Rebuild by rebooting the system and pressing **CTRL-A**. If you had a spare disk, the rebuild would have already started by deploying that disk in place of failed disk, automatically. You will need to remove the failed disk, add a new disk and make it a *spare disk* using **CTRL-A** at the boot time when the HostRAID BIOS displays the signature message.

Migrating from HostRAID to Adaptec Ultra320 SCSI

In this Appendix

<i>Migrating With Windows 2000</i>	B-2
<i>Migrating With Windows XP</i>	B-5
<i>Migrating With Windows NT 4.0</i>	B-9

If after installing the HostRAID drivers, you decide to use your controller as standalone SCSI without RAID functionality, you must disable HostRAID and install the SCSI drivers. To use standalone SCSI on your Adaptec Ultra320 SCSI Card, refer to the following sections of this appendix.



Caution: Adaptec recommends that you back up all of your data before migrating from HostRAID to Ultra320 SCSI.



Warning: Adaptec recommends that if you want to migrate to standalone SCSI, you migrate from RAID 1 only. If you try to migrate from RAID 0, you will lose all of your data. See [Disabling HostRAID Support on page B-3](#) for more information.



Caution: EZ-SCSI is only supported with standalone SCSI. Adaptec recommends that you reinstall EZ-SCSI after migrating from HostRAID to Adaptec Ultra320 SCSI.

Migrating With Windows 2000

Installing the Adaptec Ultra320 SCSI Driver

To migrate the boot channel on HostRAID to Adaptec Ultra320 SCSI with a Windows 2000 OS, follow these steps:

- 1 Start Windows 2000.
- 2 Go to the Device Manager by clicking on **Start=>Settings=>Control Panel=>System=>Hardware=>Device Manager**
- 3 At the Device Manager, click the + sign next to the SCSI and RAID controllers entry to expand it.
- 4 There will be two entries representing the dual channels. Right-click on the channel that you are booting from, then select **Properties**.



Note: If you are not sure which channel your boot drive is connected to, change the view of the Device Manager to view Devices by connection, and find out which drives are connecting to which channels.

- 5 Select **Driver**, then **Update driver**.
- 6 Click **Next**.
- 7 Select **Display a list of the known drivers for this device so that I can choose a specific driver**, then click **Next**.
- 8 Click the **Have Disk** button.
- 9 Insert the Adaptec Ultra320 SCSI Cards CD into the CD-ROM drive and click **Browse**. If the CD automatically opens a welcome screen, click the **Exit** button to close it.

10 Click on the path D:\drivers\windows\win2000 (where D: is the CD-ROM drive letter).

11 Click on **adpu320**, then click **Open**.

12 Click **OK**.

13 Scroll down the list and select your Adaptec Ultra320 SCSI driver, then click **Next**.

14 Click **Next** again. You may be prompted with this warning message:

“The software you are about to install does not contain a Microsoft Digital Signature...”

Ignore the warning and click **Yes** to continue.

15 When the driver is copied on the hard disk drive, click **Finish**.

16 You will be prompted to restart the computer. Select **Yes**.

The new Adaptec Ultra320 SCSI driver will be displayed under SCSI and RAID controllers in the Device Manager.

Disabling HostRAID Support

After installing the Adaptec Ultra320 SCSI driver, you must disable HostRAID support before you can use the SCSI features.



Warning: Before you disable HostRAID, for RAID 1, you must break a RAID 1 array. See the following steps for instructions. For RAID 0, you will lose all your data if you try to disable HostRAID.

To disable HostRAID, follow these steps:

1 Press **Ctrl+A** keys simultaneously when the Adaptec BIOS appears.

2 When your Adaptec Ultra320 SCSI Card appears, press **Enter**.

If you are using a dual channel card, select **Channel A**, then press **Enter**.

3 On any channel containing an array, scroll down and select **Configure/View HostRAID Settings**.

- 4 Select the array by scrolling to it and pressing **Enter**. This will display the members of that array.
- 5 Press the **D** key to delete the selected array. When prompted to confirm deletion of the array, select **Yes**.
- 6 At the Deleting Information window, select **None** and press **Enter**.
- 7 When prompted, select **Yes** to continue.
- 8 Press **Esc**, save change, then exit.
- 9 At the Options screen, select **Disable HostRAID support**.
- 10 Press **Esc** and save change.

Completing the Adaptec Ultra320 SCSI Driver Installation

After you have installed the Adaptec Ultra320 SCSI driver and disabled HostRAID support, you need to complete the installation so that the Windows OS can detect the new driver hardware.

To complete your Adaptec Ultra320 SCSI driver installation, follow these steps:

- 1 Restart Windows 2000.

Windows 2000 will automatically discover the new hardware and will prompt you for the Adaptec Ultra320 SCSI Card CD.

- 2 You may be prompted with this warning message:

"The software you are about to install does not contain a Microsoft Digital Signature..."

Ignore the warning and click **Yes** to continue.

- 3 Insert the Adaptec Ultra320 SCSI CD into the CD-ROM drive when prompted, click on the path D:\drivers\windows\win2000 (where D: is the CD-ROM drive letter), then click **OK**.

- 4 When the driver is copied on the hard disk drive, click **Finish**.
- 5 You will be prompted to restart the computer. Select **Yes**.



Note: To migrate the non-boot channel from HostRAID to SCSI, follow the instructions for migrating from a boot channel for your other channel.

Migrating With Windows XP

Installing the Adaptec Ultra320 SCSI Driver

To migrate the boot channel on HostRAID to Adaptec Ultra320 SCSI with a Windows XP OS, follow these steps:

- 1 Start Windows XP.
- 2 Go to the Device Manager by right-clicking on **My Computer** then clicking on **Properties=>Hardware=>Device Manager**.
- 3 At the Device Manager, click the + sign next to the SCSI and RAID controllers entry to expand it.
- 4 There will be two entries representing the dual channels. Right-click on the channel that you are booting from, then select **Update Driver**.



Note: If you are not sure which channel your boot drive is connected to, change the view of the Device Manager to view Devices by connection, and find out which drives are connecting to which channels.

- 5 Select **Install from a list or specific location (advanced)**, then click **Next**.
- 6 Select **Dont' search, I will choose the driver to install**, then click **Next**.
- 7 Click the **Have Disk** button.
- 8 Insert the Adaptec Ultra320 SCSI CD into the CD-ROM drive and click **Browse**. If the CD automatically opens a welcome screen, click the **Exit** button to close it.

- 9 Click on the path D:\drivers\windows\winxp (where D: is the CD-ROM drive letter).
- 10 Click on the **adpu320**, then click **Open**.
- 11 Click **OK**.
- 12 Scroll down the list and select your Adaptec Ultra320 SCSI driver, then click **Next**.
- 13 Click **Next** again. You may be prompted with this warning message:
"The software you are installing for this hardware...has not passed Windows Logo testing to verify its compatibility with Windows XP..."
Ignore the warning and click **Continue Anyway** to continue.
- 14 When the driver is copied on the hard disk drive, click **Finish**.
- 15 You will be prompted to restart the computer. Select **Yes**.
The new Adaptec Ultra320 SCSI driver will be displayed under SCSI and RAID controllers in the Device Manager.

Disabling HostRAID Support

After installing the Adaptec Ultra320 SCSI driver, you must disable HostRAID support before you can use the standalone SCSI.



Warning: Before you disable HostRAID, for RAID 1, you must break a RAID 1 array. See the following steps for instructions. For RAID 0, you will lose all your data if you try to disable HostRAID.

To disable HostRAID, follow these steps:

- 1 Press **Ctrl+A** keys simultaneously when the Adaptec BIOS appears.
- 2 When your SCSI Card appears, press **Enter**.
If you are using a dual channel card, select **Channel A**, then press **Enter**.
- 3 On any channel containing an array, scroll down and select **Configure/View HostRAID Settings**.
- 4 Select the array by scrolling to it and pressing **Enter**. This will display the members of that array.
- 5 Press the **D** key to delete the selected array. When prompted to confirm deletion of the array, select **Yes**.
- 6 At the Deleting Information window, select **None** and press **Enter**.
- 7 When prompted, select **Yes** to continue.
- 8 Press **Esc** to exit.
- 9 At the Options screen, select **Disable HostRAID support**.
- 10 Press **Esc** and save change.

If you are using a dual channel card, select **Channel B** and repeat the steps to disable HostRAID support.

Completing the Adaptec Ultra320 SCSI Driver Installation

After you have installed the Adaptec Ultra320 SCSI driver and disabled HostRAID support, you need to complete the installation so that the Windows OS can detect the new driver hardware.

To complete your Adaptec Ultra320 SCSI driver installation, follow these steps:

- 1 Restart Windows XP.

Windows XP will automatically discover the new hardware and will prompt you for the HostRAID RAID driver.

- 2 At the Welcome to the found new Hardware Wizard window, select **Install the software automatically (recommended)**, then click **Next**.

- 3 At the Please select the best match... window, keep the default drive that is highlighted and click **Next**.

- 4 You may be prompted with this warning message:

"The software you are installing for this hardware...has not passed Windows Logo testing to verify its compatibility with Windows XP..."

Ignore the warning and click **Continue Anyway**.

- 5 When the driver is copied on the hard disk drive, click **Finish**.

- 6 When prompted, click **Yes** to restart your system.



Note: To migrate the non-boot channel from HostRAID to SCSI, follow the instructions for migrating from a boot channel for your other channel.

Migrating With Windows NT 4.0

Installing the Adaptec Ultra320 SCSI Driver

To migrate the boot channel on HostRAID to SCSI with a Windows NT 4.0 OS, follow these steps:

- 1 Start Windows NT.
- 2 Click on **Start=>Settings=>Control Panel**.
- 3 In the Control Panel, double-click the **SCSI Adapters** icon and click on the **Drivers** tab, then click **Add**.
- 4 From the Install Driver window, click **Have Disk...**
- 5 Insert the Adaptec Ultra320 SCSI CD into the CD-ROM drive. If the CD automatically opens a welcome screen, click the **Exit** button to close it.
- 6 At the Install from Disk... window, click the **Browse** button and path D:\drivers\windows\winnt40 (where D: is the CD-ROM drive letter). Click **OK**.
- 7 From the Install Driver window, select the the appropriate Adaptec SCSI card from the list and click **OK**. Restart the system.

Disabling HostRAID Support

After installing the HostRAID driver, you must disable HostRAID support before you can use the standalone SCSI features.



Warning: Before you disable HostRAID, for RAID 1, you must break a RAID 1 array. See the following steps for instructions. For RAID 0, you will loose all your data if you try to disable HostRAID.

To disable HostRAID, follow these steps:

- 1 Press **Ctrl+A** keys simultaneously when the Adaptec BIOS appears.
- 2 When your SCSI Card appears, press **Enter**.

If you are using a dual channel card, select **Channel A**, then press **Enter**.

- 3 On any channel containing an array, scroll down and select **Configure/View HostRAID Settings**.
- 4 Select the array by scrolling to it and pressing **Enter**. This will display the members of that array.
- 5 Press the **D** key to delete the selected array. When prompted to confirm deletion of the array, select **Yes**.
- 6 At the Deleting Information window, select **None** and press **Enter**.
- 7 When prompted, select **Yes** to continue.
- 8 Press **Esc** to exit.
- 9 At the Options screen, select **Disable HostRAID support**.
- 10 Press **Esc** and save change.

If you are using a dual channel card, select **Channel B** and repeat the steps to disable HostRAID support.

Completing the Adaptec Ultra320 SCSI Driver Installation

After you have installed the Adaptec Ultra320 SCSI driver and disabled HostRAID support, complete the installation by following these steps:

- 1 Restart Windows NT 4.0.

You may receive the following Service Control Manager error:

At least one service or driver failed during system startup. Use Event Viewer to examine the event log for details.

To prevent this error from reoccurring during subsequent restarts, Click on **Start=>Settings=>Control Panel** and double-click the **SCSI Adapters** icon.

- 2 Click the **Drivers** tab, select the Adaptec HostRAID RAID driver, and click **Remove**.
- 3 When the message **Are you sure you want to remove this drivers?** appears, Click **Yes** and restart the system.

Glossary

A

array

Two or more disks configured to appear as a single disk to the host system.

array controller

The electronic circuitry used to support RAID functionality.

array disk

A hard disk that is a member of an array.

array member

A single hard disk used in an array.

B

bootable array

An array configured as the boot device.

bus

A set of conductors that connect the functional units in a computer.

C

capacity

The total usable disk space available in an array, in megabytes.

channel

Any path used for the transfer of data and control information between storage devices and a storage controller or I/O adapter.

check point

A feature that enables you to exit the *SCSISelect* Utility when an operation is in progress and be able to continue without interruption. The driver then resumes the operation from where the BIOS left off and the BIOS resumes the operation where the driver left off.

critical array

An array that is still operational, but is no longer maintaining redundant data.

D

dedicated spare

A spare hard disk that automatically replaces a failed hard disk *only* for the array to which it is dedicated.

discovery

The process by which information about a system or subsystem is obtained.

disk

See hard disk.

disk ID

Consists of the bus number, SCSI ID, and LUN, for example, 1:04:0. See also bus; LUN; SCSI ID.

drive light

An indicator light on a disk that illuminates during read or write operations.

E

enclosure

A physical housing for hard disks, which can be connected internally or externally to a computer. An enclosure usually contains one or more power supplies, fans, and temperature sensors.

enclosure ID

Consists of the bus number, SCSI ID, and LUN, for example, 1:04:0. See also bus; LUN; SCSI ID.

enclosure management device

See enclosure.

event

A notification or alert from the system indicating that a change has occurred.

event log

A file used to maintain information about prior controller activities or errors.

event notification

The means used by the system to communicate information about event occurrence.

F

fault tolerance

The ability of a system to keep working in the event of hardware or software faults. Fault tolerance is usually achieved by duplicating key components of the system.

fault-tolerant arrays

Arrays that have duplicate components (RAID 1 and RAID 10).

H

hard disk

A physical hard disk on a SCSI bus.

host adapter

Electronic circuitry that supports I/O to storage devices, but which does not support RAID.

HostRAID

Intelligent RAID on chip. Adaptec product that adds entry-level RAID functionality to SCSI ASICs and host bus adapters.

I

initialized array

An array that is ready for data reads and writes.

L

logical device

A read/write resource, such as an array or spare, that does not exist until configured by the Software Management tool.

Logical Unit Number

See LUN.

low-level format

A low-level format completely cleans any data off the hard disk.

LUN

Stands for Logical Unit Number. The number assigned to a subdevice (logical unit) of a SCSI target. Each SCSI target can contain up to eight subdevices numbered 0 through 7; however, most SCSI devices contain only one subdevice (LUN 0).

M

mirroring; mirrored array

Synonym for RAID 1. Full redundancy is obtained by maintaining identical copies of data on two or more hard disks. Mirroring provides fault tolerance with a minor performance penalty.

monitoring

The process of receiving, displaying, and logging system events.

O

off-line array

An array that is not responding.

P

parity

In RAID, a form of redundancy used to recreate the data of a failed hard disk in a disk array. Used in RAID levels 2, 3, 4 and 5.

physical resources

The Adaptec Family Adapter products, channels, and SCSI devices installed in the server.

poll

A validation of discovery information.

R

RAID

Acronym for Redundant Array of Independent (Inexpensive) Disks. Coined in 1987 by researchers at the University of California at Berkeley to describe a set of disk array architectures that provide fault tolerance and improved performance.

RAID 0 (striping)

An array where data is distributed, or striped, across the disks in the array.

RAID 1 (mirrored)

An array that uses a single pair of disks. Both disks in the pair contain the same data.

rebuild

The regeneration and writing onto one or more replacement hard disks of all the data from a failed hard disk in a redundant RAID array. Rebuild is usually performed in the background while applications are accessing data in the array.

reconstruction

See rebuild.

redundancy

Maintaining duplicates for any given component in a system so the system can automatically replace a failed component with a working substitute. A parity RAID array's members are redundant since surviving members may collectively replace the data from a failed hard disk.

S

SCSI

Stands for Small Computer System Interface. A parallel interface standard used to connect various types of peripheral device (such as disk drives) to computers. Although SCSI is an ANSI standard, it exists in several variations.

SCSI array

A group of hard disks connected to the same SCSI array controller and accessed as a single storage unit. It is not apparent to users that an array is actually more than one disk drive.

SCSI array controller

The electronic circuitry used to control a SCSI array.

SCSI Device ID

See SCSI ID.

SCSI ID

The number assigned to each SCSI device attached to a SCSI bus.
See also bus; disk ID.

server

A computer set up to provide services used by other computers in a network environment. Typical servers handle disk storage, e-mail, or database functions.

SMART

Stands for Self-Monitoring Analysis and Reporting Technology. Hard disks that support this technology continually analyze their performance and generate an alert if they determine that the hard disk is likely to fail in the next few hours.

spare

A disk drive that is assigned to one or more arrays and kept in reserve in case of drive failure. A spare automatically replaces a failed drive in an array.

stand-alone hard disk

A hard disk that is *not* part of an array.

stripe size

The size that is used to stripe data or parity information across the disks in the array.

striping, disk; striped array

Spreading data over multiple disks to enhance performance. Often referred to as RAID 0, simple data striping provides no redundancy scheme and is not technically a standardized RAID level.

subsystem

The collection of software and hardware that controls storage to be managed and monitored.

system

Used generically to refer to a server, a networked client, or a stand-alone workstation.

T

target ID

See SCSI ID.

V

verify

The process of checking the integrity of redundant data stored on fault-tolerant arrays.

virtual device

Arrays and spares that do not exist until they are configured on the server with HostRAID.

virtual device order

The sequence in which the server's operating system detects the arrays, single hard disks, and other devices connected to the controller when the server boots.

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