3ware

User Guide

# Escalade

Storage Controller

**Supports the 5000 and 6000 series**

PN 720-0031-00 Rev A
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# Before You Begin

This installation guide gives simple, step-by-step instructions for installing and configuring your 3ware Escalade storage controller. To insure your personal safety and protect your equipment and data, carefully read this section before you begin installing.

## Package contents

The 3ware storage controller kit includes:

- 3ware storage controller in an ESD-protective bag
- 3ware driver installation media
- 3ware 3DM installation media
- ATA interface cables (one per port)
- Y-splitter cables for connecting additional drives to the power source (not provided for 2 port models)
- User's Guide

If your package is missing any of these items, contact 3ware before proceeding with installation. Disk drives and disk mounting brackets are not included.

## Tools required

- An ESD grounding strap or mat
- Tools to open your systems case and install the 3ware card into an available PCI expansion slot.

## System requirements

The 3ware storage controller requires a workstation-class or server -class CPU whose bus complies with PCI 2.1 standards, and a PCI slot that meets the Plug and Play‘ and PC99 specifications. The 3ware storage controller requires one full-size PCI-bus slot. It may be connected to up to 2, 4, or 8 IDE/ATA drives by the supplied 40-pin, 80-conductor ribbon interface cables.

**Note:** The blue end of the ribbon interface cable plugs into the 3ware storage controller and the black end plugs into the drive.

Drives must meet Ultra ATA/66 or Ultra ATA/33 standards, but may be of any capacity or physical form factor. Drives installed in a Redundant Array of Inexpensive Disks (RAID) configuration must match in manufacturer, model and size. Unshielded interface cables may not exceed 18” (45.7 cm) in length.

### Personal safety

**Warning!** High voltages may be found inside computer equipment. Before installing any of the hardware in this package or removing the protective covers of any computer equipment, turn off power switches and disconnect power cords. Do not reconnect the power cords until you have replaced the covers.

## Protecting equipment and data

**Back up your Data!** Creating or deleting disk arrays destroys existing files on the member drives in the array. If your drives contain valuable data, back them up and save it elsewhere before changing your array configuration.

**ESD precautions.** Standard electrostatic discharge (ESD) precautions must be followed to avoid damaging computer components

and accessories when installing or removing the storage controller board.

- When the case of your computer is open and its internal parts are exposed, don't touch any internal part unnecessarily.
- Always wear a grounded strap or work on an ESD-protective mat.
- Don't remove the 3ware card from its protective bag until you are properly grounded.
- Handle the card by its edges or the black rail and metal bracket at the two ends of the card.
- Don't touch any pin, contact, lead, or component on the card.

**Mechanical concerns.** Be gentle when installing the storage controller board into your system. Excessive force can damage the board, the cables, your drives, or your system.

- Be sure the board is aligned with its slot on the motherboard before installing. Do not flex the board excessively.
- Interface cable connectors must be mated carefully without bending any pins. The connectors provided are keyed to prevent you from inserting them upside-down.
- The blue end of the interface cable plugs into the 3ware storage controller and the black end plugs into the drive.
- Interface cables are fragile and must not be crimped or pinched. Ensure that they do not impede the flow of cooling air from fans or heat sinks in the system case.

# Introduction

3ware Escalade storage controllers allow you to use low-cost IDE/ATA drives in your storage system and still achieve performance levels and fault tolerance capabilities typically found in more expensive SCSI systems. Escalade storage controllers are available as 2, 4, or 8 port configurations, as well as a shortened 4 port board version designed for higher density rack-mounted applications.

### *DiskSwitch*‘ architecture for scalable performance

The DiskSwitch Architecture, found only in 3ware products, accelerates your storage system’s performance by speeding data into system memory. Each drive has its own dedicated AccelerATA data IDE port, maximizing drive and system throughput.

### RAID increases performance and adds redundancy

3ware storage controllers use Redundant Array of Inexpensive Disks (RAID) to increase your storage system’s performance and provide fault tolerance. 3ware storage controllers offer RAID 0 variable striped arrays for performance; RAID 1 mirrored arrays for fault tolerance; variable striped mirrored RAID 10 arrays for fault tolerance and performance; and RAID 5 arrays for fault tolerance, high capacity, and storage efficiency.

**Note:** For most versions of BIOS, drives installed in a RAID configuration must match in manufacturer, model, and size. Also, RAID 5 is not supported by Windows 98 or ME, or 3ware’s 5000 series storage controllers.

### RAID 0 arrays maximize performance and capacity

When drives are configured in a striped disk array (see Figure 1), the storage controller distributes large files across the multiple disks using RAID 0 techniques. Striped disk arrays achieve high transfer rates because they can read or write data on more than one drive simultaneously. Striped disk arrays give exceptional performance, particularly for data intensive applications such as video editing, computer aided design, and geographical information systems. Striping your disk array concatenates each drive's capacity into one large volume. The stripe size is user configurable at 64K, 128K, 256K, 512K, or 1M..

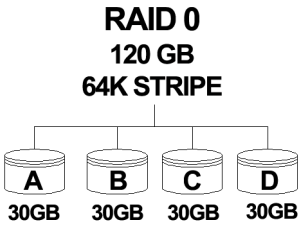



**Figure 1. RAID 0 Configuration Example**

### RAID 1 arrays offer fault tolerance

Mirrored disk arrays write data to two drives using RAID 1 algorithms (see Figure 2). This gives your system fault tolerance by preserving the data on one drive if the other drive fails. Fault tolerance is a basic requirement for mission critical systems like web and database servers.

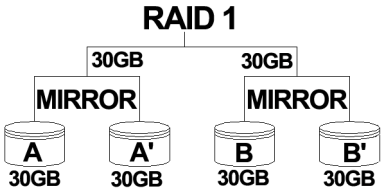



**Figure 2. RAID 1 Configuration Example**

### RAID 10 arrays maximize performance and fault tolerance

When drives are configured as a striped mirrored array, the disks are configured using both RAID 0 and RAID 1 techniques, thus the name RAID 10 (see Figure 3). A minimum of four drives are required to use this technique. The first two drives are mirrored as a fault tolerant array using RAID 1. The third and fourth drives are mirrored as a second fault tolerant array using RAID 1. The two mirrored arrays are then grouped as a striped RAID 0 array using a two tier structure. Higher data transfer rates are achieved by leveraging TwinStor and striping (64K, 128K, 256K, 512K, or 1M) the arrays. RAID 10 is available on the 4- and 8-port 3ware storage controller boards.

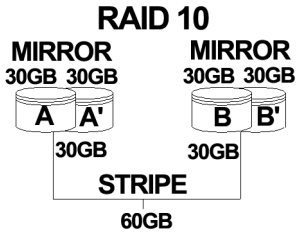



**Figure 3. RAID 10 Configuration Example**

### RAID 5 arrays optimize performance, fault tolerance, high capacity, and storage efficiency

The RAID 5 configuration features the data striping of RAID 0 combined with the parity of RAID 4. Using a simple parity (exclusive OR) function, RAID 5 can tolerate the loss of one drive. Parity information is distributed across all drives rather than being concentrated on a single disk (see Figure 4). This avoids throughput loss due to contention for the parity drive. You can use hot spares to rebuild a failed drive "on-the-fly".

RAID 5 capacity = size of smallest drive × (number of drives - 1). In addition, the array's storage efficiency increases with the number of disks; from 66.7 % for 3 drives to 87.5 % for 8 drives: storage efficiency = (number of drives -1) ÷ (number of drives).

Unlike all other RAID configurations that offer data striping, RAID 5 stripe size is limited to 64k.

**Note:** BIOS will reject the creation of a RAID 5 array having less than 3 or more than 8 drives. Also, RAID 5 is not supported by Windows 98 or ME, or 3ware's 5000 series storage controllers.

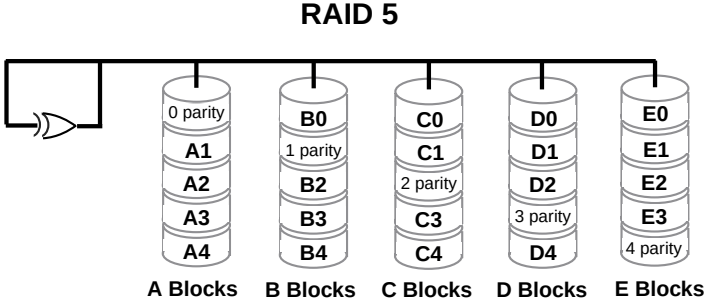



**Figure 4. RAID 5 Configuration Example**

### TwinStor‘ Technology adds performance to 3ware’s mirrored disk arrays

Traditional mirroring techniques do little to improve performance. The adaptive algorithms found in 3ware’s TwinStor technology boost performance by distinguishing between random and sequential read requests. For the sequential requests generated when accessing large files, both drives are used, with the heads simultaneously reading alternating sections of the file. For the smaller random transactions, the data is read from a single optimal drive head.

Drives can be dynamically profiled, specifically for your brand of drive, during installation to customize the stripe size (for RAID configurations offering variable striping) and seek algorithms.

### Configure and manage your disk arrays

The **3ware Disk Array Configuration Utility** is a BIOS level tool for creating, deleting, maintaining disk arrays, and rebuilding mirrored arrays. From the **3DM Disk Array Configuration Utility**, you can also specify hot spares from available drives to be dynamically substituted for a failed drive in a mirrored array. Refer to the *3ware Disk Array Configuration Utility* chapter.

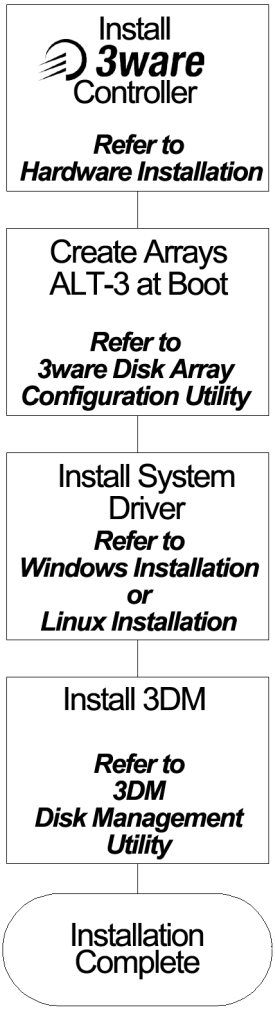
**3DM Disk Management Utility** is supported by Self-Monitoring, Analysis, and Reporting Technology (SMART). SMART adds monitoring and troubleshooting functionality by automatically checking a disk drive's health and reporting potential problems. It allows you to take proactive actions to prevent impending disk crashes.

**3DM Disk Management Utility** runs in the background on the 3ware storage controller’s host and allows you to monitor the storage controller and rebuild mirrored arrays remotely via a standard web browser. To remotely access 3DM, you are not required to install any software on your system but you must have access to the network with the 3ware storage controller. 3DM supports hot spare

and hot swap for mirrored arrays. Hot swap allows users to replace a failed drive in a mirrored array while the system remains up. Refer to the *3DM Disk Management Utility* chapter.

To create, delete, or verify arrays, you must use the **3ware Disk Array Configuration Utility**. To check array configuration or status, disable write cache, select a hot spare, or rebuild a mirrored array, you can use the **3ware Disk Array Configuration Utility** at BIOS time or **3DM Disk Management Utility** in real time. Hot swap is only available through the **3DM Disk Management Utility.**

# Quick Install Guide



### Step 1. Install the 3ware Controller

Install the 2, 4, or, 8 port 3ware controller board in an available PCI slot. Slots closest to the Accelerated Graphics Port give the best performance. The blue end of the ribbon interface cable must be connected to the 3ware controller and the black end must be connected to the drive.

### Step 2. Create Arrays

Verify your boot device precedes the 3ware storage controller in the boot sequence, then **ALT-3** to activate the **3ware Disk Array Configuration Utility** at boot time. Specify RAID arrays and hot spares.

### Step 3. Install System Drivers

The 3ware controller drivers must be installed according to the type of installation and the operating system.

Installations include:

- Installing the controller while installing the operating system.
- Installing the controller on systems that boot from a different device.
- Replacing an existing controller with a new version of the controller.

Operating systems supporting the 3ware controller include:

- Windows NT 4.0
- Windows 98 SE or Me, except RAID 5 configurations
- Windows 2000
- Red Hat Linux 6.1, 6.2 or 7.0
- SuSE Linux 6.3 or 6.4

## Step 4. Install 3DM

Install 3DM for Windows or Linux from the 3DM installation CD-ROM.

### Windows

**a:\setup** from **Run...** in the **Start** menu.

### Linux

**mount -t msdos /dev/fd0 /mnt**
**cd /mnt**
**./install.3dm**
Answer questions concerning email notification and the port number for WEB monitoring.
**cd /**
**umount /mnt**

# Hardware Installation

Figure 5 shows ports and connectors on the the Escalade Storage Controller Board.

**Warning:** Before proceeding with hardware installation, read the **Before You Begin** section completely describing personal and system precautions. Failing to do so may result in personal injury or damage to your computer or the 3ware storage controller.

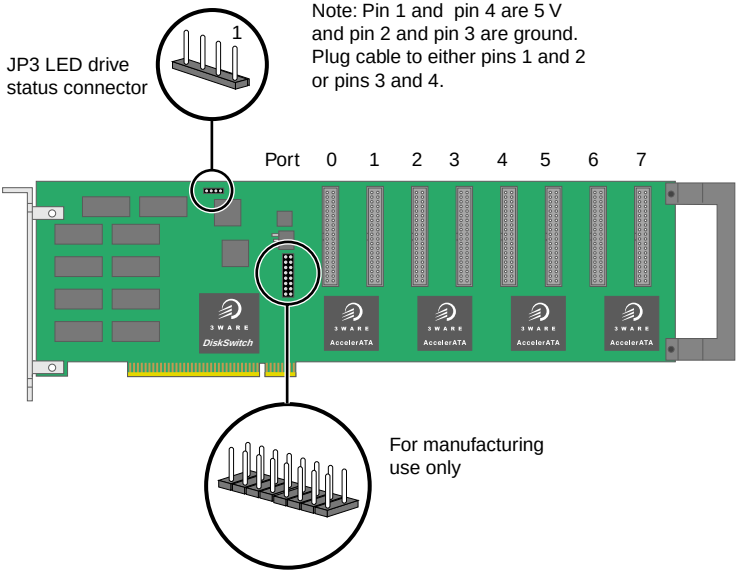



**Figure 5. 3ware 8 Port Storage Controller Assembly Drawing**

## To remove an existing 3ware card

1 Unplug the machine from its power source before removing or installing any hardware.

2 Disconnect the disks from the existing 3ware card installed in your system. If your boot disk is connected to the card and you intend to retain it as your boot device, note or mark which physical disk is connected to slot 0 on the board. This disk should be reconnected to slot 0 on the new version of the card. Preserving the slot order of how the other drives are connected is unimportant, even if the disks are part of a disk array, although it is recommended that a plug-to-plug replacement is followed.

3 Remove the screw in the metal bracket at the end of the old card. Save the screw for installing the new card.

4 Gently remove the card from the PCI slot.

5 Remove the cables from the card, and set it aside.

## Connect the interface cables to the controller

1 Connect the interface cables supplied with the product to the board.

2 One edge of each interface cable should have a colored (usually red) line denoting the conductor to Pin 1. Align the connector so that the colored line is toward the top edge of the board. Mate the connectors carefully without bending any pins.

**Note: Ultra ATA/66 drives require 40-pin, 80-conductor ribbon cables.** These cables have color coded ends. The blue end must be connected to the 3ware storage controller and the black end must be connected to the hard drive or performance will be degraded.

3 Install the other connectors in the same manner.

## Install the controller card in the computer

1 If the computer is running, shut it down. Turn off power to the computer and disconnect the power cord from the outlet.

2 Open the computer case according to the manufacturer's instructions.

3 Find the PCI slot you want to use for the storage controller board.

**Hint:** Cable routing may be easier if you install the board next to an open slot.

4 Remove the metal filler bracket for the slot. Save this screw; it will be used to secure the card after you have seated it.

**Hint:** While the storage controller runs properly in any PCI slot, not all slots give equal performance due to the architecture of the PCI bus. In our laboratories, we have noticed that the slots closest to the Accelerated Graphics Port (AGP) typically give the best performance.

5 Line the card up so that all pins make proper contact with the PCI slot pins when pushed into place. The black end rail, opposite the metal bracket, may be removed if needed to fit the card inside the chassis. The short 4-port storage controller card is keyed to ensure proper installation in a full-sized PCI slot.

6 Ensure that the contacts will mate with both grooves in the slot. Press down gently on the edge of the card directly above the slot until the card is fully seated.

7 Verify that the card's metal bracket fills the hole in the case, then secure the bracket with the screw that was formerly used to secure the chassis' filler bracket.

## Connect the drives to the interface cables

1 Be sure to use the supplied cables. With the higher speeds of Ultra ATA/66 and Ultra ATA/33, using quality cables is important.

2 Before connecting your drives, check your drives' jumper setting. The range of settings provided vary by manufacturer as do the method for adjusting them. Refer to information provided with your drives for the method required to set them. To operate properly, the storage controller requires that drives be set as **Single** (if available on your drive) or **Master** otherwise.

3 If your drives are not already installed into the computer chassis, do so now. Be sure that the drives are connected to the power supply. Y-splitter power supply connectors are included in some kits in case you need additional power supply connections.

4 For each drive, select a black end of an interface cable not connected to the board and plug it into the drive. The cable's colored edge denoting Pin 1 should be adjacent to the 4-pin power plug.

## Check your installation and close the case

1 After all of the drives are connected to the storage controller and the card is installed in its slot, verify that the cables do not interfere with the operation of any other components in the case or block the flow of cooling air.

2 Close the case and reconnect the power cables.

## Check motherboard boot sequence

Using your computer's Setup utility, ensure that your boot device precedes the 3ware storage controller in the boot sequence. If you have other disks installed on the mother board, the storage controller precedes them in boot order.

# 3ware Disk Array Configuration Utility

The 3ware Disk Array Configuration Utility allows you to create disk arrays by combining disks, deleting disks or breaking disk arrays back into their member disks. You can also specify an available drive as a hot spare. If an array becomes degraded, the hot spare will automatically be substituted for the faulted drive.

**Note:** If no drives are attached to the storage controller the BIOS will not be installed. The storage controller shares one IRQ on the PCI bus.

## Invoking the 3ware BIOS tool

Reboot your system. During the boot phase, wait until you see a message similar to the following:

```
3ware Storage Controller BIOS X.xx

  Port 0 QUANTUM FIREBALLP LM30 30.0 GB
  Port 1 QUANTUM FIREBALLP LM30 30.0 GB
  Port 2 QUANTUM FIREBALLP LM30 30.0 GB
  Port 3 QUANTUM FIREBALLP LM30 30.0 GB

... Press <Alt-3> to access 3ware Configuration Screen ...
```

Press **ALT-3** immediately to bring up the **3ware Disk Array Configuration** display.

## Exiting the 3ware BIOS tool

To save your configuration modifications, hit the **F8** key. After you have hit the **F8** key to commit your changes, a list of affected drives will be displayed and you will be asked to confirm your configuration. The booting process will resume. If you have selected mirrored arrays, after the operating system is running, the storage controller board will automatically run a background initialization to verify that both disks in the arrays are identical.

To exit the 3ware Disk Array Configuration Utility without saving your changes, hit **ESC**.

## Determining your configuration

**Caution:** Configuring a disk array writes format-type data onto its member disks and overwrites all the files on those disks. Back up data that requires retention.

With a 2 port 3ware storage controller you are limited to a two-drive JBOD (Just a Bunch of Disks) or a single two-drive array. With a 4 port 3ware storage controller, you can combine from two to four disks into a single array. With four disks, you can create a four drive RAID 0 array, two RAID 1 arrays, one RAID 5 array, or one RAID 10 array.

Using the 8 port 3ware storage controller, the 4 port configuration can be duplicated. In addition, you may also create a five, six, seven, or eight drive RAID 0 or RAID 5 array.

**Note:** 3ware's 5000 series storage controllers do not support RAID 5 configurations.

The **3ware Disk Array Configuration** main display shows the current disk drive configuration.

- **Available Drives** reports independent drives (JBOD), not associated with an array.
- **Disk Arrays** lists any existing arrays along with their member disks and hot spares.

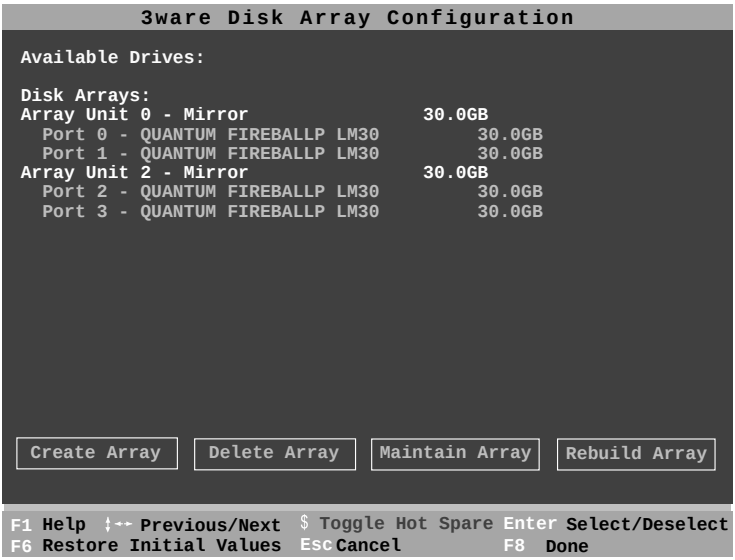



**Figure 6. Disk Array Configuration Main Display, RAID 1 Example Shown**

Throughout the utility (see Figure 6), use the **Up and Down** arrow keys to navigate, **Enter** to select the disks or buttons, and **F1** for context sensitive help. **Toggle Hot Spare** verbiage is black when the cursor is over a drive that can be specified as a hot spare and gray when hot spare cannot be specified. If you've made mistakes and want to start over, **F6** will return your starting values. **Escape** will exit the configuration utility as well as abandon your changes. **F8** will save your changes and exit the utility.

## Creating a disk array

To create an array, first select the drives to be included by navigating the cursor over each drive and pressing **Enter**. (See Figure 7.) An asterisk in the left most column indicates the drive is selected. You may include from two to eight drives in the array by selecting drives from the **Available Drives** section. To include drives that are part of an existing disk array, you must delete that array first.

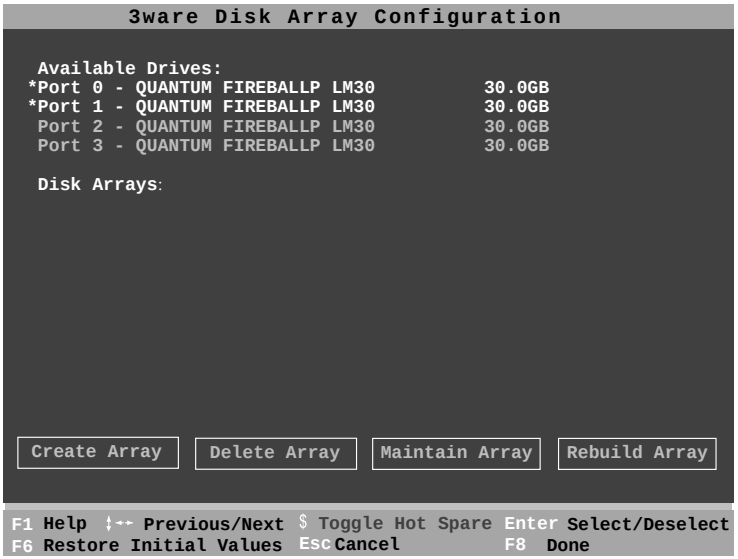



**Figure 7. Selecting Drives for a Mirrored Array**

**Hint:** To maximize disk space, include only drives of equal capacity. The capacity of each drive is limited to the capacity of the smallest drive in the array. The array must also be configured only with equivalent drives.

total capacity of the array = (number of drives in the array) X
(capacity of smallest drive in the array)

After selecting all the drives for the array, navigate to the **Create Array** button. Hit **Enter** to bring up the **Create Disk Array** display (see Figure 8 and Figure 9 for examples). Check that the proper drives are listed.


**Figure 8. Create Disk Array Display, RAID 0 Example**

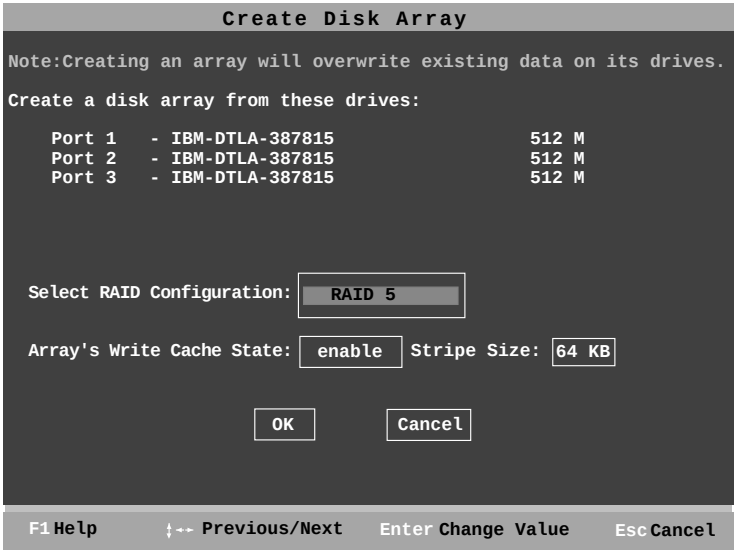



**Figure 9. Create Disk Array Display, RAID 5 Example**

### Select RAID configuration

The 3ware storage controllers give you a choice of four RAID configurations. Select one.

- Stripe (RAID 0): maximizes performance and capacity through a process called striping. High performance arrays write portions of a single file across multiple drives. There is no fault tolerance.
- Mirror (RAID 1): duplicate or "mirror" the data on both drives. No data will be lost if one of the drives fails.
- RAID 10: combine mirroring and striping, providing both fault tolerance and high performance. **RAID 10 arrays use a minimum of four drives.** Configurations consist of 4, 6, or 8 drives.
- RAID 5: combines parity data and striping, providing fault tolerance, high capacity, and high storage efficiency. The parity data is distributed across all drives, rather than being concentrated on a single disk, to avoid throughput loss due to corrections for the

parity drive. **RAID 5 arrays requre a minimum of three drives and are not supported by 3ware's 5000 series storage controllers.** Configurations consist of 3, 4, 5, 6, 7, or 8 drives.

### For RAID 5 Array, initialize using BIOS

Because of the Read-Modify-Write operations, you must first write zeros to all drives in the array before the array is functional. The screen, shown in Figure 10, appears after selecting **Create Array**.

If the write-zeros operation is aborted by the user for any reason, the unit will go into initializing mode when restarted. Initializing scans the entire array to verify the parity. If coherency problems appear, the parity will be corrected to match the data found on that stripe.

**Caution:** When running in initializing mode, the array is not redundant. You cannot remove any drive.

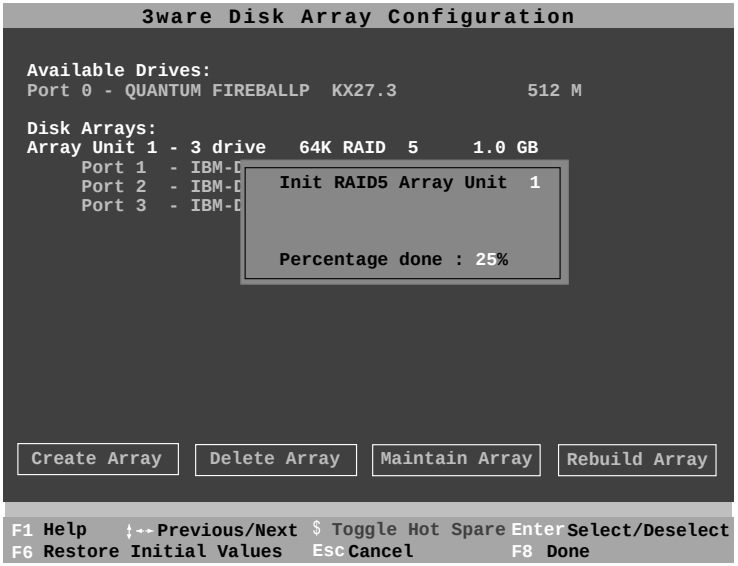



**Figure 10. BIOS Initialization Screen for RAID 5**

### Select striping size

For a RAID 1 or RAID 10 configuration, select the striping size. Sizes of 64K, 128K, 256K, 512K, or 1M are selected using the **Strip Size** box, shown in Figure 8. RAID 5 only allows a 64K stripe size.

### Select write cache properties

The 3ware storage controllers give you a choice of disabling the write cache for your disk arrays. Write cache is used to store data locally on the drive before it is written to the disk, allowing the computer to continue with its next task. Enabling the write cache results in the most efficient access times for your computer system. There may be instances, however, when you always want the computer to wait for the drive to write all the data to disk before going on to its next task. For this case, you must disable the write cache.

To disable the write cache, select **not in use** from the array's **Write Cache State** selection. The default for **Write Cache State** is **in use.**

### Confirm array configuration

Select the **OK** button to confirm creating the array, or **Cancel** to reject it. The array is not actually created and no data will be overwritten until you have finished making all your changes and select the **F8** key.

## Specifying a hot spare

3ware storage controllers give you the option to specify a hot spare from one of your **Available Drives.** If a hot spare is specified and the mirror degrades, an event notification will be generated. The hot spare will dynamically replace the failed drive in a mirrored array without user intervention. Select a hot spare by navigating to an **Available Drive.** The **Toggle Hot Spare** verbiage at the bottom of the screen will be black if the drive can be used as a hot spare. Enter **S** to select the hot spare.

**Note:** Hot spare drives need to have the same or larger storage capacity than the Raid 1 or Raid 10 drives.

## Changing an existing configuration

1 Back up any disk arrays that contain data that you want to retain before the configuration change.

2 Create new disk arrays following the instructions in the **Determining your configuration, Creating a disk array,** and **Deleting a disk array** sections. Note that you may need to delete existing arrays to free up disks first.

3 Partition and format any new disk arrays and free disk.

4 When you are finished configuring, restore from backup any data saved from previous disk arrays

## Modifying a disk array

To modify an existing array, you must first delete it, then re-create it with the new drives. As with all disk array operations, there is no way to modify an existing array without overwriting data on the drives involved.

## Deleting a disk array

To delete an array (see Figure 11), first select the array by navigating to it and hitting **Enter**. An asterisk in the left most column indicates the array is selected.

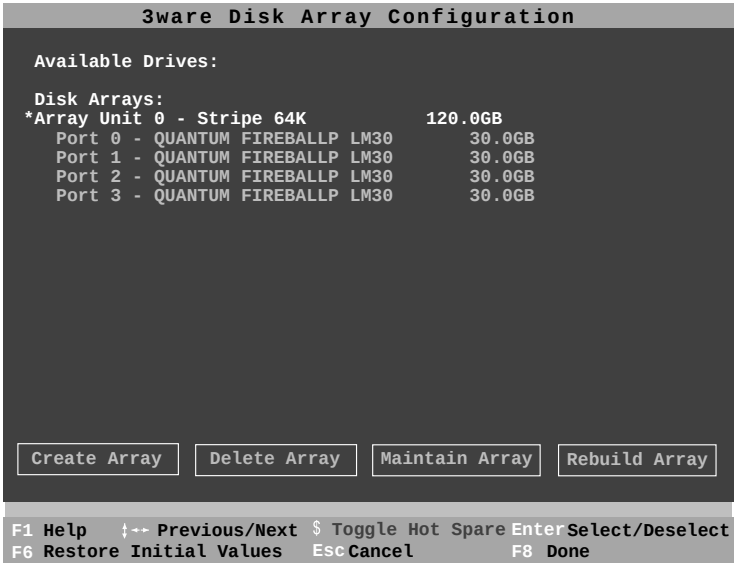



**Figure 11. Delete Disk Array Display**

Navigate to the **Delete Array** button and hit **Enter** to bring up the **Delete Disk Array** display. Check that the correct drives are listed. Select the **OK** key to confirm deleting the array, or **Cancel** to reject it. Recall that the array is not actually deleted and no data will be overwritten until you have finished making all your changes and selected the **F8** key.

### How to maintain or verify a disk array

The **Maintain Disk Array** display (see Figure 12) shows the current disk array configurations that you have selected. **Write Cache State** can be changed. Refer to **Select write cache properties** paragraph in the **Creating a disk array. Verify Array** can be specified as **no** or **yes**. The default is **no**. **Yes** launches a foreground process that compares the two drives of a Raid 1 or Raid 10 (mirrored) array, sector by sector. If the verify array process determines that the drives are not identical, the mirror is degraded and the rebuild process is launched.

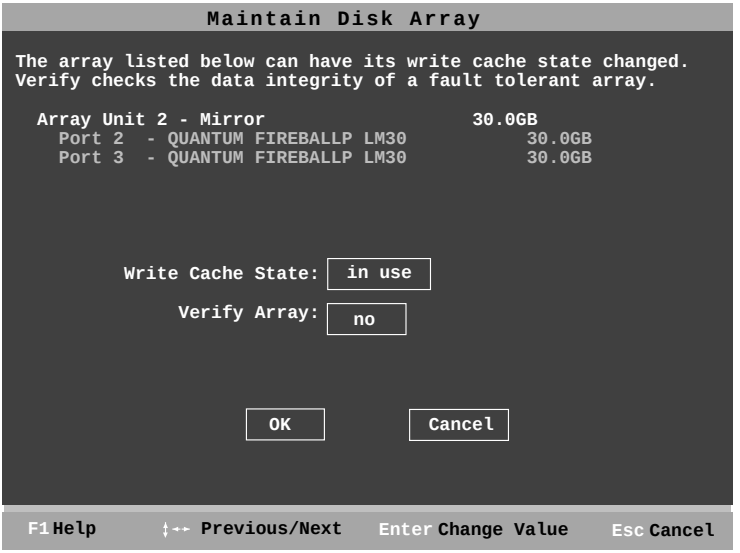



**Figure 12. Maintain Disk Array Display**

## Rebuilding a mirrored disk array

3ware storage controllers allow you to create fault tolerant disk arrays by selecting a mirrored RAID 1 or RAID 10 array. These disk arrays store identical data on two or more drives to protect against drive failure. If one or more of the drives of a mirrored array is removed, unplugged, or fails on read or write requests, the array is marked as **DEGRADED** and the drive is marked as **Not In Use.** (See Figure 13 and Figure 14.)

You can still read and write data from a degraded disk array, but the array will not be fault tolerant until it is rebuilt using the Rebuild feature, described in the *3ware Disk Array Configuration Utility* or *3DM Disk Management Utility* chapters.

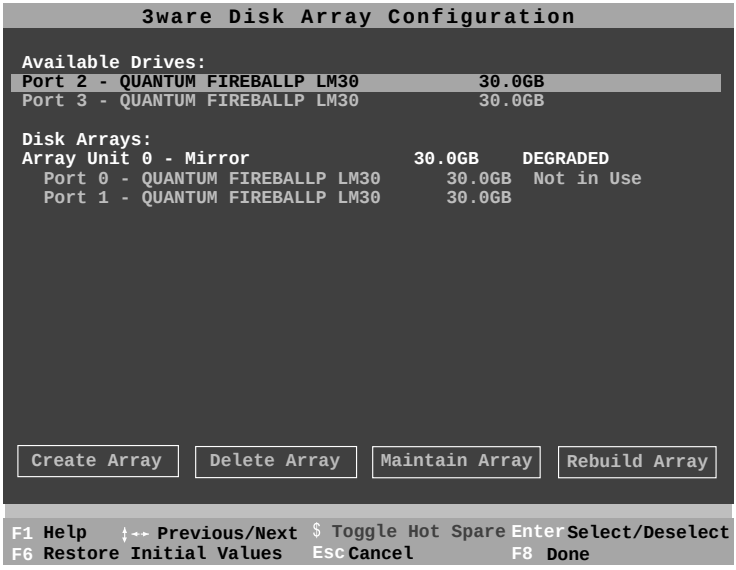



**Figure 13. Degraded RAID 1 Array Drive When Not in Use**

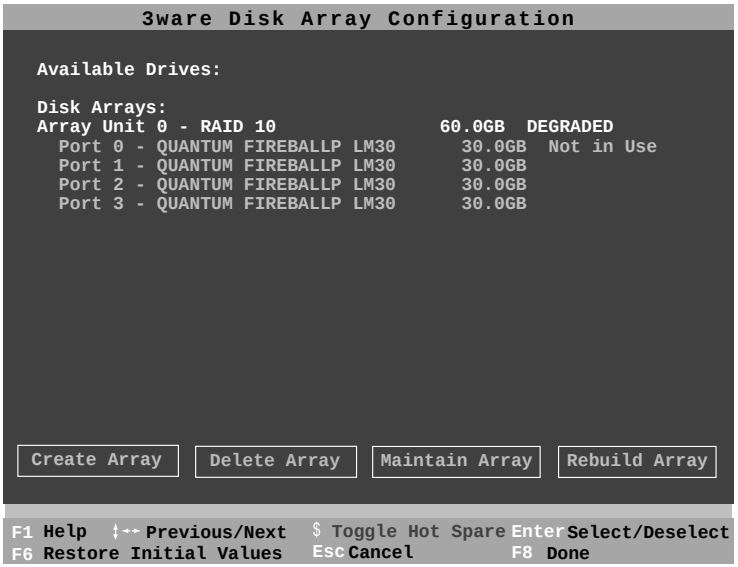



**Figure 14. Degraded RAID 10 Array Drive When Not in Use**

**Note:** A RAID 10 array can be configured with either 4, 6, or 8 disks. In a 4-drive configuration, up to two drives can be rebuilt. In a 6-drive configuration, up to three drives can be rebuilt. In an 8-drive configuration, up to four drives can be rebuilt.

## Rebuilding a RAID 5 disk array

3ware storage controllers allow you to create fault tolerant RAID 5 disk arrays. These disk arrays achieve fault tolerance by using a simple (exclusive OR) function to generate the parity data that is distributed on all drives. If one of the drives is removed, unplugged, or fails on read or write requests, the array is marked as **DEGRADED** and the drive is marked as **Not In Use.** (See Figure 15.) When running in Degraded mode, the missing data is reconstructed from all non-degraded drives.

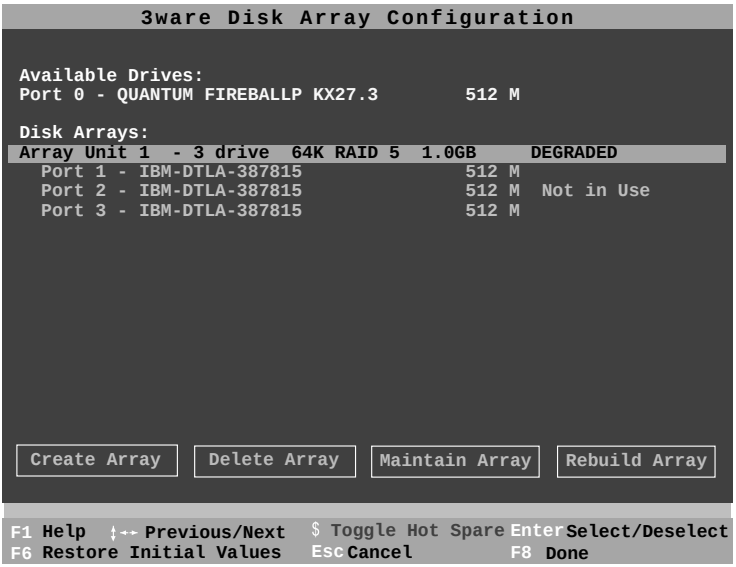



**Figure 15. Degraded RAID 5 Array Drive When Not in Use**

As in the case of RAID 1 and 10 arrays, RAID 5 arrays allow you to read and write data from a degraded disk array, but the array will not be fault tolerant until it is rebuilt using the Rebuild feature, described in the *3ware Disk Array Configuration Utility* or *3DM Disk Management Utility* chapters.

### Rebuilding a mirrored or RAID 5 array with no hot spare

1 Reboot the system and enter the **Disk Array Configuration Utility**.

2 If your mirrored or RAID 5 array has a **Not in Use** member drive, the drive may still be usable. Try rebuilding with the **Not in Use** drive intact. Simply select the array and then the **Rebuild** button.

3 Confirm that you selected the correct array by hitting **OK** in the **Rebuild** confirmation display.

4 Select **F8** to exit the **Disk Array Configuration Utility**. The array will begin rebuilding after completion of the operating system load.

5 If the rebuild fails and you have no **Available Drives**, you must replace the drive and restart the rebuild process with the new drive. If the rebuild process fails and you have **Available Drives**, reboot the system and enter the **Disk Array Configuration Utility**.

6 Select an available drive to replace the faulted drive in the array by navigating the cursor over the available drive and hitting **Enter.** (See Figure 16.) An asterisk in the left most column indicates the drive is selected.

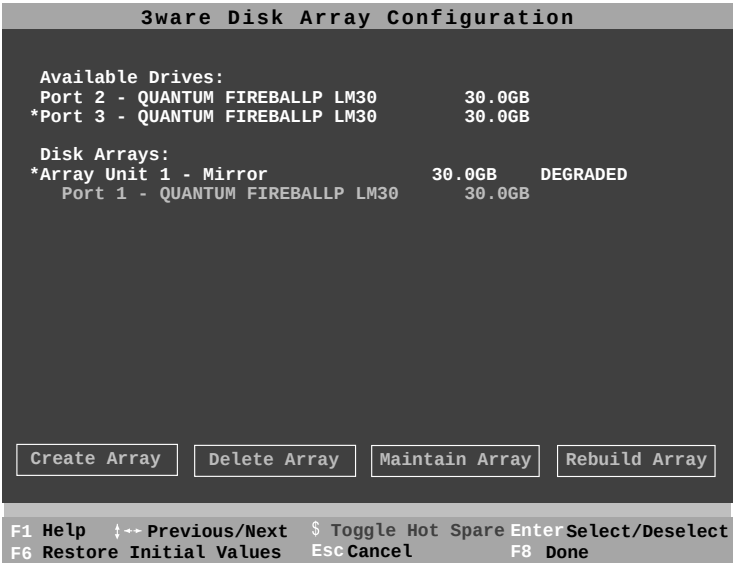



**Figure 16. Select Available Drive to Replace Faulted Drive, RAID 1 Example**

7 Navigate to the **Rebuild Array** button and press **Enter** (see Figure 17). A status screen will be displayed with your requested array and member drives.

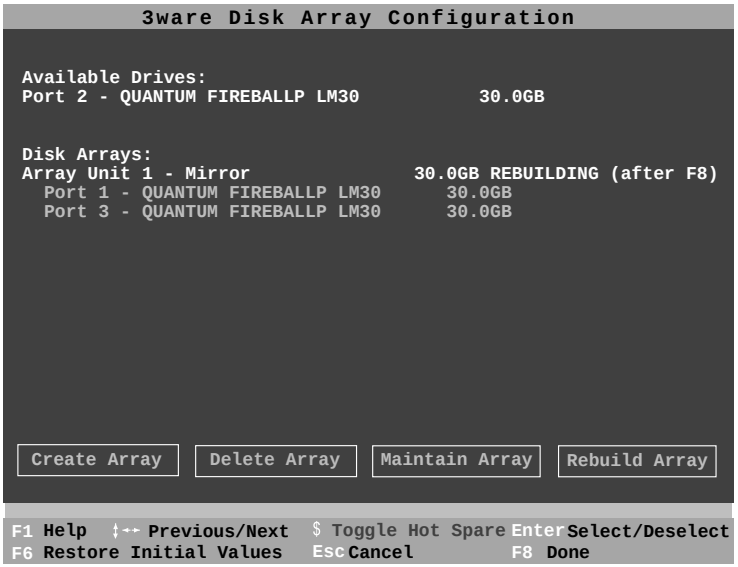



**Figure 17. Rebuild Array Status Display, RAID 1 Example**

8 Press **F8** to rebuild**.** The rebuild confirmation screen will be displayed (see Figure 18).

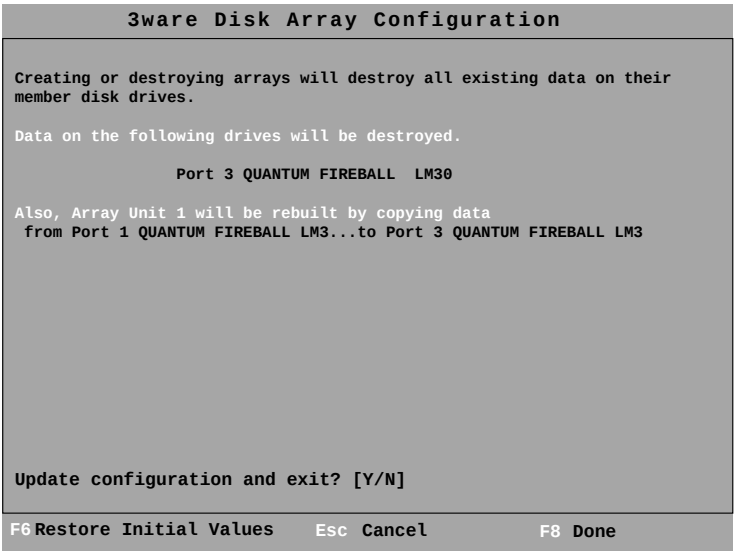



**Figure 18. Rebuild Confirmation Display**

9 Enter **Y** to update configurations and exit.

### Auto rebuild of a mirrored or RAID 5 array

If a hot spare is specified and the mirrored or RAID 5 array degrades, an event notification is generated and the hot spare dynamically replaces the failed drive in the array without user intervention. Rebuild will automatically be launched as background process and an event notification will notify the user when the rebuild process is complete.

### Auto rebuild on power failure

During driver startup, 3ware's auto rebuild feature sets a flag indicating that the driver loaded. Upon an orderly shutdown, the flag is rewritten, indicating a clean shutdown. During the next system power cycle, the firmware queries the flag. For a RAID 1 configuration, if there was a problem, the firmware degrades the secondary drive in the array and starts the background rebuild of the mirrored drive. When the rebuild is complete, the two halves of the mirror will be resynchronized. For a RAID 5 configuration, if there is a problem, the firmware starts the background verification that checks that the parity matches the data.

# Windows Installation

**Note:** If you haven't yet installed the hardware, return to the **Hardware Installation** section. The hardware must be installed before you can configure the 3ware storage controller.

# Windows NT®4.0 Installation

The 3ware storage controller may be configured to be your system's boot device, or you can use another device, such as a disk attached to the motherboard as your boot device. Use your system's Setup utility to set the boot order according to how you install your operating system.

If Windows NT has not been installed on the system, follow the instructions in either of the following sections (note: use of a boot floppy diskette may be required by some systems):
**Installing the controller and Windows NT 4.0** (page 41).
**Installing the controller and Windows NT 4.0 when using the boot diskettes** (page 45).

If you are installing the storage controller on a system that already has Windows NT installed on a drive connected to another storage controller, follow the instructions in:
**Installing the controller on systems that boot from a different device** (page 49).

If you are replacing an installed 3ware storage controller with a newer 3ware storage controller, follow the instructions in **Replacing an existing controller with a new version of the controller** (page 51).

**Note:** Windows NT 4.0 driver requires Service Pack 4 or later. Also, you cannot install the driver or the operating system unless you have administrator privileges for your system.

# Installing the controller and Windows NT 4.0

**Materials required:**

- Windows NT 4.0 installation CD-ROM
- 3ware CD-ROM
- 3ware Windows driver installation diskette

## Has your boot drive been partitioned?

Microsoft  Windows NT 4.0 Setup occasionally has problems installing on drives that have not been partitioned. If you are having trouble, you may need to create a partition on the drive where you plan to install Windows NT 4.0.

1 Use the **FDISK** DOS utility to get your disk partitioned and ready for installation quickly:

2 Boot MS-DOS and use **FDISK** to create a partition on the boot drive. The partition does not need to be formatted or made active. With **FDISK** you are limited to 4 GB for your boot partition. If you need a larger boot space, create a single small (e.g., 100 MB) partition, then adjust the size during Windows NT 4.0 Setup.

## Boot the system

Insert the Windows NT 4.0 CD-ROM into the CD-ROM drive.

## Create disk arrays

Refer to the *3ware Disk Array Configuration Utility* chapter**.**

## Continue with Windows NT 4.0 installation

1 When **Setup is Inspecting Your Computer Hardware Configuration** is displayed, press **F6** immediately.

2 You will see a **Windows NT 4.0 Setup** display.

3 Press **S** to specify that you will be installing an additional mass storage device. On the display that follows, select **Other** and press **Enter.**

### Install the driver using the 3ware diskette

1 You will be asked to insert a manufacturer-supplied hardware support disk. Insert the 3ware Windows driver installation diskette into the floppy drive and press **Enter**. DO NOT use the diskette labeled specifically for Windows NT driver installation.
2 Select the **3ware Storage Controller** from the display that appears and press **Enter** again. Ensure the path to this driver is correct in **Copy manufacturer's files from:** at the bottom of the box. To do this, type A:\winnt
3 After the driver is loaded from the diskette, you will receive the message "Setup has recognized the following mass storage devices in your computer:" The list will contain the **3ware Storage Controller**. If it does not appear, you must check the hardware and restart this software installation. Otherwise, press **Enter**.

### Partition device 0 to create a boot area

1 Follow the displayed instructions for Windows NT 4.0 installation as directed until the following message appears "The list below shows existing partitions and spaces available for creating partitions**."**
2 The partitions list should contain an entry for your 3ware storage controller that resembles the following: **4111 MB Disk 0 at Id 0 on bus 0 on 3waregsm**. If it does not include a 3ware entry, check your hardware and restart the software installation process.
3 Create a partition in the unpartitioned space of device 0 for installing Windows NT 4.0. Keep in mind that the space available in a disk array is often larger than is allowed in a single partition. Format the partition as desired with FAT or NTFS.

### Follow display instructions to complete Windows NT 4.0 installation

1 Continue with the normal Windows NT 4.0 installation.

2 Log in as administrator. You should see a brief splash screen (see Figure 19) followed immediately by an **Installation Complete** notification (see Figure 20).

3 Partition and format any new disk arrays or independent disks using **Disk Administrator** in the remaining steps:

   a From the **Start** menu, choose **Programs.**

   b From the **Programs** menu, choose **Administrative Tools.**

   c From the **Administrative Tools** menu, choose **Disk Administrator.**


**Figure 19. Controller Quick-Splash Screen**


**Figure 20. Installation Complete Notification**

### Install the 3DM disk management utility

Refer to *3DM Disk Management Utility* chapter.

# Installing the controller and Windows NT 4.0 when using the boot diskettes

### Materials required:

- Windows NT 4.0 boot installation diskettes (3)
- Windows NT 4.0 installation CD-ROM
- 3ware Windows NT 4.0 driver installation diskette
- 3ware CD-ROM

**Note:** This installation procedure uses Windows NT 4.0 diskettes in addition to the Windows NT 4.0 CD-ROM. Other installation methods should work, but be sure to detect the board and to install the driver at the appropriate time.

## Has your boot drive been partitioned?

Microsoft Windows NT 4.0 Setup occasionally has problems installing on drives that have not been partitioned. If you are having trouble, you may need to create a partition on the drive where you plan to install Windows NT 4.0.

1 Use the **FDISK** DOS utility to get your disk partitioned and ready for installation quickly:

2 Boot MS-DOS and use **FDISK** to create a partition on the boot drive. The partition does not need to be formatted or made active. With **FDISK** you are limited to 4 GB for your boot partition. If you need a larger boot space, create a single small (e.g. 100 MB) partition, then adjust the size during Windows NT 4.0 Setup.

## Boot the system

Insert Windows NT 4.0 Setup Disk #1 into the floppy drive.

### Create disk arrays

Refer to *3ware Disk Array Configuration Utility* chapter.

### Continue with Windows NT 4.0 installation

Insert the other diskettes into the floppy drive as requested until you get to the **Welcome to Setup** display.

1 When the **Welcome to Setup** display appears, Press **Enter** to begin the setup process. You will be asked whether you want to detect mass storage devices. Signify "yes" by pressing **Enter**.

2 Insert any other Windows NT 4.0 diskettes into the floppy drive as requested until you get to **Setup has recognized the following mass storages devices**. This indicates that mass storage device detection is complete.

3 Press **S** to specify that you will be installing an additional mass storage device. On the display that follows, select **Other** and press **Enter.**

### Install the driver using the 3ware diskette

1 You will be asked to insert a manufacturer-supplied hardware support disk. You MUST use the diskette labeled as the 3ware Windows NT driver installation diskette for this step. Insert the diskette into the floppy drive and press **Enter**.

2 Select the **3ware Storage Controller** from the display that appears and press **Enter** again.

3 After the driver is loaded from the diskette, you will receive the message "Setup has recognized the following mass storage devices in your computer:" The list will contain the **3ware Storage Controller**. If it does not appear, you must check the hardware and restart this software installation. Otherwise, press **Enter**.

### Partition device 0 to create a boot area

1 Follow the displayed instructions for Windows NT 4.0 installation as directed until you are shown: “The list below shows existing partitions and spaces available for creating partitions.”
2 The partitions list should contain an entry for your 3ware storage controller that resembles the following: **4111 MB Disk 0 at Id 0 on bus 0 on 3waregsm**. If it does not include a 3ware entry, check your hardware and restart the software installation process.
3 Create a partition in the unpartitioned space of device 0 for installing Windows NT 4.0. Keep in mind that the space available in a disk array is often larger than is allowed in a single partition. Format the partition as desired with FAT or NTFS.
4 Insert the Windows NT 4.0 installation CD-ROM and continue to the next section.

### Follow display instructions to complete Windows NT 4.0 installation

1 Continue with the normal Windows NT 4.0 installation.
2 Log in at the administrator level and wait for the system to reboot.
3 Insert the 3ware Windows NT 4.0 driver installation diskette.
4 Select **Start** then **Run**. In the dialog box that appears, type: A:\setup.exe
5 Press **OK**. A brief splash screen (Figure 19) appears, followed immediately by an **Installation Complete notification** (Figure 20).
6 Partition and format any new disk arrays or independent disks using **Disk Administrator** in the remaining steps:
   a From the **Start** menu, choose **Programs.**
   b From the **Programs** menu, choose **Administrative Tools.**

c From **Administrative Tools**, choose **Disk Administrator.**

# Installing the controller on systems that boot from a different device

**Materials required:**

- 3ware Windows driver installation diskette
- 3ware CD-ROM

## Create disk arrays

Refer to *3ware Disk Array Configuration Utility* chapter.

## Install the 3ware driver

1 When the system finishes booting, log in as system administrator.
2 Go to the **Start** menu, click on **Settings**, and open the **Control Panel** window.
3 From the **Control Panel** window, open **SCSI Adapters**.
4 Click on the **Drivers** tab in SCSI Adapters.
5 Follow the instructions in the *Install/Update 3ware driver* section (page 52) to continue.

## Reboot the machine

1 Remove the driver diskette, then select **Yes** to restart the system. If you don't remove the diskette, the system may not boot.
2 Log in as system administrator. You should see a brief splash screen (see Figure 19) followed immediately by an **Installation Complete** notification (see Figure 20).
3 Partition and format any new disk arrays or independent disks using **Disk Administrator** in the remaining steps:
   a From the **Start** menu, choose **Programs.**
   b From the **Programs** menu, choose **Administrative Tools.**
   c From the **Administrative Tools** menu, choose **Disk Administrator.**

### Install the 3DM disk management utility

Refer to *3DM Disk Management Utility* chapter.

# Replacing an existing controller with a new version of the controller

**Caution:** Install the new version of the driver **before** installing the new controller board. Your computer system will not boot with the new version of the controller unless the new version of the driver has been installed first.

**Note:** Upgrading to a new version of the 3ware storage controller does not require reconfiguring the drives connected to your controller and will not affect data stored in your disk arrays for this and previous versions.

## Update the 3ware driver

1 Log in to your system as system administrator.

2 Go to the **Start** menu, click on **Settings**, and open the **Control Panel** window.

3 From the **Control Panel** window, open **SCSI Adapters**.

4 Click on the **Drivers** tab in SCSI Adapters.

5 Click on the **Remove** button to remove the current driver. (See Figure 21.)

6 Follow the instructions in the *Install/Update 3ware driver* section (page 52) to continue.

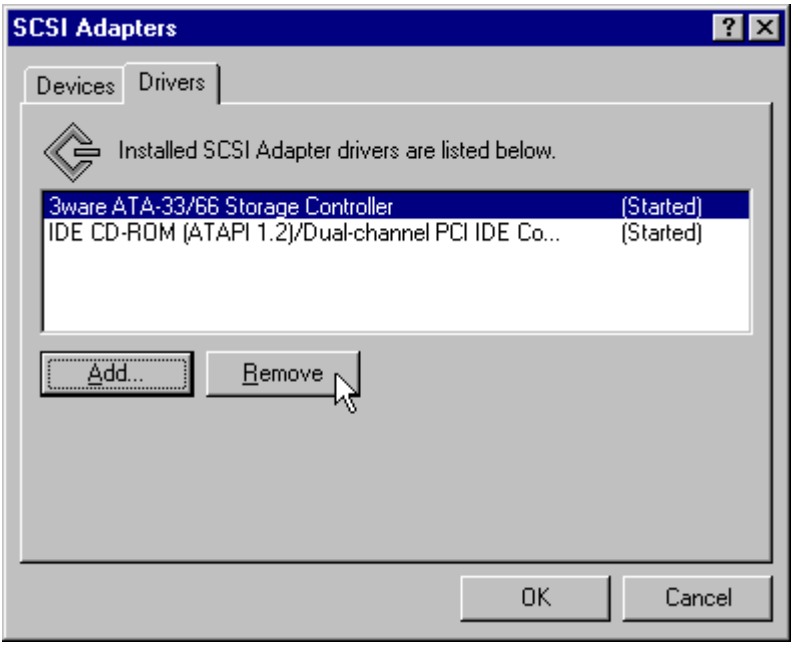



**Figure 21. Remove Current Driver**

## Install/Update the 3ware driver

1 Click on the **Add…** button. (See Figure 21.) The **Install Driver** dialog appears. (See Figure 22.)

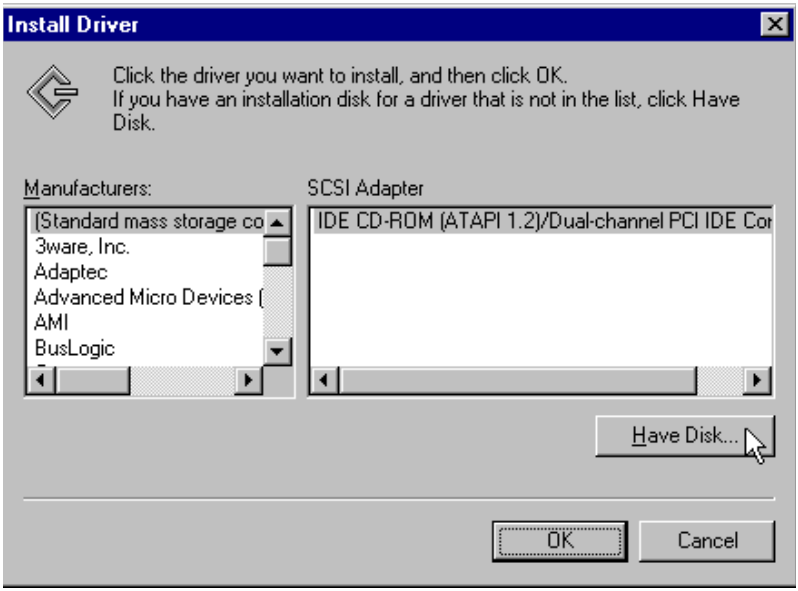



**Figure 22. Install Driver**

2 Click on the **Have Disk…** button. The **Install from Disk** (Figure 23) dialog appears. Insert the 3ware driver installation diskette. DO NOT use the special diskette labeled specifically for Windows NT driver installation.

3 Ensure that the path name is correct in **Copy manufacturer's files from:** at the bottom of the box. To do this, type A:\winnt

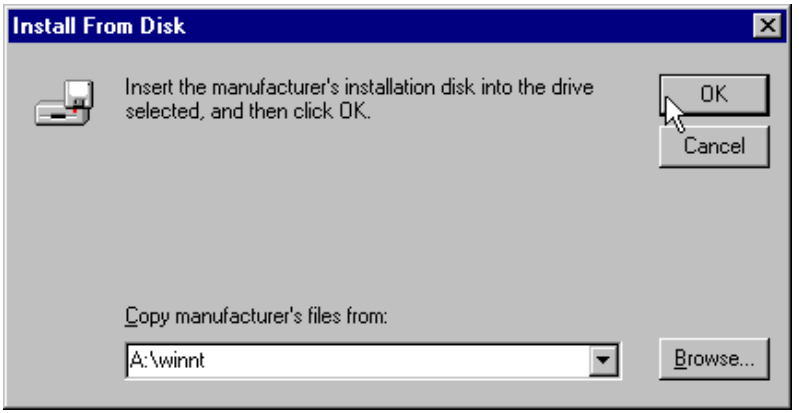



**Figure 23. Install from Disk**

4 The **Install Driver** (Figure 24) dialog box appears. Click on the **3ware Storage Controller** listed in the dialog box to highlight it, then click on **OK**. Be sure to select the correct controller listed, otherwise the driver update will not be successful. A progress bar appears briefly, followed by a **System Settings Change** dialog.

5 Shutdown your system.

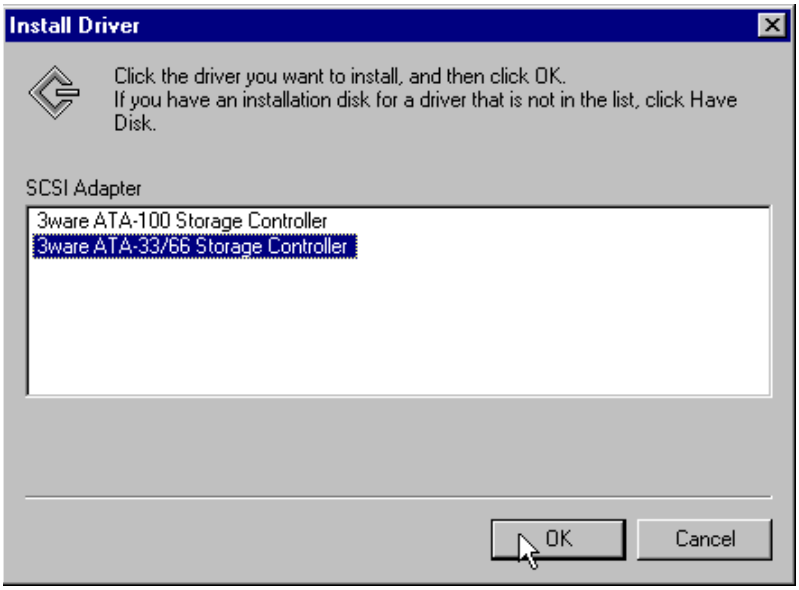



**Figure 24. Install Driver**

### Remove the existing 3ware card and install the new 3ware card

Refer to *Hardware Installation* chapter.

### Reboot the machine

1 Remove the driver diskette from your PC, then turn on the power to restart your system. If you don't remove the diskette, the system may not boot.

2 If you choose to reconfigure your disk arrays, press **ALT-3** to bring up the **Disk Array Configuration Utility.**

3 Log in at the administrator level and wait for the system to reboot. You should see a brief splash screen (Figure 19) fol-

lowed immediately by an **Installation Complete** notification (Figure 20).

4 Partition and format any new disk arrays or independent disks using **Disk Administrator** in the remaining steps:

   a From the **Start** menu, choose **Programs.**

   b From the **Programs** menu, choose **Administrative Tools.**

   c From the **Administrative Tools** menu, choose **Disk Administrator.**

# Windows® 98/Me Installation

**Note:** The procedures provided in this chapter apply to both Windows 98 and the Millenium Edition (Windows Me) installations. The RAID 5 configuration is not supported by Window 98 or ME.

As a Plug-and-Play™ device, the 3ware storage controller may be configured to be your system's boot device, or you can use another device, such as a disk attached to the motherboard as your boot device. Use your system's Setup utility to set the boot order according to how you install your operating system.

If you have a new drive configuration without an operating system and want to install Windows on a drive managed by 3ware's storage controller, follow the instructions in:
**Installing the controller while installing Windows 98/Me** (page 59).

If you are installing the storage controller on a system that already has the operating system installed on a unit connected to another storage controller, follow the instructions in:
**Installing the controller on systems that boot from another device** (page 62).

If you are replacing an installed 3ware storage controller with a newer version, follow the instructions in:
**Replacing an existing controller with a new version of the controller** (page 65)**.**

**Note:** Windows 98 driver requires Microsoft Windows 98 Second Edition, and that you cannot install the driver or the operating system unless you have administrator privileges for your system.

# Installing the controller while installing Windows 98/Me

### Materials required:

- 3ware Windows driver installation diskette
- Windows 98/Me CD-ROM
- 3ware CD-ROM

## Create disk arrays

Refer to *3ware Disk Array Configuration Utility* chapter.

## Boot the system from the Windows 98/Me diskette

1 Insert Windows 98/Me boot disk into the floppy drive.

2 Restart your computer.

3 From the Windows 98 or Me **Startup Menu**, choose **1. Start computer with CD-ROM support.**

## Partition the boot device using *fdisk*

1 If your disks have not been partitioned, you will get a message like **Windows has detected that drive C does not contain a valid FAT or FAT32 partition**. From the MS-DOS command prompt, run **fdisk** to create a partition.

```
A:\> fdisk
```

2 When asked to enable large disk support, indicate Yes by typing **Y**.

3 Under **FDISK Options**, select option 1, **Create a DOS partition or Logical DOS Drive.**

4 Under **Create a DOS Partition or Logical DOS Drive**, select option 1, **Create a Primary DOS partition.**

5 When asked to use the maximum available size for a **Primary DOS Partition**, indicate Yes by typing **Y**. Then, press the **Escape** key to return to the **FDISK Options** menu.

6 After the primary DOS partition is created for your boot device, you may partition any other devices on your system. Select option **5** to change the current drive, and then repeat steps 3-5.

7 Press the **Escape** key several times as directed to exit fdisk and return to the MS-DOS prompt.

### Restart the machine and format the boot device

1 As you did before, choose **1. Start computer with CD-ROM support.**

2 If you get the same message (e.g., **Windows has detected that drive C does not contain a valid FAT or FAT32 partition),** then your partition was not created properly. Return to the **Partition the boot device using fdisk** and try again. You may have restarted without exiting all the way to the MS-DOS prompt.

3 At the MS-DOS prompt, format your boot device.

```
A:\> format C:
```

### Continue the standard Windows 98/Me installation

1 Insert the Windows 98/Me CD-ROM into your CD-ROM drive.

2 From the MS-DOS prompt, type **setup** to continue with the standard Windows 98 or Me installation.

3 After **ScanDisk** finishes, type **X** for exit.

4 Follow the display instructions. Note that the machine restarts several times in the process.

5 Install the 3ware driver. Refer to the *Install 3ware driver* section.

## Partition and format other devices

**Note:** If you have disks or disk arrays other than your boot device on the controller, you must partition and format them before they can be written to or read from.

1 If you have other disk units to partition, run **fdisk** by selecting **Run...** from the **Start** menu, and typing **fdisk** in the dialog**.**

2 Restart the system again and format each device.

## Install the 3DM Disk Management Utility.

Refer to *3DM Disk Management Utility* chapter.

# Installing the controller on systems that boot from a different device

### Materials required:

- 3ware Windows driver installation diskette
- 3ware CD-ROM

## Create disk arrays

Refer to *3ware Disk Array Configuration Utility* chapter.

## Install the 3ware driver

As a Plug-and-Play™ device, Windows 98/Me will recognize the 3ware storage controller and automatically bring up the **Add New Hardware Wizard** which will guide you in installing the new 3ware driver. (See Figure 25.) When the **Add New Hardware Wizard** screen appears, continue to the *Install/Update 3ware driver* section. Perform the following steps only if this Wizard does not appear on your screen or was cancelled for some reason:

1 Log in after Windows installation is complete and insert the 3ware Windows driver installation diskette.

2 From the **Start** menu, select **Setting,** then **Control Panel**.

3 Double click on **Add New Hardware** icon. When the **Add New Hardware** wizard lists devices that need to be installed, select the **SCSI Controllers**.

4 Continue to the *Install/Update 3ware driver* section.


**Figure 25. Add New Hardware Wizard**

## Partition and format units on controller

1 If you have other disk units to partition, run **fdisk** by selecting **Run...** from the **Start** menu, and typing **fdisk** in the **Run** window**.**

2 Restart the system again and format each device: select the device with the right mouse button in the **My Computer** window, then select **Format...** from the popup menu.

### Install the 3DM disk management utility

Refer to *3DM Disk Management Utility* chapter.

# Replacing an existing controller with a new version of the controller

**Caution:** Install the new version of the driver **before** installing the new controller board. Your system may not boot with the new version of the controller unless the new version of the driver has been installed first.

**Note:** Upgrading to a new version of the 3ware storage controller does not require reconfiguring the drives connected to your controller and will not affect data stored in your disk arrays for this and previous versions.

### Materials required:

- 3ware Windows driver installation diskette
- 3ware CD-ROM

### Update the 3ware driver

1 Log in to your system as system administrator.
2 Go to the **Start** menu, click on **Settings**, and open the **Control Panel** window.
3 From the **Control Panel** window, click on the **System** icon.
4 Click on the **Device Manager** tab.
5 Open the **SCSI Adapters** selection**.**
6 Locate and double-click on the **3ware Storage Controller** selection. The **3ware Storage Controller Properties** pop-up menu appears.
7 Click on the **Driver** tab (see Figure 26).

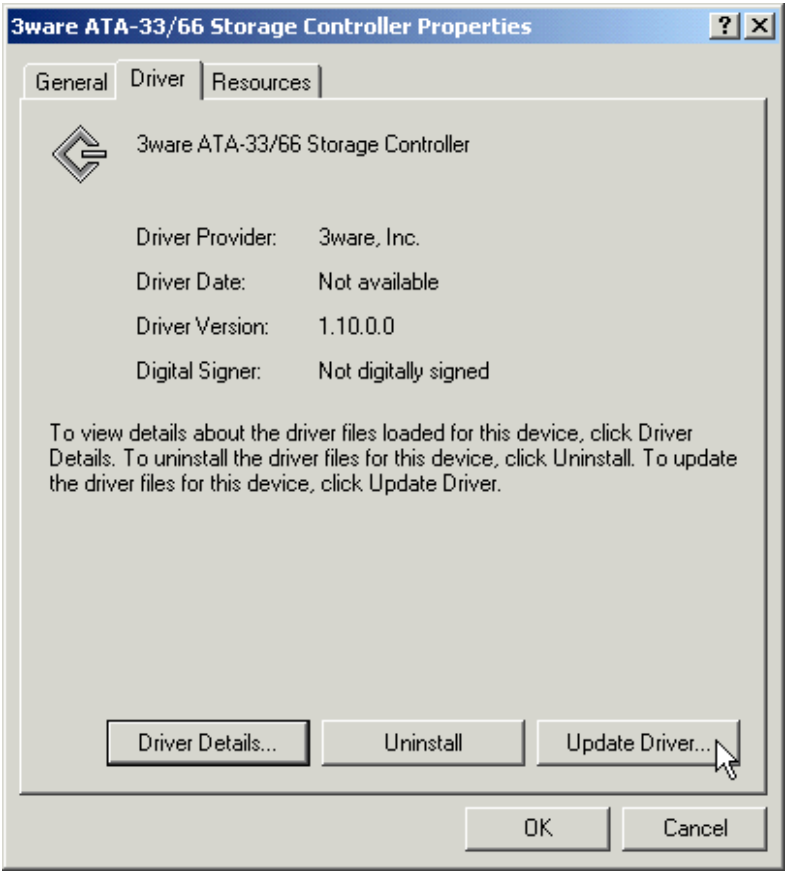



**Figure 26. 3ware Storage Controller Properties Display**

8 Click on the **Update Driver…** button and press **Next** on the **Update Device Driver Wizard**.

### Install/Update the 3ware driver

1 When you see the window in Figure 27, you MUST select “Display a list of known drivers for this device so that I can choose a specific driver.”

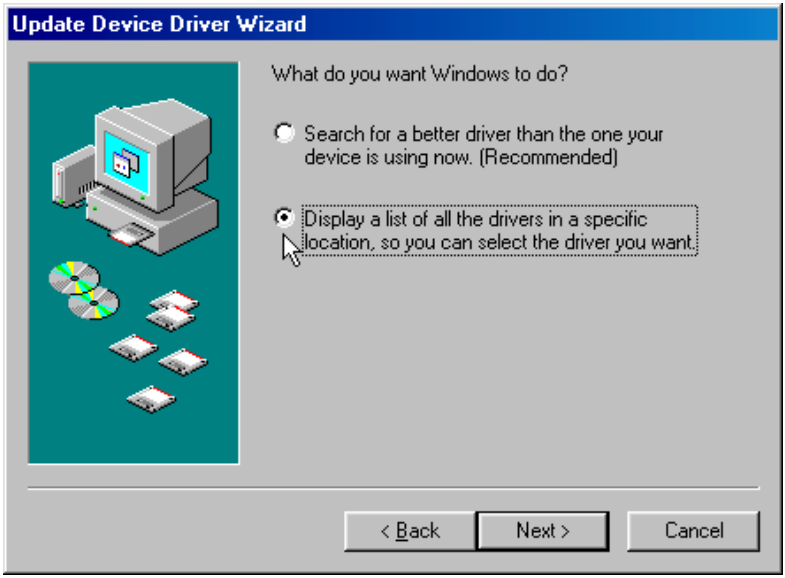



**Figure 27. Install Hardware Device Drivers**

2 The **Select a Device Driver** dialog appears (see Figure 28). Click on the **Have Disk…** button.

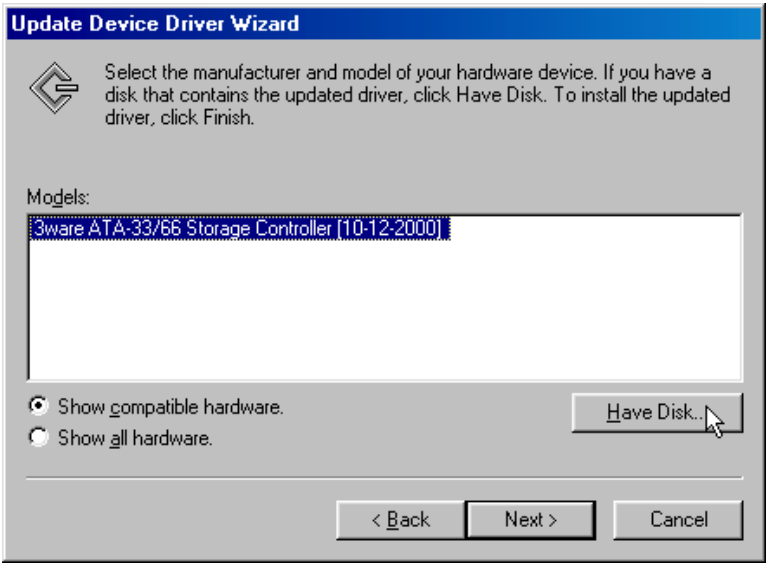



**Figure 28. Select a Device Driver Display**

3 The **Install from Disk** (Figure 29) dialog appears. Insert the 3ware driver installation diskette and type, for either Windows 98 or Me, A:\win98 in **Copy manufacturer's files from:** at the bottom of the box.

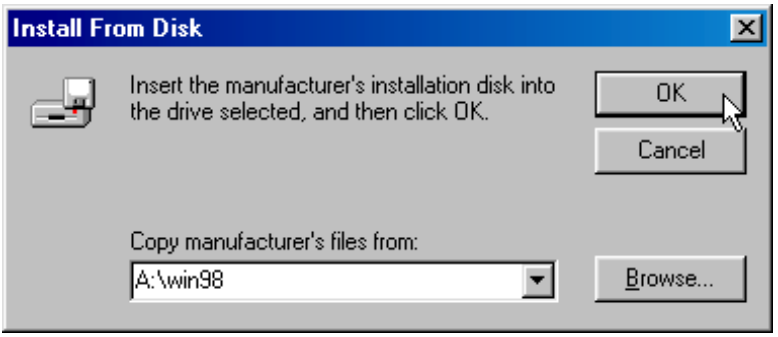



**Figure 29. Install from Disk**

4 The **Update Driver** dialog box appears. (See Figure 30.) Click on the 3ware storage controller listed in the dialog box to highlight it, then click on **Next**.

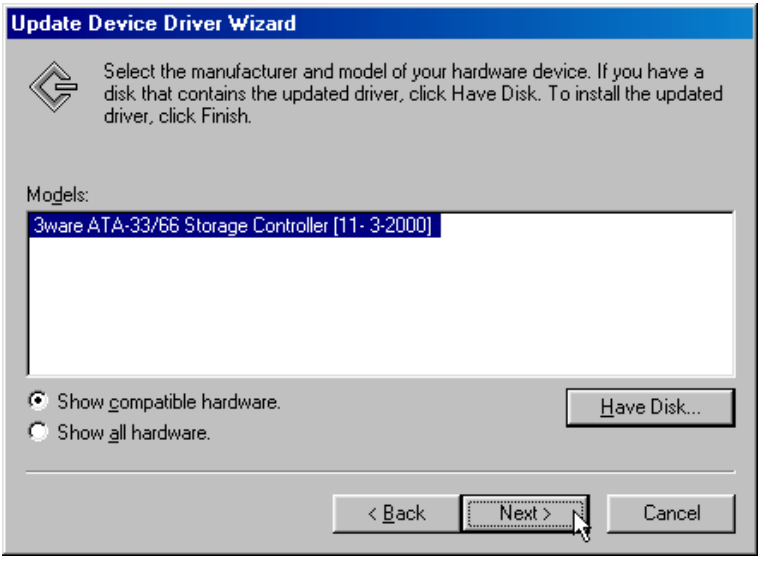



**Figure 30. Update driver**

5 The final update driver screen should appear (Figure 31), followed by a progress bar which appears briefly, then by a **System Settings Change** dialog.

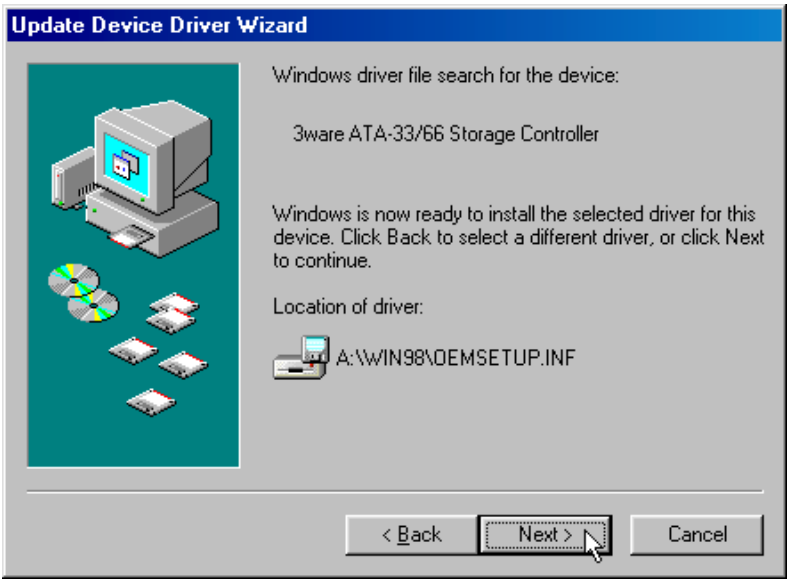



**Figure 31. Final driver installation screen**

6 Shutdown your system and log back in at the administrator level, if your system is connected to a network. When the system has rebooted, you should see a brief splash screen (see Figure 32) followed immediately by an **Installation Complete** notification (see Figure 33).


**Figure 32. Controller Quick-Splash Screen**


**Figure 33. Installation Complete Notification**

## Remove the existing 3ware card and install the new 3ware card

Refer to *Hardware Installation* chapter.

## Reboot the machine

1 If you choose to reconfigure your disk arrays, press **ALT-3** to bring up the **Disk Array Configuration Utility.**

2 If you reconfigure your disk arrays, partition and format any new disk arrays or freed disks. To partition, run **fdisk** by selecting **Run...** from the **Start** menu, and typing **fdisk** in the **Run** window**.**

3 To format, restart the system again and log in. Select the device with the right mouse button in the **My Computer** window and select **Format...** from the popup menu.

# Windows® 2000 Installation

As a Plug-and-Play™ device, the 3ware storage controller may be configured to be your system's boot device, or you can use another device, such as a disk attached to the motherboard as your boot device. Use your system's Setup utility to set the boot order according to how you install your operating system.

If you have a new drive configuration without an operating system and want to install Windows on a drive managed by 3ware's storage controller, follow the instructions in:
**Installing the controller while installing Windows 2000** (page 75).

If you are installing the 3ware storage controller on a system that already has the operating system installed on a unit connected to another storage controller, follow the instructions in:
**Installing the controller on systems that boot from another device** (page 77).

If you are replacing an installed 3ware storage controller with a newer version, follow the instructions in:
**Replacing an existing 3ware storage controller with a new version of the controller** (page 79)**.**

**Note:** The Windows 2000 driver was built on and tested for Microsoft Windows 2000 Release Candidate 3. It is not guaranteed to operate on previous versions of Windows 2000. Also, you cannot install the driver or the operating system unless you have administrator privileges for your system.

# Installing the controller while installing Windows 2000

### Materials required:

- Windows 2000 installation CD-ROM
- 3ware Windows driver installation diskette
- 3ware CD-ROM

## Create disk arrays

Refer to *3ware Disk Array Configuration Utility* chapter.

## Installing with the Initial Operating System Build

1 Boot from the Windows 2000 CD and press **F6** when the message: **Press F6 if you need to install a 3rd party SCSI or RAID driver** appears at the bottom of the display.

2 When you get the message: **Setup could not determine the type of one or more mass storage devices or you have chosen to manually specify and adapter…** press **S** to specify that you have an additional disk controller.

3 Insert the 3ware driver diskette and press **Enter**.

4 A box with **3ware Storage Controller** is displayed. Press **Enter** to select it.

5 If you have additional devices to add, press **S**, otherwise press **Enter**.

## Continue with Windows 2000 installation

You should continue with the normal Windows 2000 installation at this point. There are no 3ware-specific instructions after installing the driver. Refer to the Windows 2000 documentation supplied by Microsoft if you need additional instructions.

When you reboot the system, log in as system administrator. You should see a brief splash screen (see Figure 34) followed immediately by an **Installation Complete** notification (see Figure 35).


**Figure 34. Controller Quick-Splash Screen**


**Figure 35. Installation Complete Notification.**

## Install the 3DM disk management utility

Refer to *3DM Disk Management Utility* chapter.

# Installing the controller on systems that boot from a different device

### Materials required:

- 3ware Windows driver installation diskette
- 3ware CD-ROM

## Create disk arrays

Refer to *3ware Disk Array Configuration Utility* chapter.

## Install the 3ware driver

As a Plug-and-Play™ device, Windows 2000 will recognize the 3ware storage controller and bring up the **Found New Hardware Wizard** which will guide you in installing the 3ware driver. (See Figure 36.) Continue to the *Install/Update 3ware driver* section.


**Figure 36. Found New Hardware Wizard.**

## Install the 3DM disk management utility

Refer to *3DM Disk Management Utility* chapter.

# Replacing an existing controller with a new version of the controller

**Caution:** Install the new version of the driver **before** installing the new controller board. Your system may not boot with the new version of the controller unless the new version of the driver has been installed first.

**Note:** Upgrading to a new version of the 3ware storage controller does not require reconfiguring the drives connected to your controller and will not affect data stored in your disk arrays for this and previous versions.

### Materials required:

- 3ware Windows driver installation diskette
- 3ware CD-ROM

## Updating the 3ware driver

1 Log in to your system as system administrator.

2 Go to the **Start** menu, click on **Settings**, and open the **Control Panel** window.

3 From the **Control Panel** window, click on the **System** icon.

4 Click on the **Hardware** tab and then click on the **Device Manager** tab.

5 Open the **SCSI and Raid Controllers** selection.

6 Locate and double-click on the **3ware Storage Controller** selection. The **3ware Storage Controller Properties** pop-up menu appears.

7 Click on the **Driver** tab (see Figure 37).

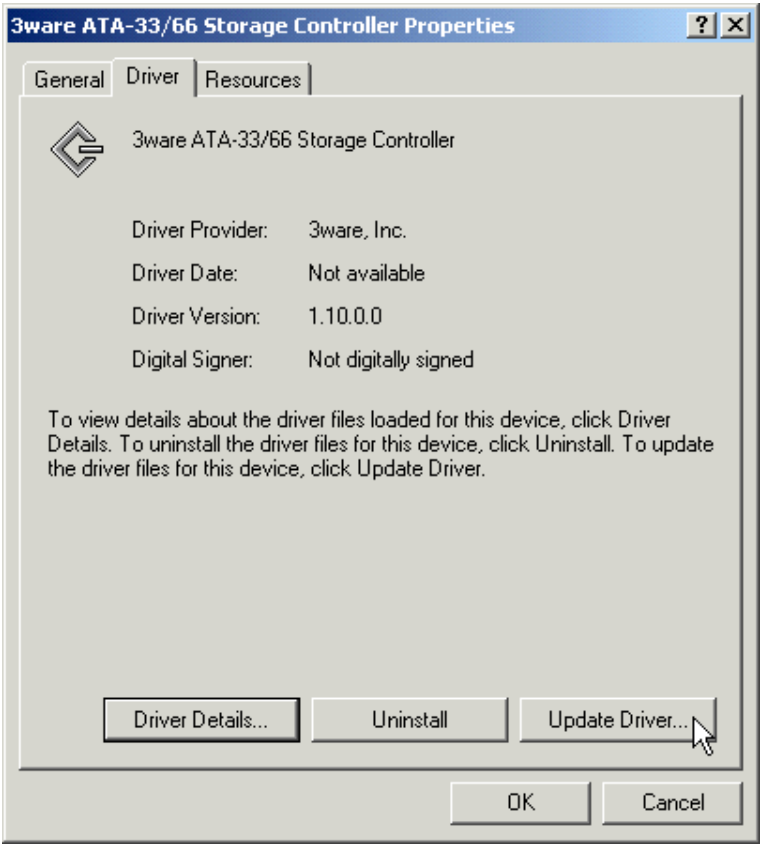



**Figure 37. 3ware Storage Controller Properties Display**

8 Click on the **Update Driver…** button.

9 Press **Next** on the **Upgrade Device Driver Wizard**. (See Figure 38.)


**Figure 38. Upgrade driver welcome screen**

## Installing/Updating the 3ware driver

1 Once you reach the screen display shown in Figure 39, **Update Device Driver**, ensure that you select "Display a list of known drivers for this device, so that I can choose a specific driver." Afterwards, press **Next** and follow the instructions.

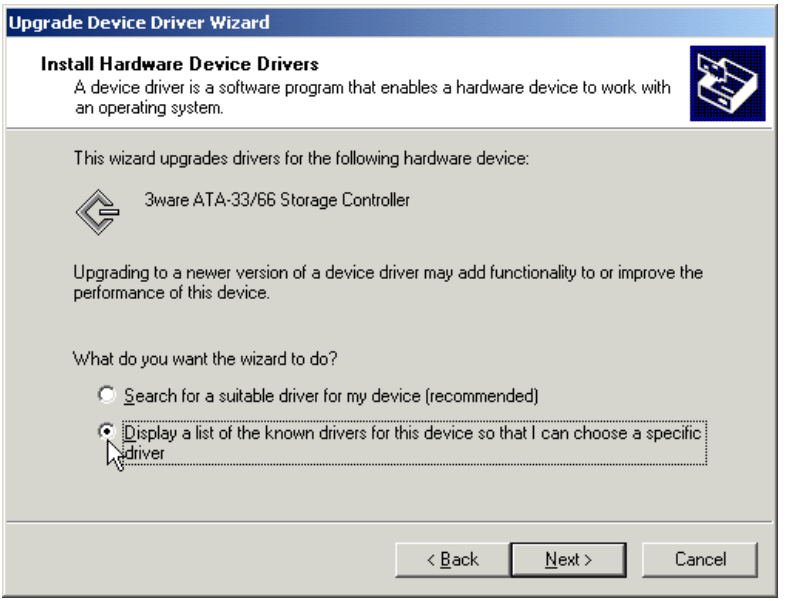



**Figure 39. Update/Install device driver**

2 The **Select a Device Driver** dialog appears (see Figure 40). Click on the **Have Disk…** button.

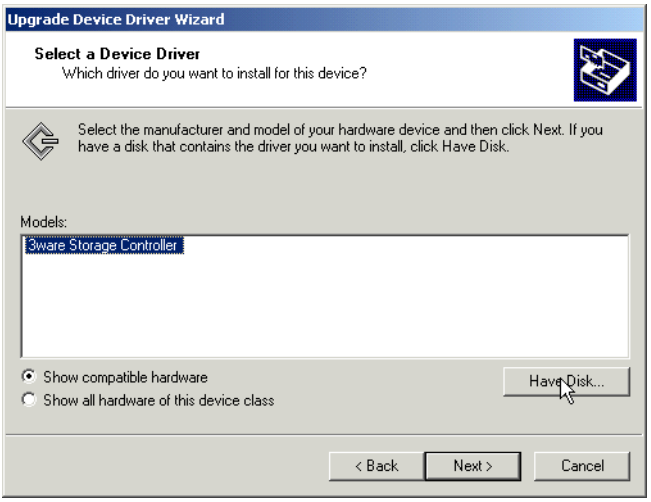



**Figure 40. Select a Device Driver**

3 The **Install from Disk** (Figure 41) dialog appears. Insert the 3ware driver installation diskette and type A:\win2k in **Copy manufacturer's files from:** at the bottom of the box.

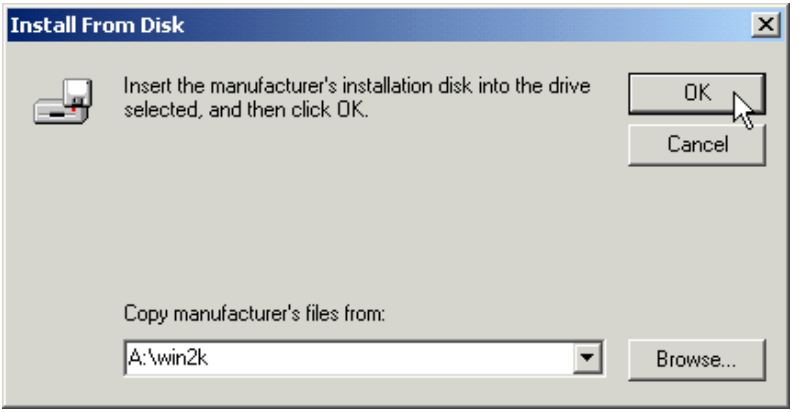



**Figure 41. Install From Disk**

4 The **Select a Device Driver** dialog box appears. (See Figure 42.) Click on the 3ware storage controller listed to highlight it, then click **Next**. The **Start Device Driver Installation** screen appears. (See Figure 43.)

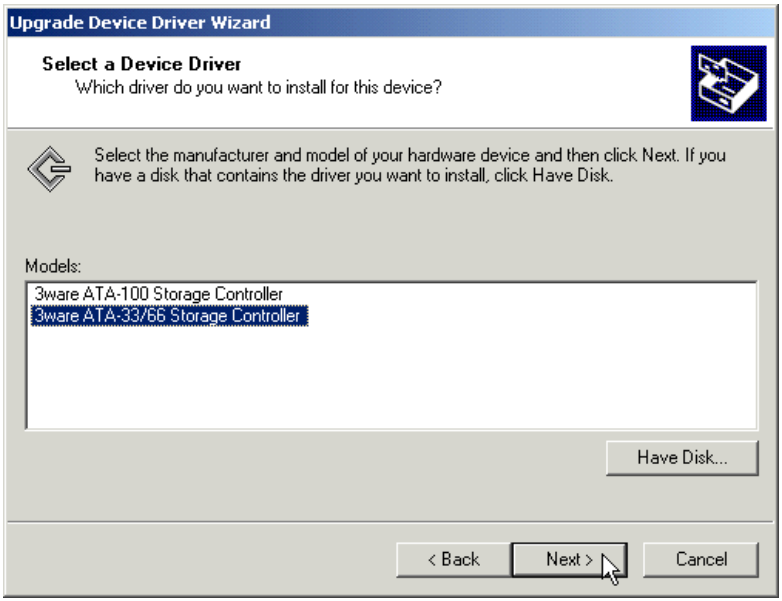



**Figure 42. Select a Device Driver**

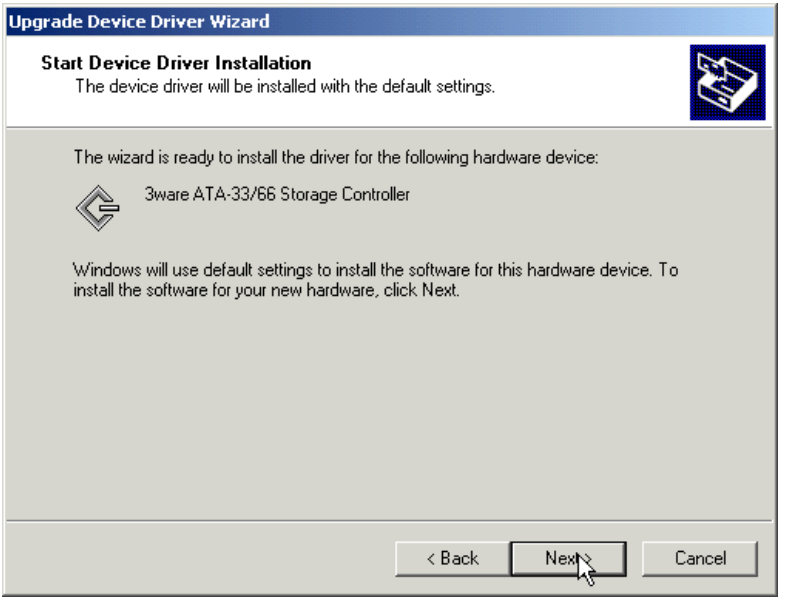



**Figure 43. Start Device Driver Installation**

5 Depending on the driver diskette that was packaged with your storage controller, the **Digital Signature Not Found** screen may appear. (See Figure 44.) If this screen appears, click on **Yes** to continue and follow the instructions to complete the driver installation.

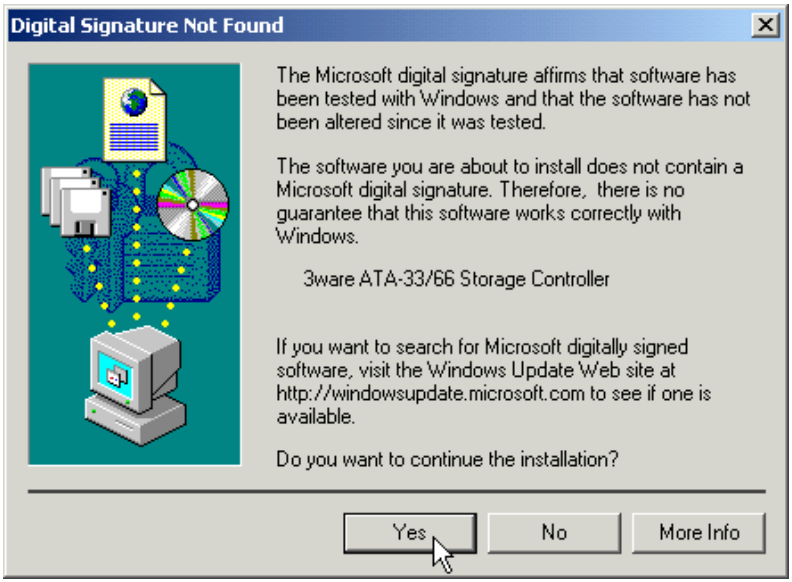



**Figure 44. Digital Signature Not Found**

6 The final update driver screen should appear (Figure 45), followed by a progress bar which appears briefly, then by a **System Settings Change** dialog.


**Figure 45. Final driver installation screen**

## Remove the existing 3ware card and install the new 3ware card

Refer to *Hardware Installation* chapter.

## Reboot the machine

1 Remove the driver diskette from your PC, then install the new card. Afterwards, turn your system on.

2 If you choose to reconfigure your disk arrays, press **ALT-3** to bring up the **Disk Array Configuration Utility.**

3 Log in as system administrator. When the system has rebooted, you should see a brief splash screen (see Figure 46) followed immediately by an Installation Complete notification (see Figure 47).

4 Partition and format any new disk arrays or independent disks using **Disk Management** from **Administrative Tools**.


**Figure 46. Controller Quick-Splash Screen**


**Figure 47. Installation Complete Notification**

.

# Linux Installation

**Note:** If you haven't yet installed the hardware, return to the *Hardware Installation* chapter. The hardware must be installed before you can configure the 3ware storage controller.

# Red Hat® Linux 6.1, 6.2 or 7.0 Installation

As a Plug and Play™ device, the 3ware storage controller may be configured to be your system's boot device, or you can use another device, such as a disk attached to the motherboard as your boot device. Use your system's Setup utility to set the boot order according to how you install your operating system.

If you have a new drive configuration without an operating system and want to install Linux on a drive managed by 3ware's storage controller, follow the instructions in:
**Installing the controller while installing Red Hat Linux 6.1, 6.2 or 7.0** (page 93).

If you are installing the storage controller on a system that already has the operating system installed on a unit connected to another storage controller, follow the instructions in:
**Installing the controller on systems that boot from a different device** (page 95).

**Note:** The 3ware Red Hat driver requires Red Hat Linux 6.1, 6.2 or 7.0. Also, the use of the Disk Druid partitioning utility with Red Hat 6.2 or 7.0 is limited to 112 GB. Use fdisk if more storage capacity is required.

# Installing the controller while installing Red Hat Linux 6.1, 6.2 or 7.0

**Materials required:**

- 3ware CD-ROM or 3ware software installation for Red Hat Linux diskettes (2). One diskette contains 3ware drivers for Red Hat 6.1, 6.2 and 7.0. A second diskette contains the 3DM utility.
- Red Hat Linux 6.1, 6.2 or 7.0 boot diskette
- Red Hat Linux 6.1, 6.2 or 7.0 Linux installation CD-ROM

**Note:** We have tested systems where an IDE drive connected to the motherboard interfered with using the 3ware storage controller as a boot device. Disconnecting the IDE drive while installing Linux will eliminate this problem. After Linux is installed, the drive can be reconnected.

**Note:** The use of the Disk Druid partitioning utility with Red Hat 6.2 or 7.0 is limited to 112 GB. Use fdisk if more storage capacity is required.

## Create disk arrays

Refer to *3ware Disk Array Configuration Utility* chapter.

## Boot with both the Red Hat diskette and CD-ROM

1 Insert Red Hat Linux boot diskette into the floppy drive, and insert the Red Hat Linux installation CD into the CD-ROM.

2 Restart your computer.

3 When the **Welcome to Red Hat** 6.1, 6.2 or 7.0 display appears, type **expert** at the boot prompt.

```
boot: expert
```

### Install the driver

1 After loading a number of files, you will be asked to insert your driver disk. Remove the boot diskette from the floppy, insert the 3ware software installation diskette, and press **OK**.

2 Select the proper language and keyboard types for your locality.

3 If asked for what type of media, select **Local CD-ROM** since you are installing from CD-ROM.

4 When asked if you would like to specify a special device driver, select **Add Device**, and press **Return**.

5 When asked what kind of device you would like to add, select **SCSI**.

6 Scroll down the list and select the **3ware Storage Controller**.

7 Installing the driver will conclude with a message: **I have found the following devices in your system and should list the 3ware Storage Controller**. Unless you have other third party devices to install in your system, select **Done**.

### Complete the normal Red Hat installation

Continue with the Red Hat Linux 6.1, 6.2 or 7.0 installation. Refer to the Red Hat documentation for questions or problems**.**

### Install and run 3DM disk management utility

Refer to *3DM Disk Management Utility* chapter.

# Installing the controller on systems that boot from a different device

**Materials required:**

- 3ware software installation for Red Hat Linux diskettes (2). One diskette contains 3ware drivers for Red Hat 6.1, 6.2 and 7.0. A second diskette contains the 3DM utility.

**Note:** The use of the Disk Druid partitioning utility with Red Hat 6.2 or 7.0 is limited to 112 GB. Use fdisk if more storage capacity is required.

## Create disk arrays

Refer to *3ware Disk Array Configuration Utility* chapter.

## Install the 3ware driver

**Case 1: Your system runs Red Hat Linux 6.1, 6.2 or 7.0**

Mount the floppy drive and copy the driver into a working directory.

1 Type: `mount –t msdos /dev/fd0 /mnt`

2 **For Red Hat 6.1**, type:
`cp /mnt/rh61/3w-xxxx.o /lib/modules/2.2.12-20/scsi`
**For Red Hat 6.2**, type:
`cp /mnt/rh62/3w-xxxx.o /lib/modules/2.2.14-5.0/scsi`
**For Red Hat 7.0**, type:
`cp /mnt/rh70/3w-xxxx.o /lib/modules/2.2.16-22/scsi`

3 Edit the /etc/rc.d/rc.sysinit file as follows.
After the lines:
#Start up swapping.
action “Activating swap partitions” swapon -a
*Add* the following lines:

**For Red Hat 6.1**, type:

```
#Start up 3ware driver
/sbin/insmod /lib/modules/2.2.12-20/scsi/3w-xxxx.o
```

or

**For Red Hat 6.2**, type:

```
/sbin/insmod /lib/modules/2.2.14-5.0/scsi/3w-xxxx.o
```

or

**For Red Hat 7.0**, type:

```
/sbin/insmod /lib/modules/2.2.16-22/scsi/3w-xxxx.o
```

4 Afterwards, halt the system, add the board, and reboot. During reboot, the new board should be recognized. Afterwards, the **Hardware Discover** utility should pop up.

5 Press return to enter the **Hardware Discover** utility.

6 Select the **Configure Device** option. The system boot completes and drives are now available.

#### Case 2: Your system runs Red Hat Linux 6.1, 6.2 or 7.0 and is an SMP system (multi-processor) running the kernel in SMP mode.

Mount the floppy drive and copy the driver into a working directory.

1 Type the following lines:

```
mount –t msdos /dev/fd0 /mnt
```

2 **For Red Hat 6.1**, type:

```
cp /mnt/rh61/3w-xxxx.smp /lib/modules/2.2.12-20smp/
scsi/3w-xxxx.o
```

**For Red Hat 6.2**, type:

```
cp /mnt/rh62/3w-xxxx.smp /lib/modules/2.2.14-5.0smp/
scsi/3w-xxxx.o
```

**For Red Hat 7.0**, type:

```
cp /mnt/rh70/3w-xxxx.smp /lib/modules/2.2.16-22smp/
scsi/3w-xxxx.o
```

3 Edit the /etc/rc.d/rc.sysinit file as follows.

After the lines:

#Start up swapping.

action “Activating swap partitions” swapon -a

*Add* the following lines:

**For Red Hat 6.1**, type:

```
#Start up 3ware driver
```

```
/sbin/insmod /lib/modules/2.2.12-20smp/scsi/3w-xxxx.o
```

or

**For Red Hat 6.2**, type:

```
/sbin/insmod /lib/modules/2.2.14-5.0smp/scsi/3w-xxxx.o
```

or

**For Red Hat 7.0**, type:

```
/sbin/insmod /lib/modules/2.2.16-22smp/scsi/3w-xxxx.o
```

### Compiling the Driver (For experts only)

If you wish to compile the driver yourself (for a different kernel version that you are running), then perform the following steps.

1 Copy the driver source from the floppy into a working directory.

2 Untar the driver source with the command, `tar zxf 3w-xxxx.tgz`.

3 Add the flag -D__SMP__ to the CFLAGS line in the Makefile for SMP kernels. You must have a full Linux kernel source tree in /usr/src/linux in order to do the compile.

### Install and run 3DM disk management utility

Refer to *3DM Disk Management Utility* chapter.

# SuSE® Linux 6.3 or 6.4 Installation

As a Plug and Play™ device, the 3ware storage controller may be configured to be your system's boot device, or you can use another device, such as a disk attached to the motherboard as your boot device. Use your system's Setup utility to set the boot order according to how you install your operating system.

If you have a new drive configuration without an operating system and want to install Linux on a drive managed by 3ware's storage controller, follow the instructions in either:
**Installing the controller while installing SuSE Linux 6.3 with YaST2** (page 99)
**Installing the controller while installing SuSE Linux 6.3 or 6.4 with YaST1** (page 102)

The storage controller cannot be installed while installing SuSE 6.4 with YaST2. Refer to the SuSE installation instructions to determine which installation is right for you.

If you are installing the storage controller on a system that already has the operating system installed on a unit connected to another storage controller, follow the instructions in:
**Installing the controller on systems that boot from a different device** (page 106).

**Note:** The 3ware SuSE Linux driver requires SuSE Linux 6.3 or 6.4.

# Installing the controller while installing SuSE Linux 6.3 with YaST2

**Materials required:**

- 3ware CD-ROM or 3ware software installation for SuSE Linux diskettes (2). One diskette contains 3ware driver for SuSE Linux 6.3 and driver source code. A second diskette contains the 3DM utility.
- SuSE Linux 6.3 installation CD-ROMs

**Note:** IWe have tested systems in which an IDE drive connected to the motherboard interfered with using the 3ware storage controller as a boot device. Disconnecting the IDE drive while installing Linux eliminates this problem. After Linux is installed, the drive can be reconnected.

## Create disk arrays

Refer to *3ware Disk Array Configuration Utility* chapter.

## Boot with the SuSE CD-ROM

1 Insert SuSE Linux installation CD 1 into the CD-ROM.

2 Restart your computer.

3 When the display that asks to select the proper language and keyboard types for your locality appears, press **CTL-ALT-F2** to get a command prompt.

## Install the driver via a command shell

1 Insert the 3ware software installation for SuSE Linux diskette into the floppy drive.

2 From the command prompt, issue the following commands:

```
/# mount -t msdos /dev/fd0 /mnt
```

```
/# cd /mnt/SuSE_63
/mnt # cp 3w-xxxx.o /modules
/mnt # cd /
/ # umount /mnt
```

3 Eject the 3ware Software Installation diskette from the floppy drive.

```
/ # cd /modules
/linux/modules # insmod 3w-xxxx.o
```

4 Press **CTL-ALT-F7** to return to the SuSE installation display.

### Continue with the normal SuSE installation

Continue with the normal SuSE installation until you reach a login display. If necessary, refer to the SuSE documentation for questions or problems.

### Set up system so driver will load on boot

1 At the login display, log in as root.

2 Insert the 3ware Software Installation diskette into the floppy drive.

3 Type in the following:

```
linux:~ # mount -t msdos /dev/fd0 /mnt
linux:~ # cp /mnt/SuSE_63/initrd.img /boot
```

**or**

```
linux:~ # cp /mnt/SuSE_63/initsmp.img /boot
```

**(for SMP systems)**

```
linux:~ # umount /mnt
```

4 Eject the 3ware Software Installation diskette from the floppy drive.

### Edit the lilo.conf file

1 Use an editor (emacs, vi, pico, etc.) to edit /etc/lilo.conf

```
linux:~ # vi /etc/lilo.conf
```

2 After the `image = /boot/vmlinuz` line and the `image = /boot/vmlinuz.suse line`, add the line `initrd = /boot/initrd.img`

```
image = /boot/vmlinuz
initrd = /boot/initrd.img
```
**or**
```
initrd = /boot/initsmp.img
```
**(for SMP systems)**
```
      :
      :
image = /boot/vmlinuz.suse
initrd = /boot/initrd.img
```
**or**
```
initrd = /boot/initsmp.img
```
**(for SMP systems)**

3 Save and the lilo.conf file and exit the editor.

4 Run lilo by typing:

```
linux:~ # /sbin/lilo
```

5 Restart the system.

### Install and run 3DM disk management utility

Refer to *3DM Disk Management Utility* chapter.

# Installing the controller while installing SuSE Linux 6.3 or 6.4 with YaST1

## Materials required

- 3ware CD-ROM or 3ware software installation for SuSE Linux diskettes (2). One diskette contains 3ware driver for SuSE Linux 6.3 and 6.4 and driver source code. The second diskette contains the 3DM utility.
- SuSE Linux 6. 3 or 6.4 Installation CDs

**Note:** We have tested systems where an IDE drive connected to the motherboard interfered with using the 3ware storage controller as a boot device. Disconnecting the IDE drive while installing Linux will eliminate this problem. After Linux is installed, the drive can be reconnected.

## Create disk arrays

Refer to *3ware Disk Array Configuration Utility* chapter.

## Boot with the SuSE CD

1 Insert SuSE Boot disk into the floppy drive of the computer. If your BIOS supports it you may use the SuSE installation CD 2 instead.

2 Restart your computer.

3 When the **Type of Installation** display appears, **do not select anything** yet.

4 Insert the 3ware software installation for SuSE Linux diskette, and press **CTL-ALT-F2**.

## Install the driver via a command shell

1 From the command prompt, issue the following commands:

```
/ # mount -t msdos /dev/fd0 /mnt
/ # cp /mnt/SuSE_63/3w-xxxx.o /modules (for SuSE 6.3)
/ # cp /mnt/SuSE_64/3w-xxxx.o /modules (for SuSE 6.4)
/ # umount /mnt
```

2 Eject the 3ware Software Installation diskette from the floppy drive and issue the following commands. Note that in the second command it is indeed /.bin/insmod, not /bin/insmod for SuSE 6.3.

```
/ # cd /modules
/modules # /.bin/insmod 3w-xxxx.o (for SuSE 6.3)
```

**or**

```
/modules # /sbin/insmod 3w-xxxx.o (for SuSE 6.4)
```

3 Press **CTL-ALT-F1** to return to the **Type of Installation** display.

4 Select **Abort-No Installation.**

5 At the **Start Installation/System** display, select **Start Installation**, then select **Install Linux from Scratch**.

6 When asked to select the kernel type, select **Kernel with SMP-support** or **Standard kernel (Pentium-optimized)**.

7 When Lilo is finished installing and the confirmation window appears, **do not continue**. Press **CTL-ALT-F2** instead.

### Set up the system so driver will load on boot

1 Insert the 3ware software installation diskette and type in the following:

```
/ # mkdir /mnt2
/ # mount -t msdos /dev/fd0 /mnt2
/ # cp /mnt2/SuSE_63/initrd.img /mnt/boot (for SuSE 6.3)
/ # cp /mnt2/SuSE_64/initrd.img /mnt/boot (for SuSE 6.4)
```

```
/ # umount /mnt2
```

If you are on an SMP system, type:

```
/ # mkdir /mnt2
/ # mount -t msdos /dev/fd0 /mnt2
/ # cp /mnt2/SuSE_63/initsmp.img /mnt/boot
/ # umount /mnt2
```

2 Eject the 3ware Software Installation diskette from the floppy drive.

## Edit the lilo.conf file

1 Edit /mnt/etc/lilo.conf. Note that to use vi, you must first set the LD_LIBRARY_PATH

```
/ # export LD_LIBRARY_PATH=/mnt/usr/lib
/ # /mnt/usr/bin/vi /mnt/etc/lilo.conf
```

2 For non-SMP systems, in the lilo.conf file add the line, `initrd = /boot/initrd.img` after the line, `image = /boot/vmlinuz.`

```
image = /boot/vmlinuz
initrd = /boot/initrd.img
```

**or**

For SMP systems, in lilo.conf, add the line `initrd = /boot/initsmp.img` after the line, `image = /boot/vmlinuz.`

```
image = /boot/vmlinuz
initrd = /boot/initsmp.img
```

3 Save and the lilo.conf file and exit the editor.

4 Run lilo by typing:

```
/ # /mnt/sbin/lilo -r /mnt
```

5 Press **CTL-ALT-F1** to return to the confirmation window that came up when lilo was finished installing.

6 Select **OK** and reboot the system.

### Install and run 3DM disk management utility

Refer to *3DM Disk Management Utility* chapter.

# Installing the controller while installing SuSE Linux 6.4 with YaST2

## Installing the controller on systems that boot from a different device

### Materials required:

- 3ware CD-ROM or 3ware software installation for SuSE Linux diskettes (2). One diskette contains 3ware driver for SuSE Linux 6.3 and 6.4 and driver source code. The second diskette contains the 3DM utility.

## Create disk arrays

Refer to *3ware Disk Array Configuration Utility* chapter.

## Install the 3ware driver

#### Case 1: Your system runs SuSE Linux 6.3

1 Edit /etc/rc.d/boot, and before the line: ECHO_RETURN=$rc_done: add the following line:
```
/sbin/insmod /lib/modules/2.2.13/scsi/3w-xxxx.o
```
2 Mount the floppy drive and copy the driver into a working directory.
```
mount –t msdos /dev/fd0 /mnt
cp /mnt/SuSE_63/3w-xxxx.o /lib/modules/2.2.13/scsi
/sbin/insmod /lib/modules/2.2.13/scsi/3w-xxxx.o
umount /mnt
```

#### Case 2: Your system runs SuSE Linux 6.4

1 Edit /etc/rc.d/boot, and before the line: ECHO_RETURN=$rc_done: add the following line:
```
/sbin/insmod /lib/modules/2.2.14/scsi/3w-xxxx.o
```
2 Mount the floppy drive and copy the driver into a working directory.
```
mount –t msdos /dev/fd0 /mnt
```

```
cp /mnt/SuSE_64/3w-xxxx.o /lib/modules/2.2.14/scsi
/sbin/insmod /lib/modules/2.2.14/scsi/3w-xxxx.o
umount /mnt
```

**Case 3: Your system runs SuSE Linux 6.3 and is an SMP system (multi-processor)**

1 Edit /etc/rc.d/boot, and before the line: ECHO_RETURN=$rc_done: add the following line:
. . . . . /sbin/insmod /lib/modules/2.2.13-SMP/scsi/3w-xxxx.o

2 Mount the floppy drive and copy the driver into a working directory.

```
mount –t msdos /dev/fd0 /mnt
cp /mnt/SuSE_63/3w-xxxx.smp
        /lib/modules/2.2.13-SMP/scsi/3w-xxxx.o
/sbin/insmod
        /lib/modules/2.2.13-SMP/scsi/3w-xxxx.o
umount /mnt
```

**Case 4: Your system runs SuSE Linux 6.4 and is an SMP system (multi-processor)**

1 Edit /etc/rc.d/boot, and before the line: ECHO_RETURN=$rc_done: add the following line:

```
/sbin/insmod /lib/modules/2.2.14-SMP/scsi/3w-xxxx.o
```

2 Mount the floppy drive and copy the driver into a working directory.

```
mount –t msdos /dev/fd0 /mnt
cp /mnt/SuSE_64/w-xxxx.smp
        /lib/modules/2.2.14-SMP/scsi/3w-xxxx.o
/sbin/insmod
        /lib/modules/2.2.14-SMP/scsi/3w-xxxx.o
umount /mnt
```

## Compiling the Driver (For experts only)

If you wish to compile the driver yourself (for a different kernel version that you are running), then perform the following steps.

1 Copy the driver source from the floppy into a working directory.

2 Untar the driver source with the command, `tar zxf 3w-xxxx.tgz`.
3 Add the flag -D__SMP__ to the CFLAGS line in the Makefile for SMP kernels. You must have a full Linux kernel source tree in /usr/src/linux in order to do the compile.

### Install and run 3DM disk management utility

Refer to *3DM Disk Management Utility* chapter.

# 3DM Disk Management Utility

The 3DM disk management utility, allows you to view status and version information about your 3ware storage controller. 3DM alerts you when a disk array needs maintenance and from 3DM, you can maintain your disk arrays. You can add or remove drives, specify an available drive as a hot spare or launch the rebuild process. Array status can be viewed or arrays can be maintained remotely via a standard web browser provided you have access to the network containing the 3ware storage controller. In the Windows environment, array status can also be checked in the local popup notifier.

.

Event notification occurs from 3DM when the storage controller requires attention, such as when a disk array becomes degraded and is no longer fault tolerant. Event notification will only occur while 3DM is running, so we recommend that 3DM be left running as a background utility on the storage controller's machine. Event notification's email feature can send an email to a specified recipient when there is a problem with the array.

Refer to the following sections for more information:

# Windows Installation

## Installing 3DM for Windows NT, Windows 98, Windows 2000

1 Insert the 3DM installation media into the CD-ROM.

2 Run the 3DMsetup.exe program found on the installation disk. You may do this using Windows Explorer by double-clicking on the Setup file found on the installation disk or by executing **run a:\setup** from the **Run...** in the **Start** menu.

3 The **3DM Setup Standard** install window will guide you through the installation process.

4 At the **Remote Monitoring Configuration** window (see Figure 48), select the HTTP port that you would like 3DM to use. If you do not know what port to use, select the default. If you select port 0, the web interface will be disabled (not recommended).

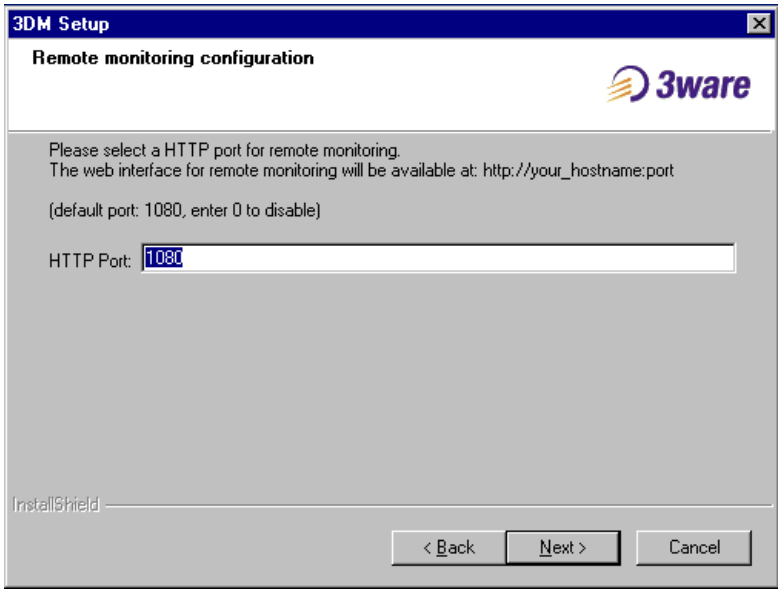



**Figure 48. 3DM Remote Monitoring Configuration Display**

5 At the **Email Notification Preferences** window (see Figure 49), enter the email address of the user that will be receiving the 3DM email status messages. If you do not know your server name, ask your system administrator, or check the email preferences or setup options on your email client.

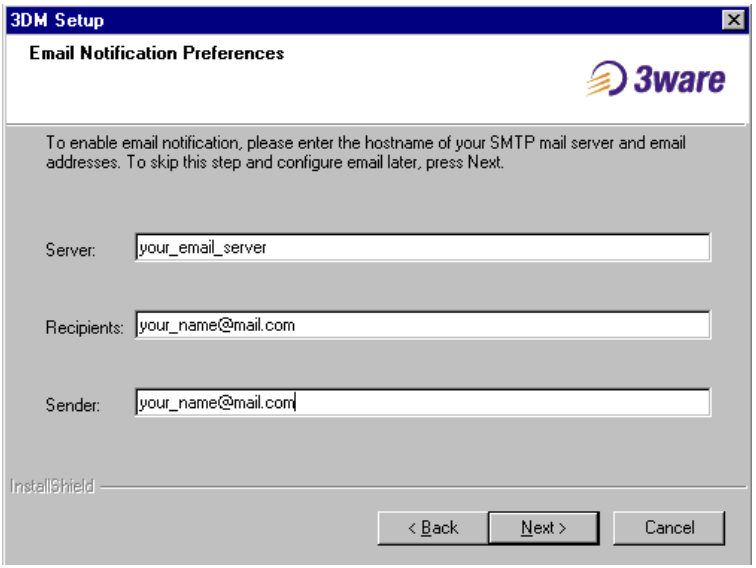



**Figure 49. 3DM Email Notification Preferences**

6 Continue with the installation as prompted. 3DM gives you the option of starting the application and opening the browser window when you complete the installation (recommended). You can run 3DM later by selecting **3DM** from the **Start** menu. To view 3DM remotely via a standard web browser, enter the URL of the system containing the 3ware storage controller in the address line of your browser. The default URL is http://localhost:1080/.

# Linux Installation

## Installing 3DM for Red Hat Linux 6.1, 6.2 or 70, SuSE Linux 6.3 or 6.4

**Note:** For SuSE Linux 6.3 or 6.4, network RPC services are required to be running, otherwise 3DM will not start.

1 Insert the 3ware software installation diskette for Linux into the floppy drive.

2 Mount the floppy drive:

```
mount /dev/cdrom/mnt
```

3 Change the directory and run the install script.

```
cd /mnt
./install.3dm
```

You will be prompted with the a series of questions to complete the installation.

4 The first question asks if you would like to receive an email message when an event occurs. The default to this question is “yes”. If you enable email notification, you will be asked to provide the name of the mail server, the user name for the person who will send the Email notification (typically the local host name), and the user name for the person who will receive the email notification (typically the system administrator):

Would you like to have email notification enabled (Y/N)?

Please enter the name of your mail server: (default is local host name)

Please enter the name of the user you want sending email notification: (default is root)

Please enter the name of the user you want receiving email notification: (default is 3ware_admin)

5 The second question asks if you want the popup window for event notification to beep:

Would you like to have audio notification enabled when the `local application starts? (default is yes)`

6 The third question asks for the HTTP port that you would like 3DM to use. If you do not know what port to use, select the default.

Please enter the port number you would like to use for web monitoring (default is 1080)

7 The fourth question asks for the location of the help documentation.

Please enter the location of the help documentation (default is /usr/local/doc)

8 The fifth question asks you to select the distribution software.

```
Select Distribution:

1. Red Hat 6.1/6.2/7.0

2. SuSE 6.3/6.4

3. Other
```

9 Change the directory and then unmount the floppy drive.

```
cd /

umount /mnt
```

### Starting 3DM

3DM should start automatically after bootup. If you need to start 3DM manually, follow these steps:

1 Login as root.

2 Afterwards, type:

```
/etc/rc.d/init.d/3dmd start
```

# Checking Array Status

Array status can be viewed using a web browser. Event notification occurs when the storage controller requires attention, such as when a disk array becomes degraded and is no longer fault tolerant. Event notification will only occur while 3DM is running, so we recommend that 3DM be left running as background utility on the storage controller's machine. Event notification's email feature can send an email to a specified recipient when there is a problem with the array.

## View status using your standard browser

Open the 3DM browser window (see Figure 50) by starting your standard web browser and entering the URL of the system where 3DM is running in the address bar of your browser. The default URL is
http://localhost:1080/.

Disk arrays and independent disks are listed on the 3DM main display. Disks that are members of an array will be indented and listed below their parent array. The type and size of the disks or arrays are listed
as well as status of each array.

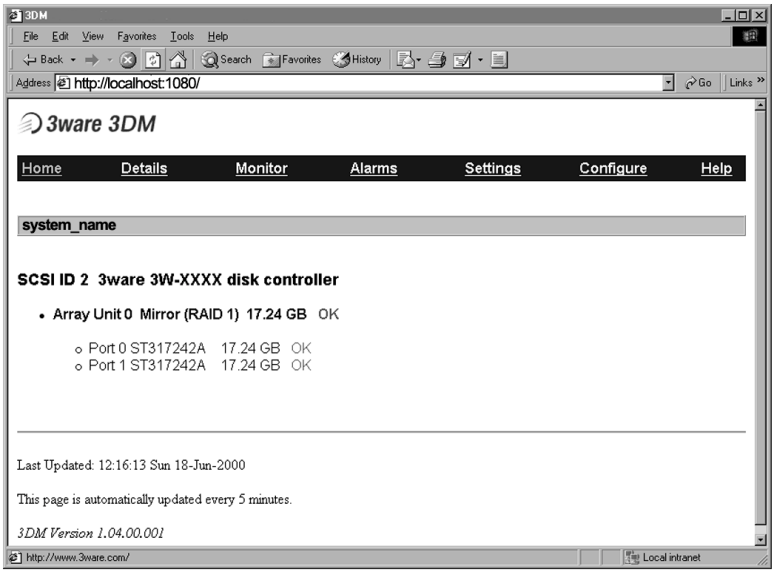



**Figure 50. 3DM Home Display**

The **Details** display (see Figure 51) gives storage controller version and status information in text format, which is helpful when contacting 3ware Customer Support with questions or for troubleshooting. Its text format allows you to select the text in the window with your mouse and use the system clipboard to cut and paste it into email or documentation.

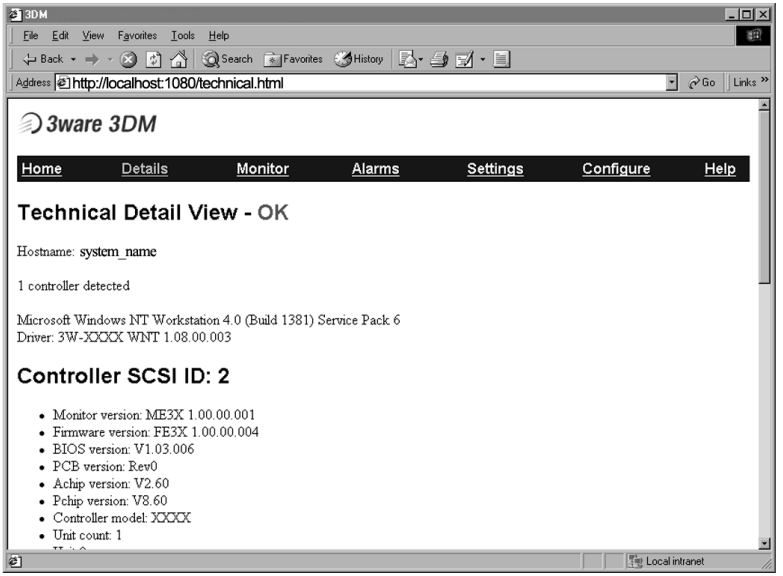



**Figure 51. 3DM Details Display**

Before sending an email or calling Customer Service, it is a good idea to take a snapshot of the **Details** display so that you can respond to questions about your system configuration to the Customer Support representative.

The **Monitor** display (see Figure 52) is useful for overall visual status of your disk arrays. The **Monitor** display opens with either a green (All OK) or red (alarm) banner. If you have multiple systems to monitor, a monitor window may be opened for each system. Status information can be viewed at a glance by minimizing the windows so that only the color is visible.

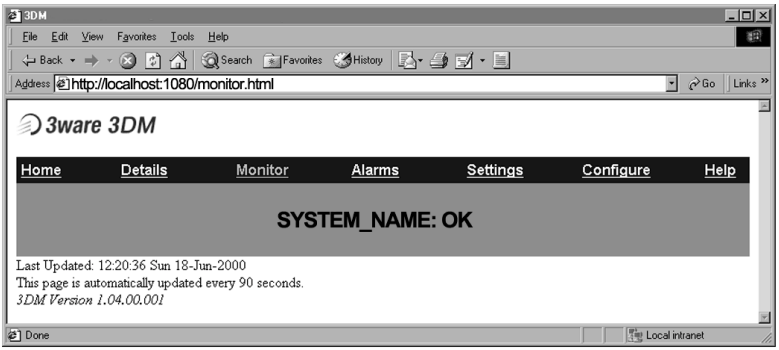



**Figure 52. 3DM Monitor Display**

The **Alarm** display (see Figure 53) keeps a log of all alarms that have occurred on the disk arrays. An alarm occurs when the storage controller requires attention, such as when a disk array becomes degraded and is no longer fault tolerant. SMART notifications appear in this display.

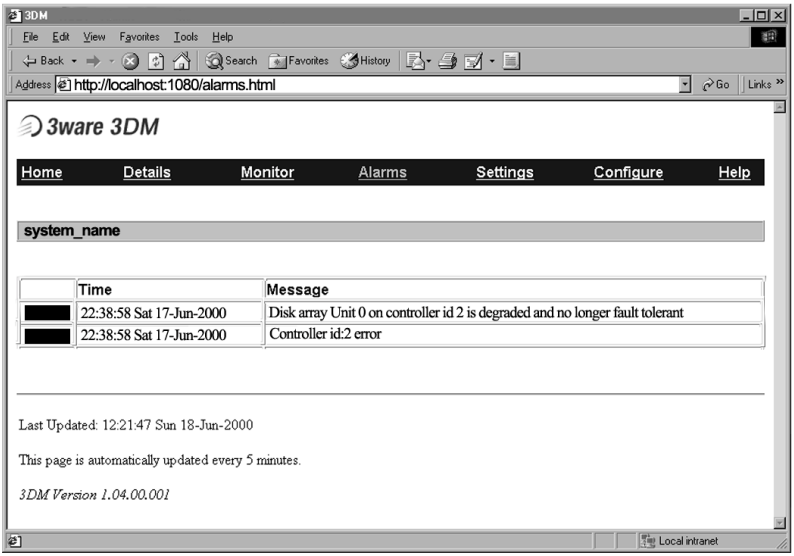



**Figure 53. 3DM Alarm Display**

The **Settings** display (see Figure 54) allows you to configure 3DM for a faster Rebuild rate and password protection, as well as view the settings for the email notification and audio warning.

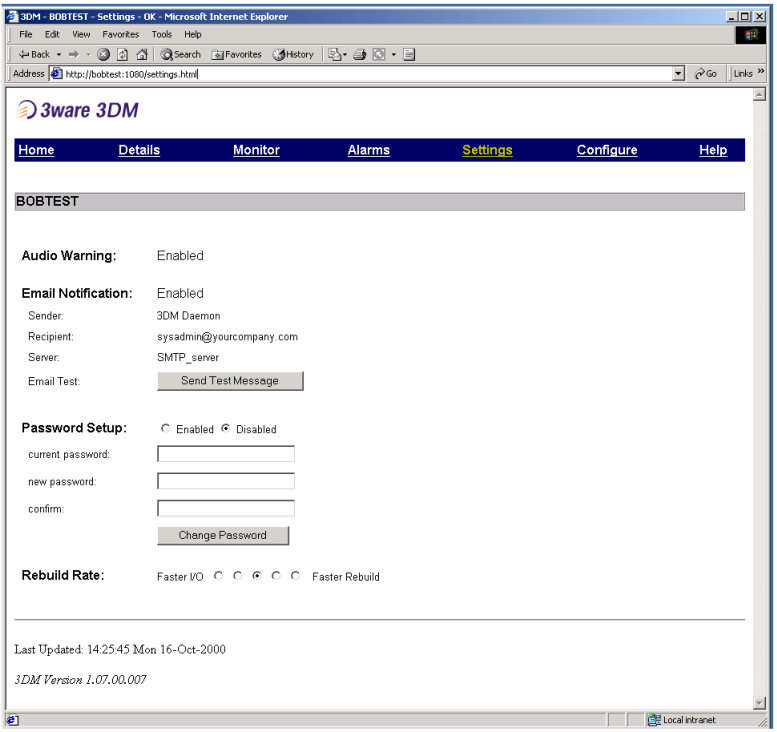



**Figure 54. 3DM Settings Display**

**Note:** Selecting the **Help** option brings up the 3DM Help display.

## Password Setup

1 In 3DM, open the **Settings** display (see Figure 54).

2 If configuring a password for the first time, in the **current password** field, enter the default password (“3ware”).

3 Enter a new password in the **new password** box, then in the **confirm** box.

4 Click **Change Password**, and click the **Enabled** option. (It is necessary to click Change Password BEFORE you click the Enabled option.)

5 With password protection enabled, using 3DM will require entering the password into the login display shown in Figure 55. Passwords are case sensitive.

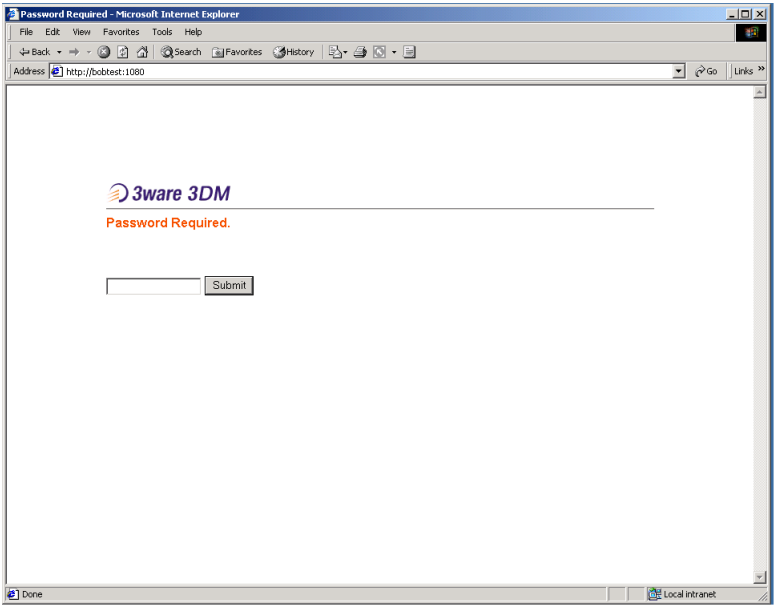



**Figure 55. 3DM Login Display**

### Selecting I/O and Rebuild Speeds

3DM allows you to choose between a faster I/O rate or a faster Rebuild rate. Once the rate is selected, this function is only active during Rebuilds. Click on the desired rate in the **Rebuild Rate** portion of the **Settings** display (see Figure 54).

### Event notification via email

If an event occurs, an event notification will be emailed to the recipient identified in the email setting specified at 3DM installation. The email will contain the same information found on the Alarm display.

### Popup notifications in a Windows environment

3DM is a background process that can run as a system tray utility in the Windows environment. Essentially, the same information that is found using the remote monitor capability through your web browser can be accessed locally on your computer.

**Note:** The system tray is the small area on the right side of the desktop's task bar. It contains the clock and small icons for applications running in the background (programs which are always running, but don't take up space on the screen).

If you have not already done so, run 3DM by selecting **3DM** from the Start menu (see Figure 56). You should see the 3DM icon displayed in the system tray and the 3DM Windows main popup will open. This popup displays configuration, status and version information for 3ware storage controller(s) installed in the local system.

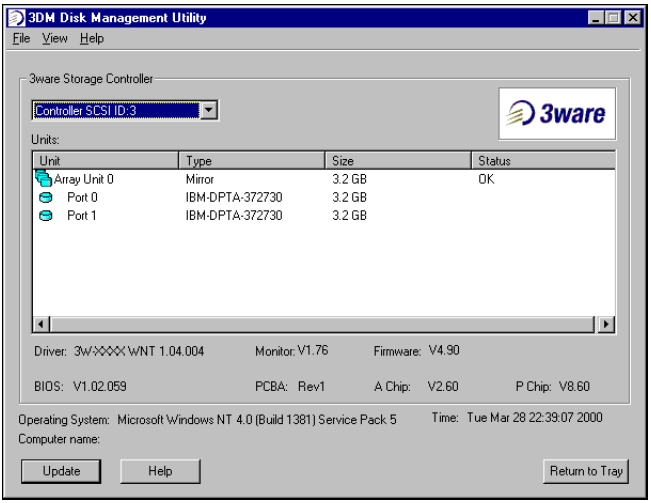



**Figure 56. 3DM Windows Main Popup**

The popup shows the configuration and version information for the 3ware storage controller listed in the drop down menu. If you have more than one storage controller installed, you may view information for the other storage controllers by changing the value in the drop down menu.

Disk arrays and independent disks are listed under “Units.” Disks that are members of an array will be indented and listed below their parent array. The type and size of the disks or arrays are listed as well as status of each array.

Version information for the driver, monitor, firmware, BIOS, and hardware revisions are listed. This information can be invaluable when troubleshooting problems and should be noted when contacting 3ware customer support. For an easy way to include this information in an email or other text document, refer to the **Snapshot** or **Copy to Clipboard** features in the following paragraphs. The

**Event Notification** popup (see Figure 57) appears when the storage controller requires attention, such as when a disk array becomes degraded.

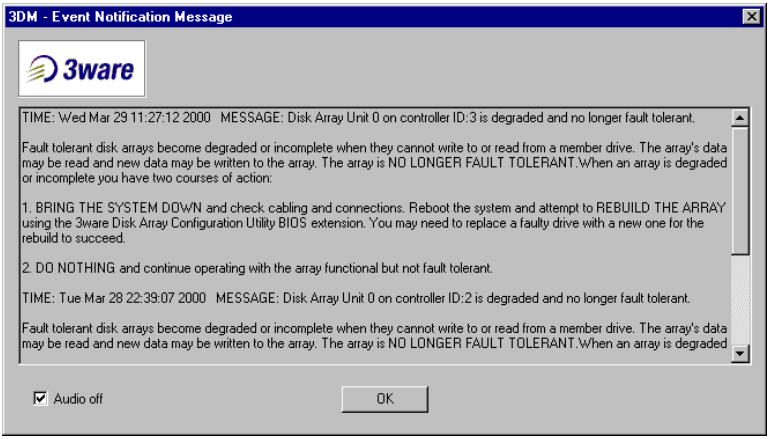



**Figure 57. 3DM Windows Event Notification Popup**

The popup will flash its border and beep until it is dismissed with the OK button. To return a degraded disk array to full fault tolerance, refer to *3DM Maintaining Arrays* or *Rebuilding a Mirrored Disk Array* in the *3ware Disk Array Configuration Utility* chapter.

Event notification will only occur while 3DM is running, so we recommend that 3DM be left running as background utility by returning it to the system tray rather than exiting.

The Snapshot popup (see Figure 58) gives storage controller version and status information in text format, which is helpful when contacting 3ware Customer Support with questions or for troubleshooting. Select **File,** then **Snapshot**, to bring up the snapshot popup. Its text format allows you to select the text in the window with your mouse and copy the information to the system clipboard.

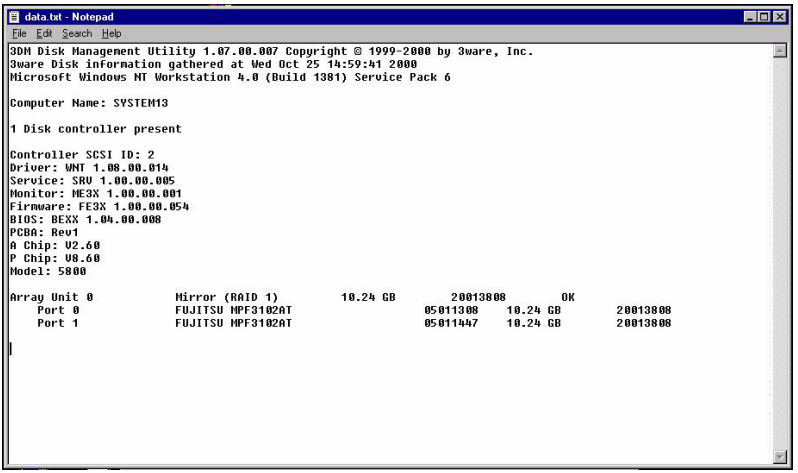



**Figure 58. 3DM Windows Snapshot Popup**

Alternatively, you can also Select **File,** then **Copy to Clipboard,** from the 3DM main popup to copy information to the system clipboard. The information obtained from **Snapshot** or **Copy to Clipboard** can then be pasted into email or documentation.

When you are finished reviewing the information in the 3DM main popup, you may either close the window with the **Return to Tray** button or exit the application (see Figure 59). Since 3DM will alert you of drive failures, we recommend that you close it with the **Return to Tray** button. This will keep the application running in the background, ready to alert you in case of drive failure. When 3DM runs in the background, it will appear as an icon in the system tray in the lower right corner of your screen. Clicking on the icon will bring the 3DM main window back into view.


**Figure 59. 3DM Icon in Windows System Tray**

# Mirrored Array Maintenance

From the **3DM Configure Display** (see Figure 60), you can designate an available drive as a hot spare, rebuild mirrored arrays or remove and add a drive as part of a hot swap procedure. To access the **Configure Display** enter the URL of the 3DM port in the address bar of your standard web browser. You must be connected to the same network as 3DM. The default URL is http://localhost:1080/. Navigate to the **Configure** display. The display shows arrays, member drives and status.

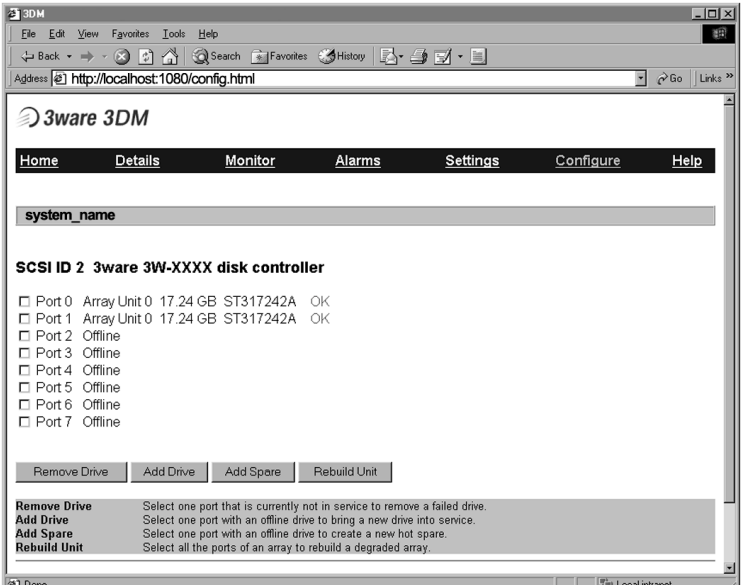



**Figure 60. 3DM Configure Display**

## Specifying a hot spare

3ware storage controllers give you the option to specify a hot spare from one of your available drives**.** Hot spares should be selected after mirror creation. Refer to *Creating a disk array* in the *3ware Disk Array Configuration Utility* chapter. If a hot spare is specified and the mirror degrades, an event notification will be generated. The hot spare will dynamically replace the failed drive in a mirrored array without user intervention. To specify a hot spare, click on the check box next to an available drive and then click on the **Add Spare** button.

### Rebuilding a mirrored array with no hot spare

Use the check box to select the two drives, faulted and non-faulted, of the degraded mirror. Click on the **Rebuild Unit** button. If the drive is not successfully rebuilt, the faulted drive will have to be replaced and the array rebuilt. You can use the 3DM hot swap procedure in the section below or refer to *Rebuilding a mirrored array with no hot spare* in the *3ware Disk Array Configuration Utility* chapter.

### Auto rebuild of a mirrored array

If a hot spare is specified and the mirror degrades, an event notification is generated and the hot spare dynamically replaces the failed drive in a mirrored array without user intervention. Rebuild will automatically be launched as background process and an event notification will notify the user when the rebuild process is complete.

## Hot swap

Hot swap allows user to replace a failed drive in a mirrored array while the system remains up. Hot swap can be used when 24x7 system operation is a consideration. If multiple drives are faulted in a RAID 10 configuration, you must rebuild the drives sequentially by port number starting with the lowest port number.

1 Click on the check box of the failed drive.

2 Click button **Remove Drive**.
3 Physically remove the failed drive and replace it with a new drive.
4 Click on the check box of the new drive.
5 Click button **Add Drive**.
6 Click on the check boxes of the members of the array to be rebuilt. This should include the new drive added in step 3.
7 Click button **Rebuild Array.**

The rebuild process will run in the background and an event notification will be sent when it is completed.

# Troubleshooting

## Problems and Solutions

### Hardware Installation

**Q1: The rail on the storage controller board doesn't fit in the case.**
Use a screwdriver to remove the black end rail. It aligns and secures the board in the computer chassis, but is not critical for operation.

**Q2: My system only has two power connectors, but I have four drives.**
The kit includes two Y-splitter power cables. Plug them into your existing power supply lines to go from two to four power lines for your drives.

**Q3: The system doesn't begin booting (no BIOS runs) when the storage controller board is installed, but boots OK when the board is removed.**
Check the cabling between the drives and the storage controller board. A cable plugged in upside down can prevent your system from running its BIOS.

**Q4: The 3ware BIOS scrolling messages never appear.**
The storage controller board is not installed properly. Reinstall the hardware and reboot.

**Q5: Some of the drives do not appear in the Disk Array Configuration Utility's main display.**
Your drives are not connected properly to the storage controller board. Check that both the power and ATA cables are connected properly and that the drives are all properly jumpered. To operate properly, the storage controller requires that drives be set as **Single** (if available on your drive) or **Master**.

**Q6: The 3ware BIOS scrolling messages stop midway:**

```
3ware DiskSwitch 4 Storage Controller BIOS
Bus A:0x00 Device #:0x70 PCI base addr:0x000010B1 units #
```

The storage controller board is detected, but the disks may not be connected to their power source. Reconnect to their power source and reboot.

**Q7: The 3ware BIOS displays the following error message:**

```
RAID configuration only support identical drives. Please
check and replace unidentical drives.
```

The current hardware installation includes a combination of disk drives that are not identical in manufacturer, model, and size. A BIOS error message and screen for RAID 10 is shown in Figure 61.

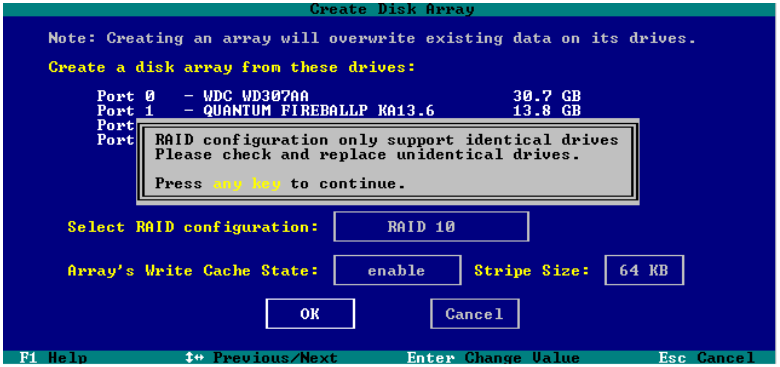



**Figure 61. BIOS Error Message for Unmatched Drives**

**Q8: RAID 5 is not supported by 3ware's 5000 series storage controllers.**

## Software Installation

**Q9: The storage controller was configured without problems, but the system does not boot.**

The problem could be one or more of the following:

- The operating system is installed on a device that is not in your system's boot order. Use your system's Setup utility to include the DiskSwitch controller in the boot order.
- If your operating system was installed before you configured your disk arrays, you may have overwritten your operating system. Remember that creating or deleting a disk array overwrites any existing data on the member drives. Reinstall your operating system.
- If you installed your operating system when you installed the storage controller, you may have made a mistake in installing the operating system. Reinstall your operating system.

**Q10: Under Windows NT, disks show up at boot time but don't show up in Disk Administrator.**
The driver has not been installed. Follow the instructions in **Installing the storage controller on systems that boot from a different device**.

**Q11: An array does not appear in the 3ware BIOS scrolling messages, and shows up as incomplete in the Disk Array Configuration Utility's main display similar to the following:**

```
Array Unit 1 - Incomplete     6.5 GB
       Port 1 - FUJITSU MPC3065AH      6.5 GB
```

The array has some, but not all of its members available. The array will be unusable. If this array is your boot device, your machine will not boot. You must either find the missing disk and replace it to complete the array, or release the member disks by deleting the incomplete array(s) listed in the display. Remember that deleting a disk array overwrites any existing data on the member drives.

**Q12: Under Windows NT, disks don't appear in the Windows Explorer, but appear in the 3ware BIOS scrolling messages and appear in the Disk Array Configuration Utility's main display.**
Log in as the administrator. Partition and format any new disk arrays or freed disks using Disk Administrator. From the Start

menu, choose Programs, followed by Administrative Tools and Disk Administrator.

**Q13: RAID 5 is not supported by Windows 98 or ME.**

**Q14: The use of Red Hat's Disk Druid partitioning utility with Red Hat 6.2 or 7.0 is limited to 112 GB.**
Use fdisk if more storage capacity is required.

## Screen Display Messages

Figure 62 through Figure 67 help explain screen messages that may appear during installation

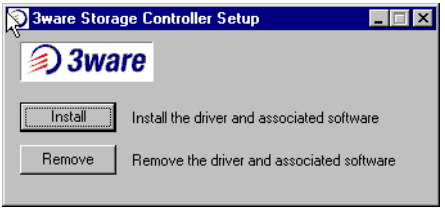



**Figure 62. Installation or Removal Dialog Box**

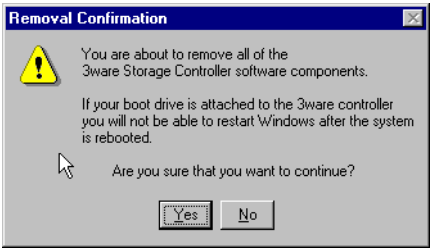



**Figure 63. A Warning for All Software Removal Requests**


**Figure 64. Confirmation of Successful Software Removal**


**Figure 65. Administrator Privileges Required Warning**

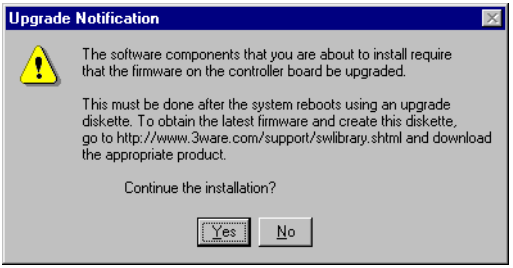



**Figure 66. Firmware Upgrade Requirement Warning**

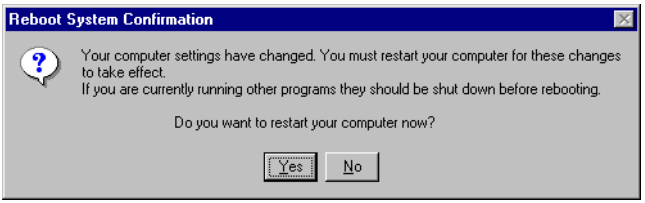



**Figure 67. System Reboot Request**

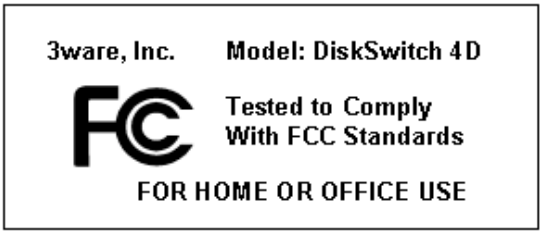
# Appendix A Compliance and Conformity Statements

## Federal Communications Commission Radio Frequency Interference Statement

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 instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television 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 the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

To maintain compliance with FCC radio frequency emission limits, use shielded cables and connectors between all parts of the computer system.



## Microsoft Windows Hardware Quality Lab (WHQL)

3ware, Inc. is committed to Microsoft Windows Hardware Quality Labs (WHQL) certification for all its products. However, a product's software drivers are typically submitted for certification at nearly the same time as their release to market. Since the certification process may lag behind the release of the drivers, please refer to our WEB site at www.3ware.com for current certification information.

## European Community Conformity Statement

The DiskSwitch Controller Card Model DiskSwitch 4D is in conformity with the following Common Technical Regulations and/or normative documents:

**EN 55022** Limits and methods of measurements of radio interference characteristics of information technology equipment

**EN 61000-4-2** Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques Section 2: Electrostatic discharge immunity test

**EN 61000-4-3** Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques Section 3: Radiated, Radio-Frequency, Electromagnetic Field Immunity Test

**EN 61000-4-4** Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques Section 4: Electrical fast transient/burst immunity test

**EN 60950** Safety of information technology equipment, including electrical business equipment following the provisions of the Electromagnetic Compatibility Directive 89/23/EEC Low Voltage Directive.

CE

PCI LOCAL BUS

# Appendix B
# Warranty, Technical Support and Service

## Limited Warranty

3-Year Hardware Warranty: 3WARE, INC. warrants this product against defects in material and workmanship for a period of thirty-six (36) months from the date of original purchase. 3ware, at no charge and at its option, will repair or replace any part of this product which proves defective by reason of improper workmanship or materials. Repair parts or replacement products will be provided by 3ware on an exchange basis, and will be either new or refurbished to be functionally equivalent to new. Products or parts replaced under this provision shall become the property of 3ware.
Software Warranty: 3WARE, INC. will replace a defective media purchased with this product for a period of up to 30 days from the date of purchase.
For detailed terms and conditions, please see the Limited Hardware Warranty and Software License Agreement at our website http://www.3ware.com/support/rma.shtml
3ware warranty service is provided by returning the defective product to 3ware.

## Exclusions

THIS WARRANTY DOES NOT COVER ANY DAMAGE TO THIS PRODUCT WHICH RESULTS FROM ACCIDENT, ABUSE, MISUSE, NATURAL OR PERSONAL DISASTER, OR ANY UNAUTHORIZED DISASSEMBLY, REPAIR OR MODIFICATION. 3WARE SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOSS OF PROFITS, OTHER LOSS, DAMAGE OR EXPENSE DIRECTLY OR INDIRECTLY ARISING FROM THE CUSTOMER'S MISUSE OF OR INABILITY TO USE THE PRODUCT, EITHER SEPARATELY OR IN COMBINATION WITH OTHER EQUIPMENT, REGARDLESS OF WHETHER 3WARE HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. 3WARE IS NOT LIABLE FOR, AND DOES NOT COVER UNDER WARRANTY, ANY COSTS ASSOCIATED WITH SERVICING AND/OR THE INSTALLATION OF 3WARE PRODUCTS. THIS WARRANTY SETS FOR THE ENTIRE LIABILITY AND OBLIGATIONS OF 3WARE WITH RESPECT TO BREACH OF WARRANTY, AND THE WARRANTIES SET FORTH OR

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This warranty gives you specific legal rights and you may have other rights which vary from state to state. Some states do not allow the exclusion of incidental or consequential damages or allow limitation of implied warranties or their duration, so that the above exclusions or limitations may not apply.

## Obtaining Warranty Protection

In order to obtain warranty service during the warranty period, please call 3ware toll free at (877) 88-3ware [(877)-883-9273] or +1-650-614-3439 direct as soon as you have identified a problem with your 3ware Storage Controller unit. At such time, you will be issued a return material authorization (RMA) number. 3ware will send a replacement within 2 business days of receipt of the defective unit.

Advanced Replacement is available with a credit card number with an authorization in the amount equaling the then current list price, including shipping costs, of the 3ware Storage Controller. As soon as practicable thereafter, 3ware will ship the Advanced Replacement to you at the address of your choosing. Upon receipt of the Advanced Replacement, we ask that you immediately ship the defective 3ware Storage Controller unit to 3ware at 490 California Avenue, 2nd Floor, Palo Alto, California 94306. If 3ware receives the defective 3ware Storage Controller unit from you within thirty (30) days of the date of shipment of the Advanced Replacement, 3ware will destroy your credit card authorization and you will not be charged for the Advanced Replacement.

Please use the original packing material contents of the box when exchanging or returning a product.

## 3ware Technical Support and Services

Product information, Frequently Asked Questions, software upgrade and driver files, and other support are available through the 3ware World Wide Web site at http://www.3ware.com. 3ware's software library is accessible at http://www.3ware.com/support/swlibrary.shtml. Web-based software downloads feature upgrading multiple controllers simultaneously.

For specific answers to questions or to give feedback about the product, visit out website at www.3ware.com/support and use our convenient webmail form. 3ware also offers toll-free phone support during normal business hours at (877)88-3WARE or (650) 614-3439.

## Sales and ordering information

For sales information, send an electronic mail message to sales@3ware.com or call 3ware at 1(650) 614-3494.

## Feedback on this manual

Your feedback is welcome. If anything in the guide seems unclear, please let us know by sending email to support@3ware.com.

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