# TeraPac 3

## User Operation and Maintenance Guide

**MaxVision Corporation**
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**Madison, AL 35758, USA**

**Part Number: 209-0052-0**

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## Regulatory Approvals

EN60950, EN55024, EN55022, FCC, Part 15, EN61000-3-2 & EN61000-3-3.

## Warnings

Changes or modifications to this device that are not approved by the party responsible for compliance could void the user's authority to operate the equipment.

To reduce the risk of electrical shock, do not attempt to open the device unless instructed to do so. Do not use any tool for purposes other than instructed.

A Lithium Ion battery is included with the system motherboard. This battery is used for the Real Time Clock (RTC) circuit. The expected lifetime of the battery is approximately 5 years. There is a danger of explosion if this battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the motherboard manufacturer. Dispose of used batteries according to the manufacturer's instructions.

# Contents

# Chapter 1: Introduction and Very Important (Must-Read) Information!

# Very Important Information!

RAID Arrays in general – and RAID controllers in particular – can be somewhat tricky to work with. It is very easy to lose your data – and your operating system – if you execute an incorrect sequence of commands. Thus, unless you are very experienced in the use of *3ware* SATA II RAID controller cards and their BIOS-level setup utilities, it is strongly recommended that you follow the step-by-step instructions provided in this manual.

Once a MaxPac and TeraPac 3 have been mated (powered-up and initialized) together – which is the way a new MaxPac/TeraPac combo arrive when you purchase them together – there are certain things to keep in mind:

- You should connect the data cables linking the MaxPac and TeraPac 3 units *before* powering-up either of the units.
- On power-up, it is recommended that you first power-up the TeraPac 3 and *then* power-up the MaxPac. It won't cause any serious problems if you power-up the MacPac first, except that the MaxPac won't see the TeraPac 3, even after the TeraPac 3 has powered up (you will have to restart the MaxPac in order for it to see the TeraPac 3).
- On power-down, it is recommended that you first perform a controlled shutdown of the MacPac (using the **Start > Shutdown** command), and then power-down the TeraPac 3.
- If you wish to disconnect the TeraPac 3 *without* powering-down the MaxPac, then you **must** first un-mount the TeraPac 3, then power-down the TeraPac 3, and *then* disconnect the TeraPac 3 from the MaxPac.
- It is strongly recommended that you have UPS backup on both the MaxPac and TeraPac 3 units.

# Documentation Conventions

## Icons

- The information icon is used to annotate important information.

- The exclamation icon is used to annotate cautionary information.

## Fonts

- *Italics* font is used for emphasis, book titles, commands, and path and file names.
- **Bold** may be used to emphasize text, highlight menu items, and denote the titles of dialog boxes.
- **Menu > Command** identifies the path used to select a menu command.
- `Courier` font is used for program listings and for any text messages that the software displays on the screen.
- **Note:** describes important information, warnings, or unique commands.
- "Select" means click the left mouse button on the indicated item.
- "Click-left" (or just "click") means click the left mouse button on the indicated item.
- "Click-middle" means click the middle mouse button on the indicated item.

- “Click-right” means click the right mouse button on the indicated item.
- “Double-click” means click twice consecutively with the left mouse button.
- “Drag-left” (or just “drag”) means press and hold the left mouse button on the indicated item, then move the cursor (pointer) to the destination and release the button.
- “Shift-click-left” means press and hold the <Shift> key then click the left mouse button on the indicated item.
- “Ctrl-click-left” means press and hold the <Ctrl> key then click the left mouse button on the indicated item.

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# Chapter 2: Preparing a MaxPac 8230 (The Hardware)

# Introduction

The discussions in this chapter pertain to the case whereby you have purchased a TeraPac 3 as a separate unit and you wish to mate this TeraPac 3 with an existing MaxPac 8230 system.

# Preparation

1) Place the MaxPac 8230 system in its service position as described in the *MaxPac Single / Dual / Triple-Screen 8230 XRA1/2/3 User Operation and Maintenance Guide* (if you have misplaced your copy, you can download a machine-readable version from the *Support* page on the MaxVision website at **www.MaxVision.com**).

2) Lift the inner chassis straight up and then rest the edge on the outer chassis as illustrated in Figure 2-1.

**Figure 2-1**

**Figure 2-2**

3) Use a Philips #2 screwdriver to remove the two screws securing the access panel under the CD/DVD drive as illustrated in Figures 2-2 and 2-3.

**Figure 2-3**

**Figure 2-4**

4) In order to remove the access plate you will have to push it in and bend it and then slide it out as illustrated in Figure 2-4.

5) Unpack the TeraPac 3 connection kit for the MaxPac 8230 and verify that all items are present as illustrated in Figure 2-5 (the two small black plates shown to the left of this figure are referred to as "wing plates").

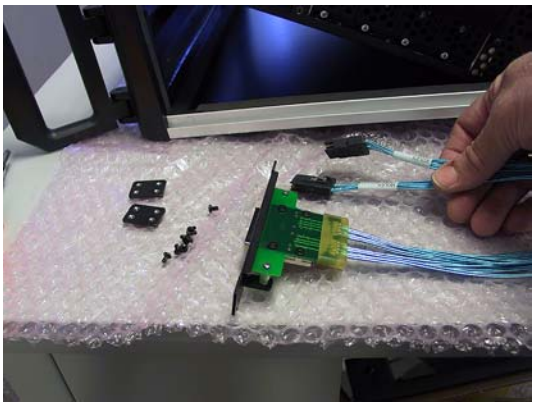

**Figure 2-5**

**Figure 2-6**

6) Use the screws provided in the kit to attach the two "wing plates" on either side of the cable access slot as illustrated in Figures 2-6 and 2-7 (only one screw is required per plate).

**Figure 2-7**


**Figure 2-8**

7) Slide the connection kit cable assembly into the chassis (Figure 2-8) until its faceplate is flush with the inner chassis (Figure 2-9). Orient the panel such that the silk-screen legends are as shown in this illustration.


**Figure 2-9**

**Figure 2-10**

8) Use a Phillips #2 screwdriver to attach the assembly to the "wing plates" (two screws per side) as illustrated in Figure 2-10.

9) Before connecting the cables internally, lift the inner chassis (Figure 2-11) and return it to its normal service position in the outer chassis.

**Figure 2-11**

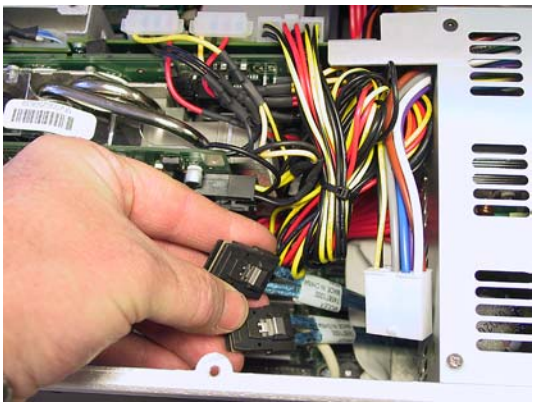

**Figure 2-12**

10) Gently guide the two multi-lane (ML) SATA cables under the CD/DVD drive and bring them up as shown in Figure 2-12.

11) The remainder of these instructions assume that your MaxPac 8230 is equipped with a 12-channel *3ware* RAID controller card. A quick way to check this is to ensure that the cables connected to the four internal disks are all red as illustrated in Figure 2-13. (In the case of earlier 8230 models equipped with a 4-channel *3ware* RAID controller card, these cables will be color coded. In this case, contact MaxVision for details on acquiring and installing a 12-channel controller.)

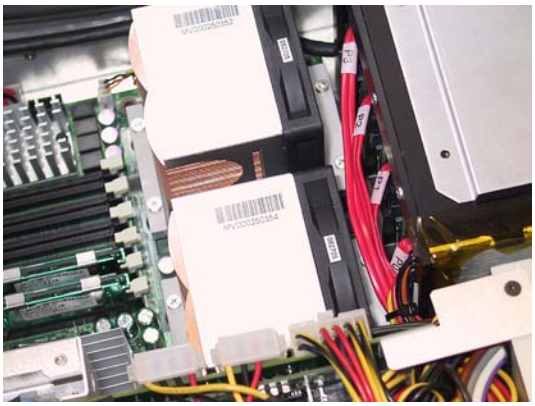

**Figure 2-13**

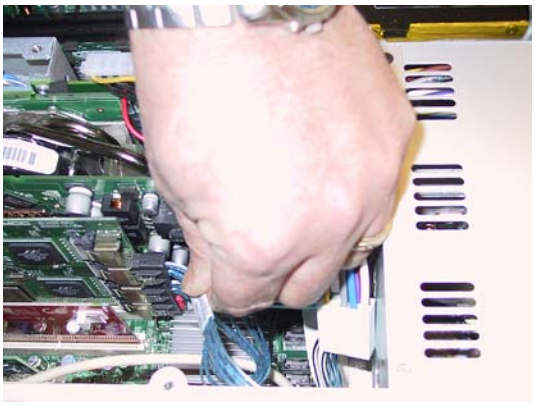

**Figure 2-14**

12) There are three 4-channel connectors on the 12-channel *3ware* RAID controller card. The bottom connector is used for the four internal drives. Connect the ML cable marked *disk 0-3* to the middle connector; and then connect the ML cable marked *disk 4-7* to the top connector (Figure 2-14).

# Chapter 3: Preparing a MacPac 9200 / 9210 (The Hardware)

# Introduction

The discussions in this chapter pertain to the case whereby you have purchased a TeraPac 3 as a separate unit and you wish to mate this TeraPac 3 with an existing MaxPac 9200/9210 system.

# Preparation

In order to use a TeraPac 3 with a MaxPac 9200/9210, you will need a free PCI Express slot in your MaxPac system. You will also require a custom 8-channel PCI Express *3ware* RAID controller card (such a card is obtainable only from MaxVision).

1) Unpack the custom 8-channel PCI Express *3ware* RAID controller card provided by MaxVision as illustrated in Figure 3-1.

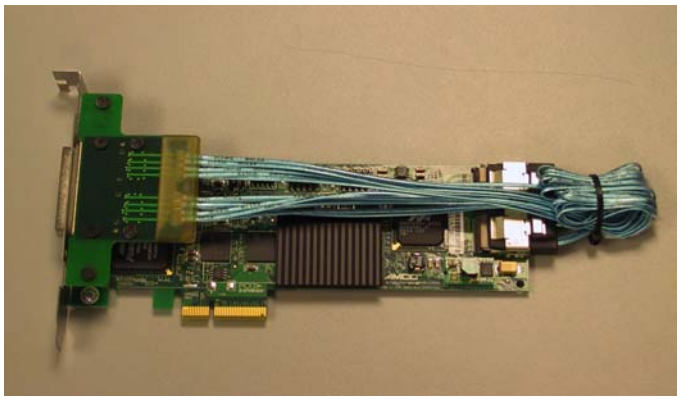

**Figure 3-1**

2) Add this card to the system using the procedures described in the appropriate *MaxPac 9200* or *MaxPac 9210 User Operation and Maintenance Guide* (Figure 3-2).

**Figure 3-2**

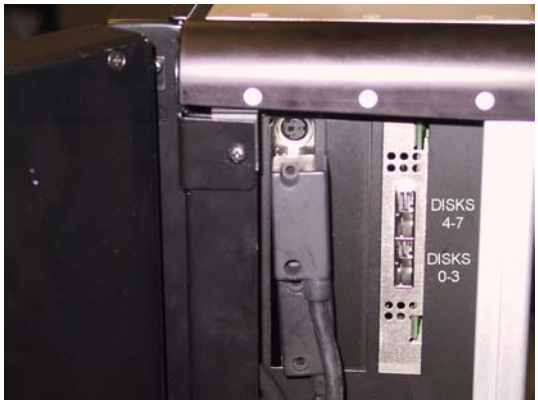


**Figure 3-3**

3) Once added, this card should appear as shown in Figure 3-3.

# Chapter 4: Unpacking and Preparing your TeraPac 3

# Inspect the TeraPac Shipment

TeraPac systems are packaged to withstand the roughest of treatment during shipping. Any boxes, foam core padding, and anti-static bags should be stored safely away in case you need to ship the system for any reason in the future. Inspect the Pelican Case the system arrived in. If there is any unusual damage to the case, make note of the damage on the delivery form and contact MaxVision support (see *Appendix A for more details*).

# Unpacking the TeraPac

TeraPac 3 units are always shipped inside an associated Pelican case, which weighs approximately 20 lbs. The TeraPac/Pelican combo weighs approximately 45 lbs. If you are unable to lift this weight safely, you should obtain assistance in unpacking and moving the system.

1) Clear an area on a desk or table on which to place the TeraPac 3 system.
2) Place the Pelican case containing the TeraPac 3 unit on the floor.

**Note:** In order to raise or lower the handle on the Pelican case, use your thumb to press the release catch on the top of the handle (Figure 4-1).

**Figure 4-1. Use the release catch to raise or lower the Pelican case handle.**

3) Place the Pelican case in an upright position and open it (Figure 4-2).
4) Lift the TeraPac 3 out of the Pelican case (Figure 4-3) and place it on the desk next to the main MaxPac system.

**Figure 4-2**

**Figure 4-3**

# Location and Power Requirements

## Location

Your TeraPac 3 unit needs to be positioned in a location with the capacity to safely support the main MaxPac system plus least 25 lbs for the TeraPac. The unit should be unobstructed so as to permit the free flow of cooling air through the intake and exhaust vents.

## Power Requirements

TeraPac 3 power supplies are auto-sensing 100 to 240 VAC, 50 to 60Hz units. Ensure that the supplied power is sufficient, stable, and without spikes or surges for operation of your TeraPac 3 and other required equipment.

# Preparing Your TeraPac 3

1) Remove the power cord and two multi-lane (ML) SATA data cables from the Pelican case as illustrated in Figure 4-4 (the default length of the data cables is 1 meter). Observe the special Baghdad oil-based filter, which protects the TeraPac 3 from hostile environments (Figure 4-5).

**Figure 4-4**

**Figure 4-5**

2) Proceed to chapter 5 for instructions on powering up your MaxPac / TeraPac combo.

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# Chapter 5: Powering-up a MaxPac / TeraPac Combo

# Before You Start

**Note:** Do NOT power-up your MaxPac until you have connected it to the TeraPac 3 as discussed later in this Chapter. Also, in the case of dual- or triple-display systems, do not unfold the display screens at this time (wait until after you have connected the TeraPac 3 to the MaxPac).

1) If your TeraPac 3 was delivered as part of a preconfigured MaxPac / TeraPac combo, unpack your MaxPac system and connect its cables (power, mouse, keyboard, and network) as described in the appropriate *MaxPac User Operation and Maintenance Guide*.

   Alternatively, if you are adding a new TeraPac 3 to an existing MaxPac system, first prepare the MaxPac as described in *Chapter 2* (MaxPac 8230) or *Chapter 3* (MaxPac 9200/9210).

2) Unpack and prepare your TeraPac 3 unit as described in *Chapter 4* of this manual.

# Using the TeraPac 3 with a MaxPac 8230

1) Take the TeraPac 3 data/control cable marked *disks 0-3* and plug one end into the upper connector on the MaxPac system as illustrated in Figure 5-1 (this connector will also be annotated *disks 0-3*).


**Figure 5-1**

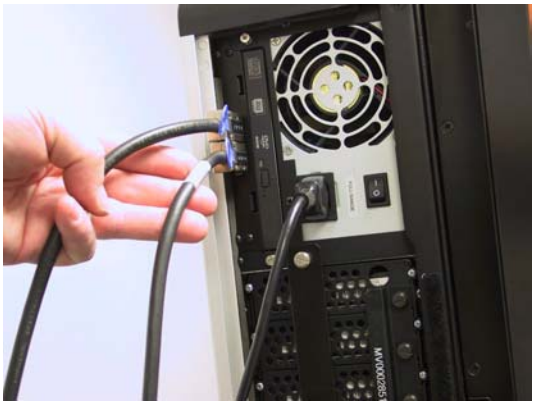

**Figure 5-2**

2) Take the TeraPac 3 data/control cable marked *disks 4-7* and plug one end into the lower connector on the MaxPac system as illustrated in Figure 5-2 (this connector will also be annotated *disks 4-7*).

3) Plug the other ends of these data/control cables into the correspondingly labeled connectors on the TeraPac 3 unit as illustrated in Figure 5-3 (the *disks 0-3* connector is located on the right-hand-side of the back face of the unit – this is the connector being pointed to in Figure 5-3).

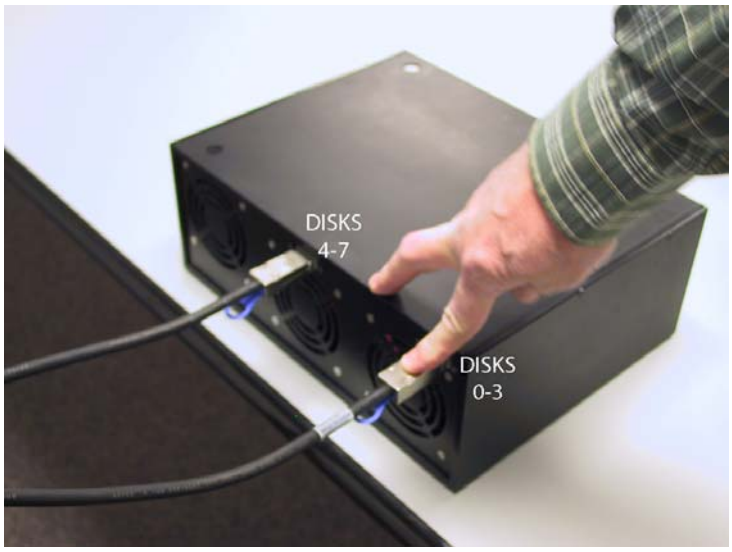


**Figure 5-3**

4) Connect the main power cable to the TeraPac 3 as illustrated in (Figure 5-4) and then plug the other end into an appropriate power supply.

**Figure 5-4**

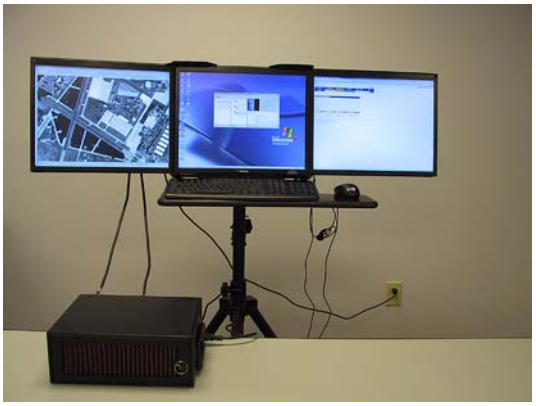

**Figure 5-5**

5) In the case of dual- or triple-display MaxPac systems, unfold the display screens at this time.

## Using an Existing TeraPac 3 / MaxPac 8230 Combo

1) Power-up the TeraPac 3 using the power switch located just above the main power connector as illustrated in Figure 5-4. Wait a few seconds for the unit to power-up, and then power-up the MaxPac system as described in the in the *MaxPac 8230 User Operation and Maintenance Guide*.

2) If your TeraPac 3 was delivered as part of a preconfigured MaxPac / TeraPac combo, then the system should boot as expected (Figure 5-5). You can check for the existence of the TeraPac RAID array by means of the **Disk Administrator** utility as follows:

   a) Right-click on the **My Computer** icon on your desktop, and then select (left-click) the **Manage** item from the ensuing pop-up menu.

b) Click the '**+**' symbol next to the **Storage** item (if this item is in its collapsed state) in the left-hand navigation pane, and then select the **Disk Management** item. You should see three disk drives similar to those shown in Figure 5-6.

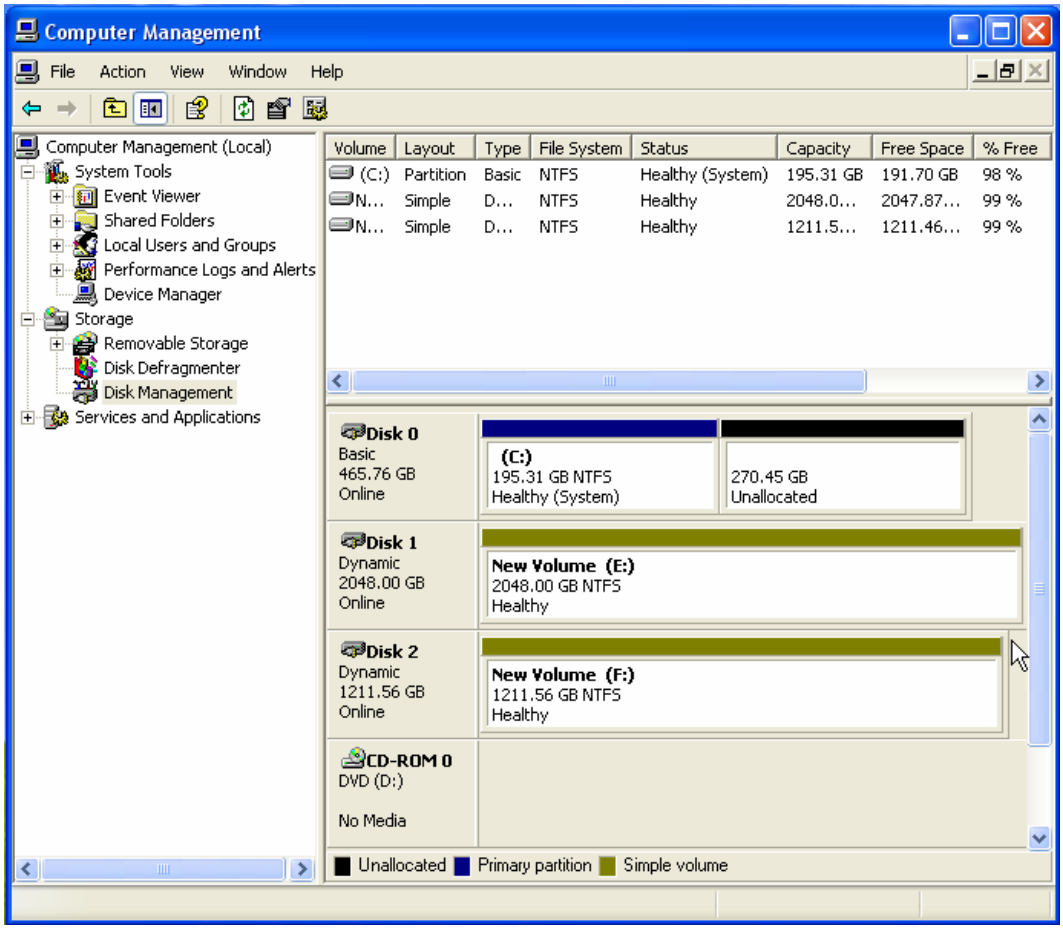


**Figure 5-6. The internal 4-disk RAID array (Disk 0, Drive C: in this example) and the external TeraPac 8-disk RAID Array (Disk 1, Drive E: and Disk 2, Drive F: in this example).**

3) If (for some strange reason) your system does not "see" the external TeraPac 3 RAID array, proceed as though you had just mated a new TeraPac 3 with an existing MaxPac as discussed in the following topic.

**Note:** In this case the TeraPac 3 contains eight 500GB SATA disks in a RAID 5 array. This results in a total array size of 3.2 TeraByte (TB). Windows XP can only address Volumes of up to 2 TB. In this case the TeraPac 3 array was built using the auto-carve feature of the 3ware RAID controller. The RAID 5 array was broken up into multiple volumes of 2 TB maximum size. Operating systems without this limitation include Linux 2.6, FreeBSD 5.x, Windows XP-64bit and Windows 2003 SP1.

## Using a New TeraPac 3 with an Existing MaxPac 8230

1) Power-up the TeraPac 3 using the power switch located just above the main power connector as illustrated in Figure 5-4. Wait a few seconds for the unit to power-up, and then power-up the MaxPac system as described in the in the *MaxPac 8230 User Operation and Maintenance Guide*.

2) In the case of a normal boot-up sequence in which the external TeraPac 3 RAID array is seen by the main system, the *3ware* BIOS will report the presence of both the internal and external arrays, which – in this example – comprise 4 and 8 drives, respectively, as illustrated in Figure 5-7.

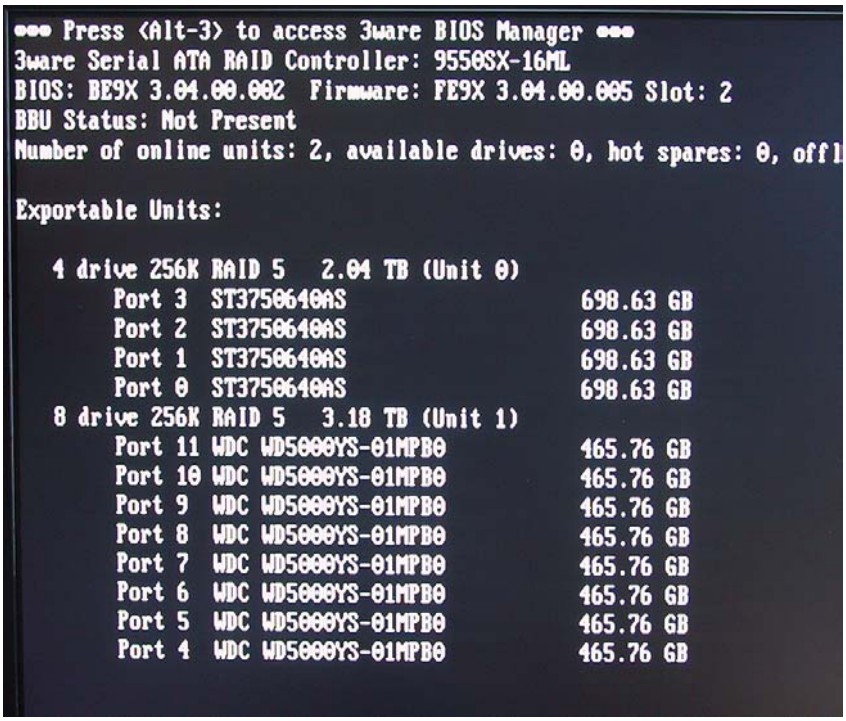


**Figure 5-7**

3) If, for some reason, the MaxPac 8230 does not boot into windows, this may be due to a boot-order problem. In this case, reboot the system and enter the motherboard BIOS as discussed in the *MaxPac 8230 User Operation and Maintenance Guide*.

4) Check the boot order. It should appear similar to that shown in Figure 5-8 with the *3ware* RAID controller listed after the DVD. If not, rearrange the boot order accordingly (you may need to move the *3ware* raid controller from the **Exclude** list to the **Include** list and then move it to just after the DVD entry.

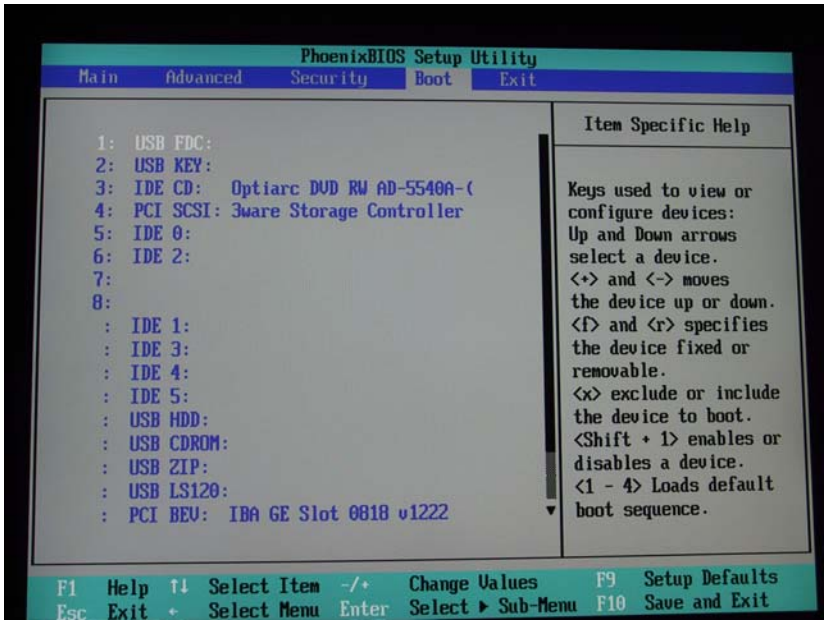


**Figure 5-8**

5) Reboot the system again and enter the *3ware* BIOS as discussed in the *MaxPac 8230 User Operation and Maintenance Guide*.

6) Check the disk order. It should appear similar to that shown in Figure 5-9 with the internal 4-drive RAID array shown on the top and the external 8-drive array on the bottom. (Only the two main unit entries – Unit 0 and Unit 1 – would be displayed by default. Each of these entries would have a '+' symbol next to it. For the purposes of these discussions, Figure 5-9 shows these units as being expanded to reveal the disks forming the array.)

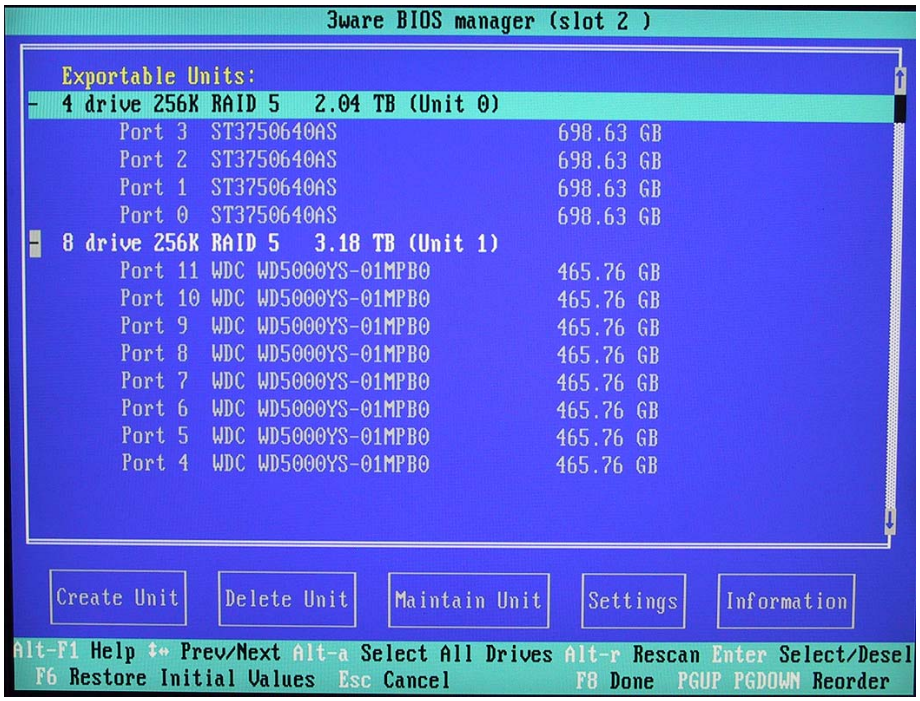


**Figure 5-9**

7) If the array order is not as shown in Figure 5-9, use the **PgUp** and **PgDn** keys on your keyboard to reorder the arrays and then follow the on-screen instructions to accept this change and exit the *3ware* BIOS.

8) When you exit the 3ware BIOS, it will automatically initiate the re-boot process. This time, the system should boot all the way up into Windows®. The next step is to import (incorporate) the external RAID array such that it can be seen and used by the operating system.

9) Right-click on the **My Computer** icon on your desktop, and then select (left-click) the **Manage** item from the ensuing pop-up menu.

10) Click the '+' symbol next to the **Storage** item (if this item is in its collapsed state) in the left-hand navigation pane, and then select the **Disk Management** item. You should see two disk drives similar to those shown in Figure 5-10.

**Note:** In this example, **Disk 0** (drive **C:**) is the main system disk (the internal 4-drive RAID array in this example), while **Disks 1 & 2**– shown as being **Foreign** – are the external 8-drive TeraPac 3 RAID array. Observe that **Disks 1 & 2** do not have a drive letter assigned at this time.

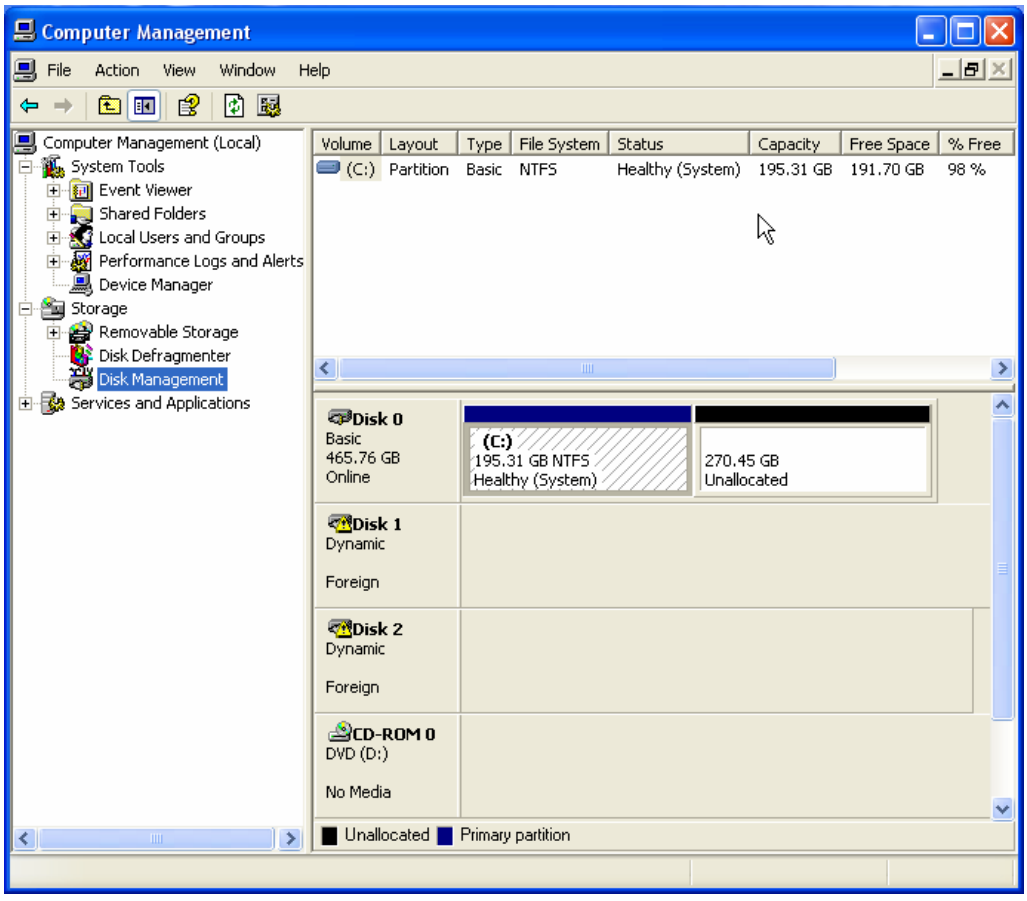


**Figure 5-10**

**Note:** In this case, the TeraPac 3 contains eight 500 GB SATA disks in a RAID 5 array. This results in a total array size of 3.2 terabytes (TB). Windows XP can only address Volumes of up to 2 TB. In this case, the TeraPac 3 array was built using the auto-carve feature of the *3ware* RAID controller. The RAID 5 array was broken up into multiple volumes, one of 2 TB and the other of 1.2 TB. Operating systems without this limitation include Linux 2.6, FreeBSD 5.x, Windows XP-64bit, and Windows 2003 SP1.

11) We now need to import **Disks 1 & 2** into Windows® XP using the following steps. Right-click on the **Disk 1** annotation and then select the **Import Foreign Disks** option, resulting in the **Import Foreign Disks** dialog as illustrated in Figure 5-11.

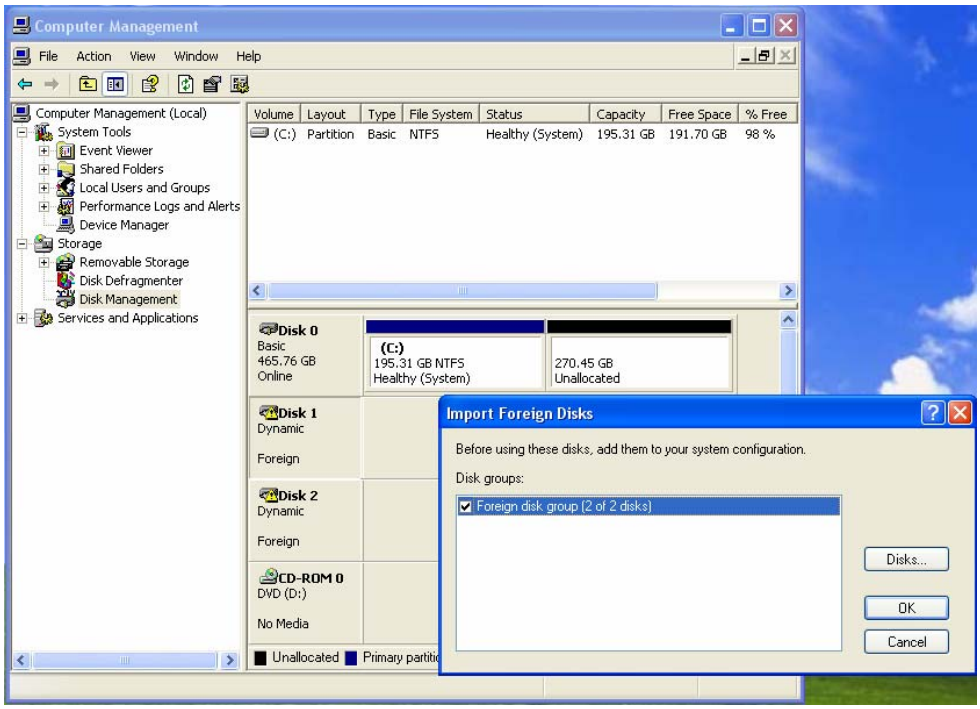


**Figure 5-11**

12) Ensure that the **Foreign Disk** check box in the **Disk Group** area is selected and then click the **OK** button to access the **Foreign Disk Volumes** dialog as illustrated in Figure 5-12.

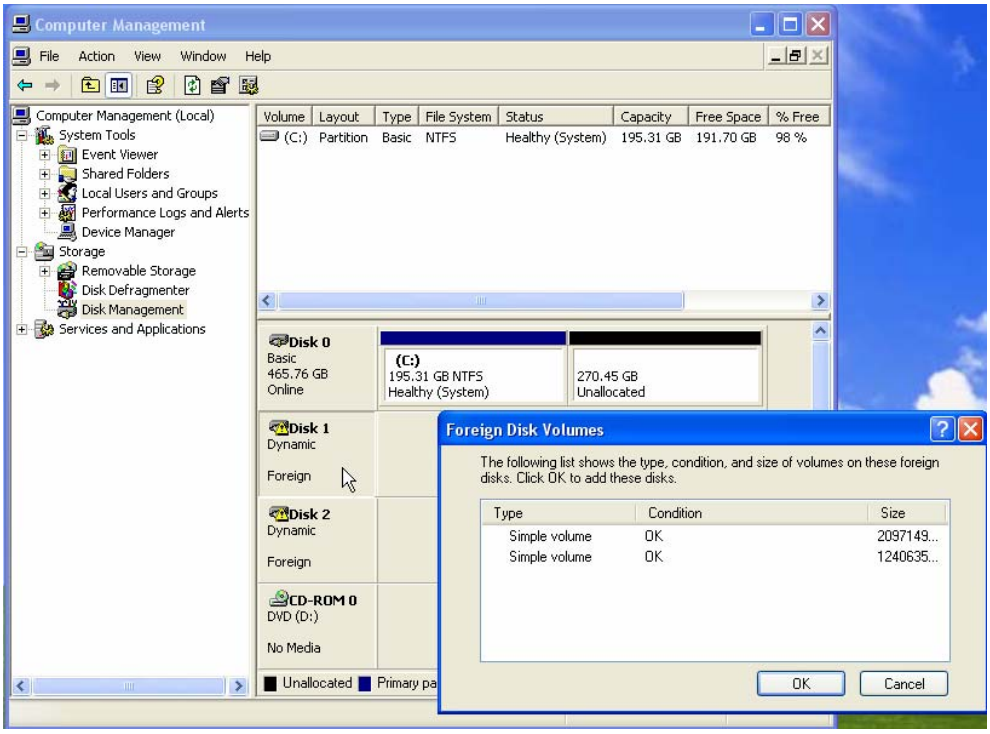


**Figure 5-12**

13) Click the **OK** button to accept the **Foreign Disk Volumes** dialog. Assuming that the TeraPac 3 array has been formatted (as will be the case if it was shipped from MaxVision), the array will automatically be assigned drive letters as illustrated in Figure 5-13. In this case the array is ready to use. (If you've recently re-built the array and it is not automatically assigned a drive letter, you will have to format the array at this point – this is just like formatting a regular hard drive.)

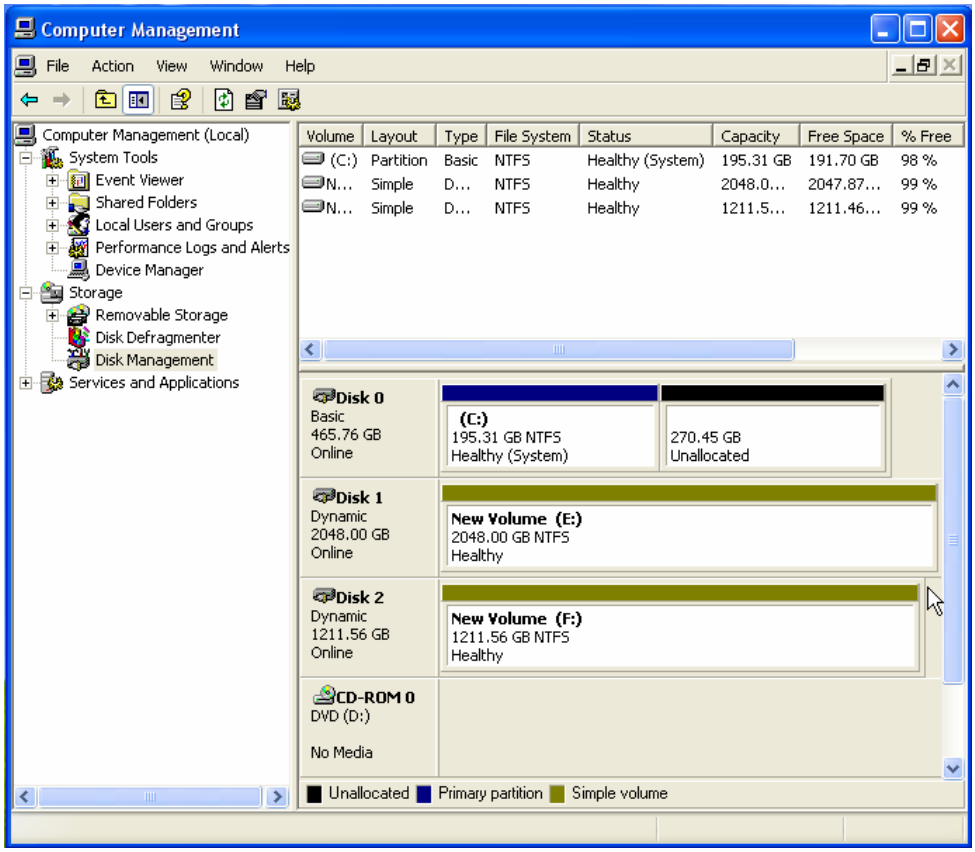


**Figure 5-13**

# Using the TeraPac 3 with a MaxPac 9200/9210

1) Observe the *3ware* PCI Express RAID controller as illustrated in Figure 5-14. The lower connector is annotated *sub-units 0-3*; the upper connector is annotated *sub-units 4-7*.

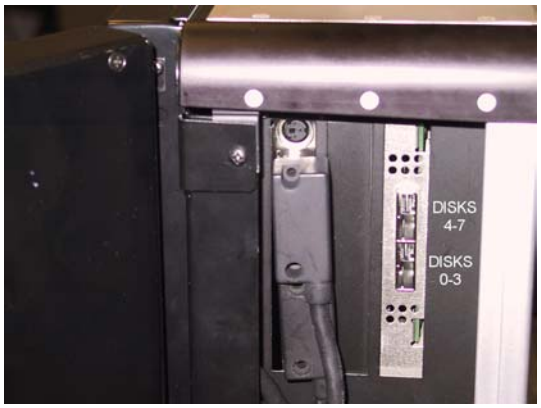


**Figure 5-14**

**Figure 5-15**

2) Take the TeraPac 3 data/control cable marked *disks 0-3* and plug one end into the *lower* connector on the MaxPac system; take the TeraPac 3 data/control cable marked *disks 4-7* and plug one end into the *upper* connector on the MaxPac system (Figure 5-15).

3) Plug the other ends of these data/control cables into the correspondingly labeled connectors on the TeraPac 3 unit as illustrated in Figure 5-16 (the *disks 0-3* connector is located on the right-hand-side of the back face of the unit – this is the connector being pointed to in Figure 5-16).

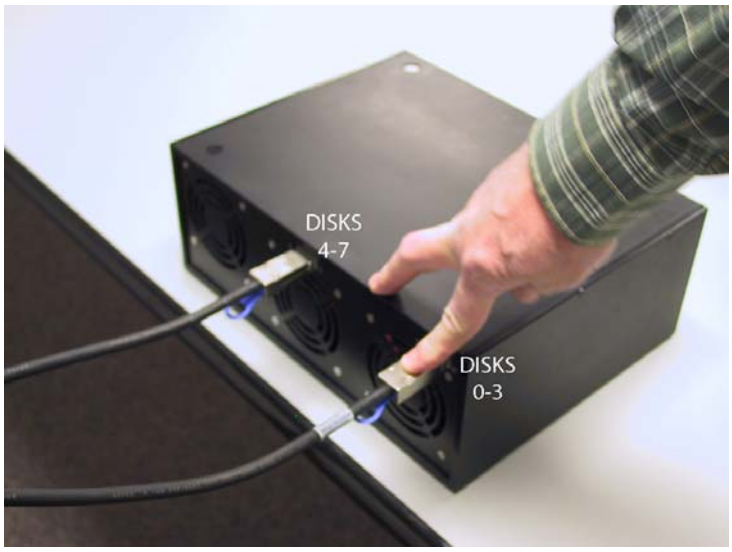


**Figure 5-16**

4) Connect the main power cable to the TeraPac 3 as illustrated in (Figure 5-17) and then plug the other end into an appropriate power supply.

**Figure 5-17**

6) In the case of a dual-display MaxPac system, unfold the second display screen at this time.

## Using an Existing TeraPac 3 / MaxPac 9200/9210 Combo

1) Power-up the TeraPac 3 using the power switch located just above the main power connector as illustrated in Figure 5-17. Wait a few seconds for the unit to power-up, and then power-up the MaxPac system as described in the in the *MaxPac 9200/9210 User Operation and Maintenance Guide.*

2) If your TeraPac 3 was delivered as part of a preconfigured MaxPac / TeraPac combo, then the system should boot as expected. You can check for the existence of the TeraPac RAID array by means of the **Disk Administrator** utility as follows:

   a) Right-click on the **My Computer** icon on your desktop, and then select (left-click) the **Manage** item from the ensuing pop-up menu.

   b) Click the '**+**' symbol next to the **Storage** item (if this item is in its collapsed state) in the left-hand navigation pane, and then select the **Disk Management** item. You should see three disk drives similar to those shown in Figure 5-18.

3) If (for some strange reason) your system does not "see" the external TeraPac 3 RAID array, proceed as though you had just mated a new TeraPac 3 with an existing MaxPac as discussed in the following topic.

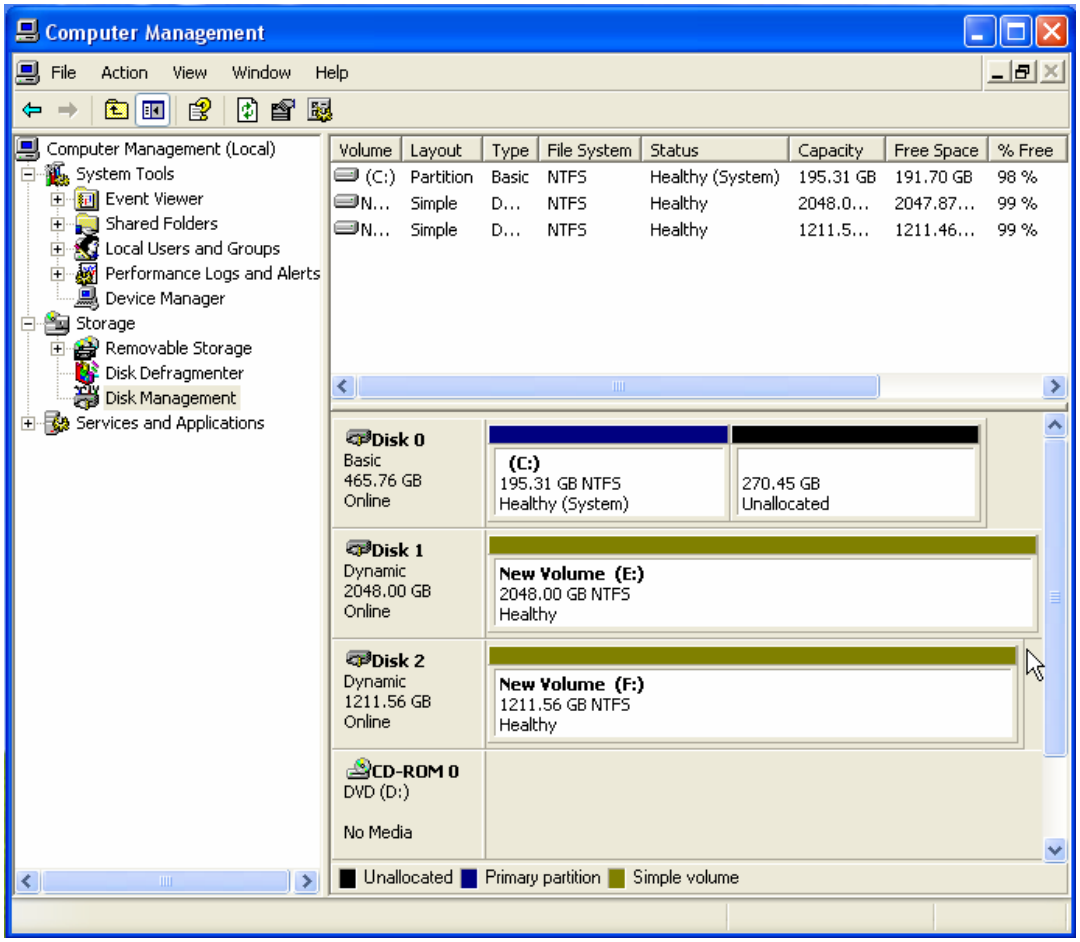


**Figure 5-18. The internal system disk (Disk 0 / Drive C: in this example) and the external TeraPac 8-disk RAID Array (Disk 1 / Drive E: / 2 TB and Disk 2 / Drive F / 1.2 TB in this example).**

**Note:** In this case, the TeraPac 3 contains eight 500 GB SATA disks in a RAID 5 array. This results in a total array size of 3.2 terabytes (TB). Windows XP can only address Volumes of up to 2 TB. In this case, the TeraPac 3 array was built using the auto-carve feature of the *3ware* RAID controller. The RAID 5 array was broken up into multiple volumes, one of 2 TB and the other of 1.2 TB. Operating systems without this limitation include Linux 2.6, FreeBSD 5.x, Windows XP-64bit, and Windows 2003 SP1.

## Using a New TeraPac 3 with an Existing MaxPac 9200/9210

1) Power-up the TeraPac 3 using the power switch located just above the main power connector as illustrated in Figure 5-17. Wait a few seconds for the unit to power-up, and then power-up the MaxPac system as described in the in the *MaxPac 9200/9210 User Operation and Maintenance Guide.*

2) In the case of a normal boot-up sequence in which the external MaxPac 3 RAID array is seen by the main system, the *3ware* BIOS will report the presence of the external array, which – in this example – comprises 8 drives, as illustrated in Figure 5-19.

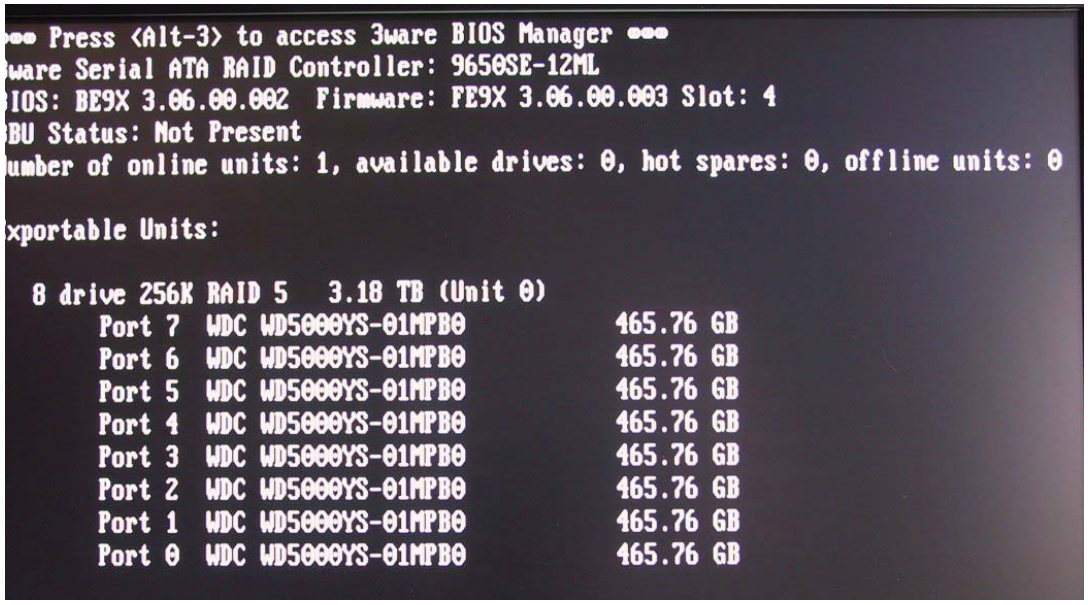


**Figure 5-19**

3) If, for some reason, the MaxPac 9200/9210 does not boot into windows, this may be due to a boot-order problem. In this case, reboot the system and enter the motherboard BIOS as discussed in the *MaxPac 9200/9210 User Operation and Maintenance Guide*.

4) Check the boot order. It should appear similar to that shown in Figure 5-20 with the system drive (highlighted in this example) appearing just before/above the *3ware* RAID controller. If not, rearrange the boot order accordingly.

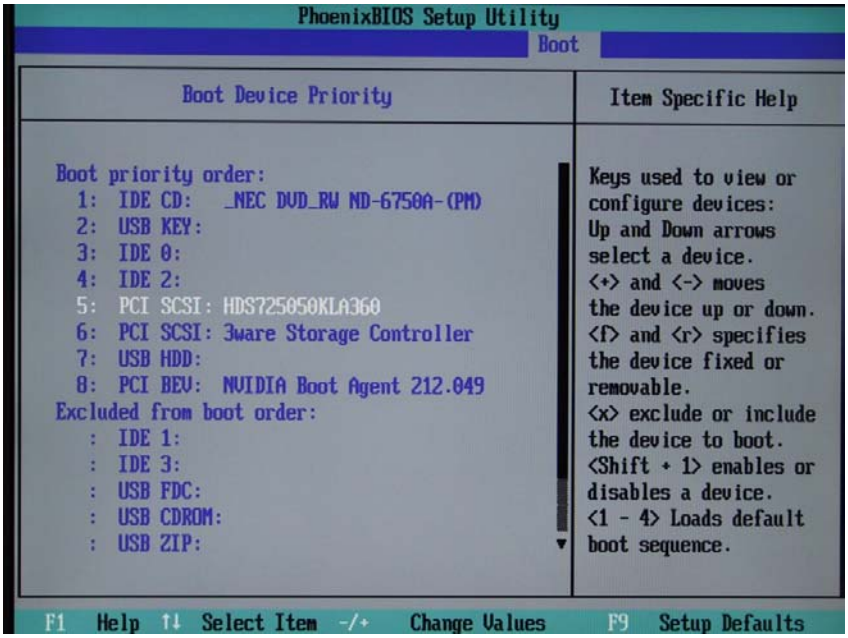


**Figure 5-20**

**Note:** In the case where you have just mated a *new* TeraPac 3 with an existing MaxPac 9200/9210, the first time you power the MaxPac up and the motherboard BIOS detects the presence of the new *3ware* RAID controller, it will automatically move the existing system drive to the **Excluded** list and replace it with the *3ware* controller. In this case, you will need to move the system disk from the **Excluded** list to the **Include** list and then move it to just before the *3ware* RAID controller entry.

5) Save the BIOS settings and exit the BIOS. This will cause the system to reboot automatically. This time, the system should boot all the way up into Windows®.

# Installing the Web-Based 3ware Software

Assuming that the *3ware* RAID controller was just added to a MaxPac 9200/9210, then you will also need to load the appropriate RAID driver followed by *3ware's 3DM 2* web-based RAID management application as described below. (Note that MaxPac 8230 systems already have this controller loaded because they come equipped with an internal RAID array.)

1) Power-up the TeraPac 3 using the power switch located just above the main power connector as illustrated in Figure 5-17. Wait a few seconds for the unit to power-up, and then power-up the MaxPac system as described in the in the appropriate *MaxPac User Operation and Maintenance Guide*. The operating system will see the RAID controller as a new device and will therefore prompt you to load the appropriate driver from the *3ware* CD, which is provided with your system.

2) Insert the *3ware* CD. The auto-play function will bring up the **3ware Escalade Menu** as shown in Figure 5-21. Initially you should ignore this menu; don't dismiss it, but instead use the operating system's **Device Manager** utility to look for the *3ware* driver on the CD and install it.

3) Once the *3ware* driver has been loaded, return to the **3ware Escalade Menu** and click the **Install 3DM 2** button.

4) Approve the license agreement in the ensuing pop-up dialog.

5) Following this wizard, *3ware's 3DM 2* software will be installed (when prompted to do so, allow the installation script to place a **3DM 2** icon on your desktop).

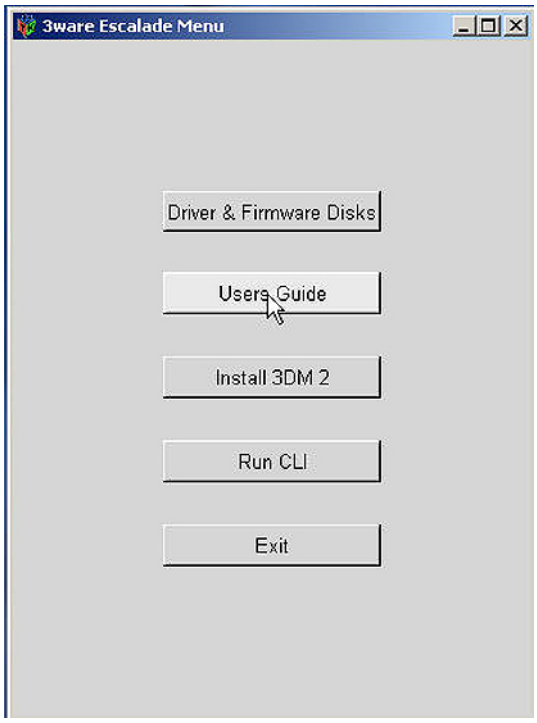


**Figure 5-21**

6) Once the 3DM 2 Web Software is installed reboot your MaxPac.

7) After reboot, the next step is to import (incorporate) the external RAID array such that it can be seen and used by the operating system.

8) Right-click on the **My Computer** icon on your desktop, and then select (left-click) the **Manage** item from the ensuing pop-up menu.

9) Click the '+' symbol next to the **Storage** item (if this item is in its collapsed state) in the left-hand navigation pane, and then select the **Disk Management** item. You should see three disk drives similar to those shown in Figure 5-22.

**Note:** In this example, **Disk 0** (drive **C:**) is the main system disk (direct connect to motherboard SATA), while **Disks 1** and **2** (shown as being **Foreign**) are the external 8-drive TeraPac 3 RAID array. Observe that **Disks 1** and **2** do not have a drive letter assigned at this time.

**Note:** MacPac 9200/9210 systems may have one or two removable SATA drives. In the case of a system with both internal drives, Figure 5-22 would display two **Basic** internal drives and two **Foreign** drives.

**Note:** In this case, the TeraPac 3 contains eight 500 GB SATA disks in a RAID 5 array. This results in a total array size of 3.2 terabytes (TB). Windows XP can only address Volumes of up to 2 TB. In this case, the TeraPac 3 array was built using the auto-carve feature of the *3ware* RAID controller. The RAID 5 array was broken up into multiple volumes, one of 2 TB and the other of 1.2 TB. Operating systems without this limitation include Linux 2.6, FreeBSD 5.x, Windows XP-64bit, and Windows 2003 SP1.

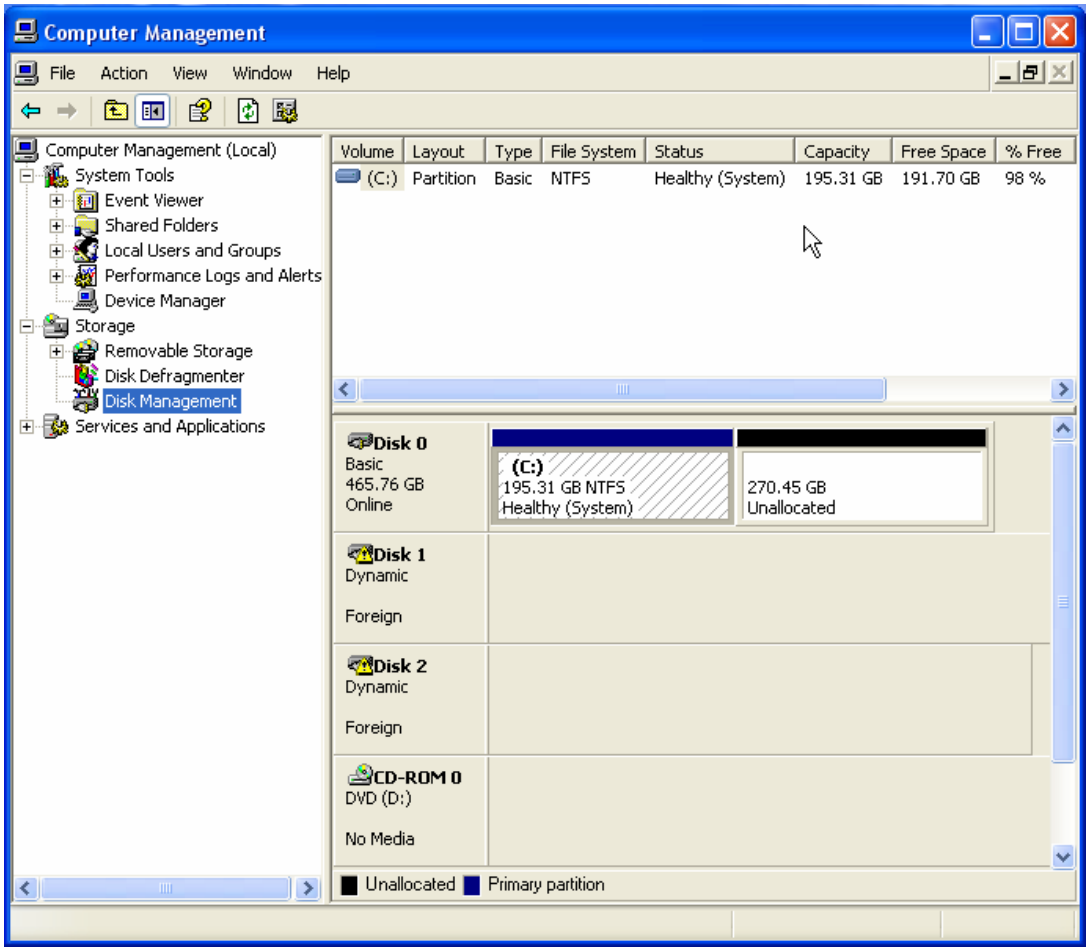


**Figure 5-22**

10) We now need to import **Disk 1** and **2** into Windows® XP using the following steps. Right-click on the **Disk 1** annotation and then select the **Import Foreign Disks** option, resulting in the **Import Foreign Disks** dialog as illustrated in Figure 5-23.

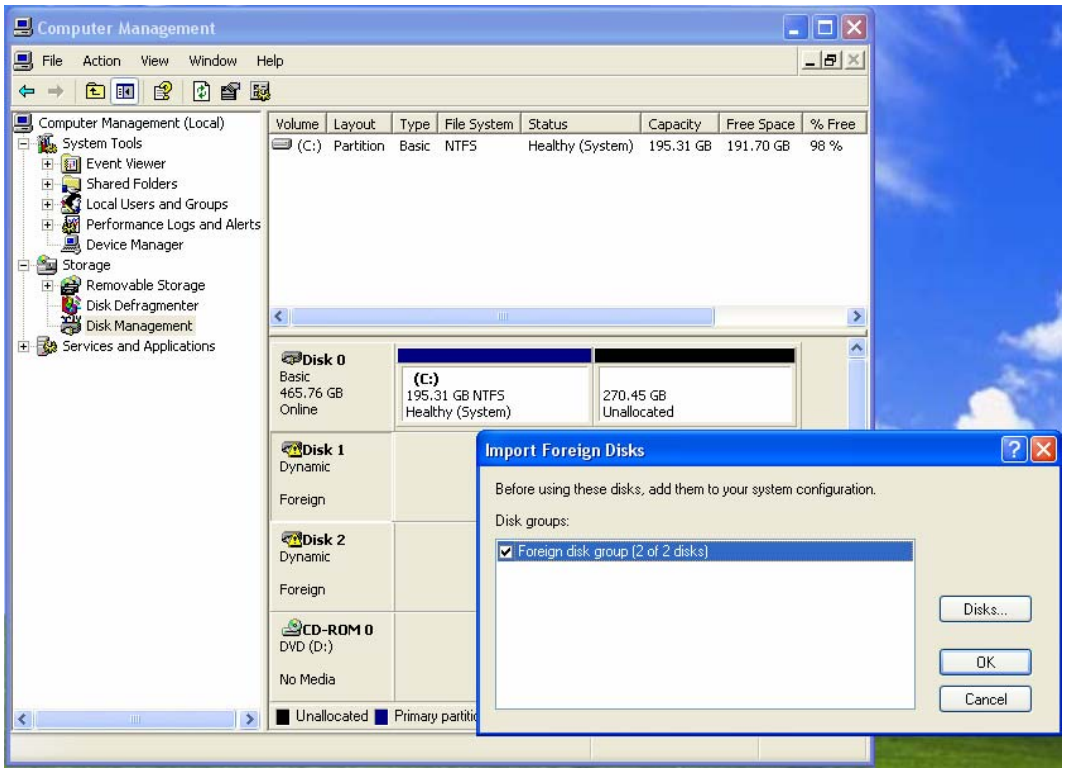


**Figure 5-23**

11) Ensure that the **Foreign Disk** check box in the **Disk Groups** area is selected and then click the **OK** button to access the **Foreign Disk Volumes** dialog as illustrated in Figure 5-24.

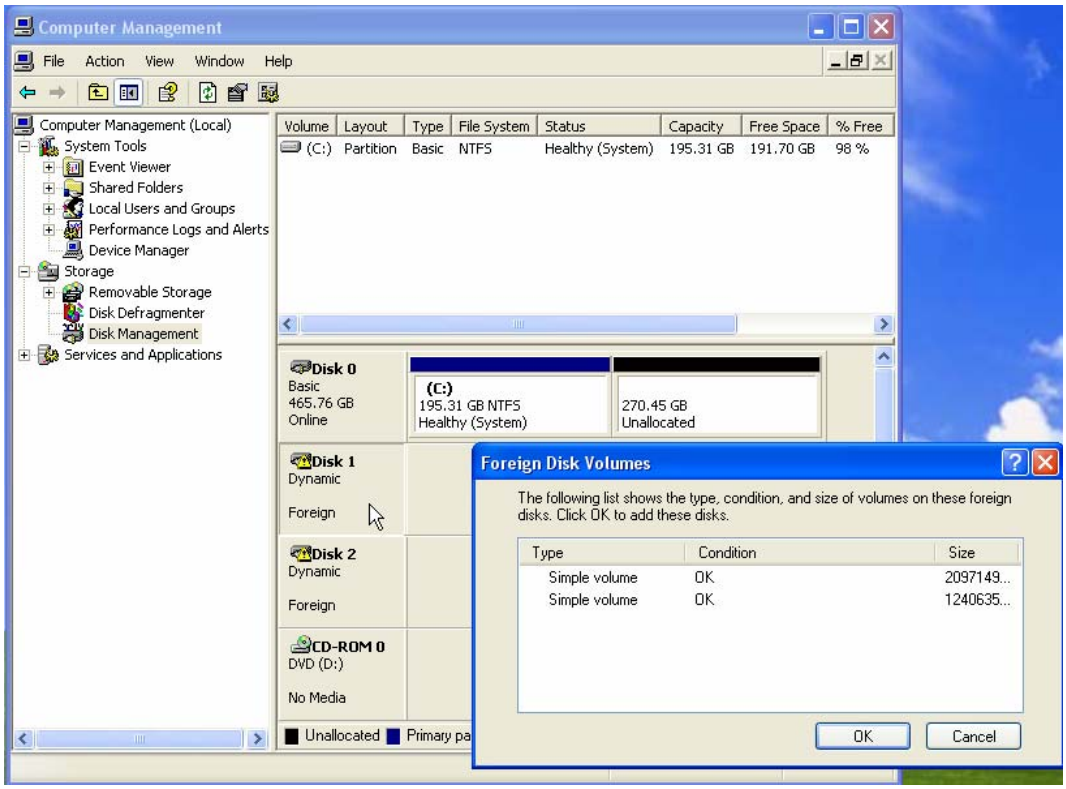


**Figure 5-24**

12) Click the **OK** button to accept the **Foreign Disk Volumes** dialog. Assuming that the TeraPac 3 array has been formatted (as will be the case if it was shipped from MaxVision), the array will automatically be assigned drive letters as illustrated in Figure 5-25. In this case, the array is ready to use. (If you've recently re-built the array and it is not automatically assigned a drive letter, you will have to format the array at this point – this is just like formatting a regular hard drive.)

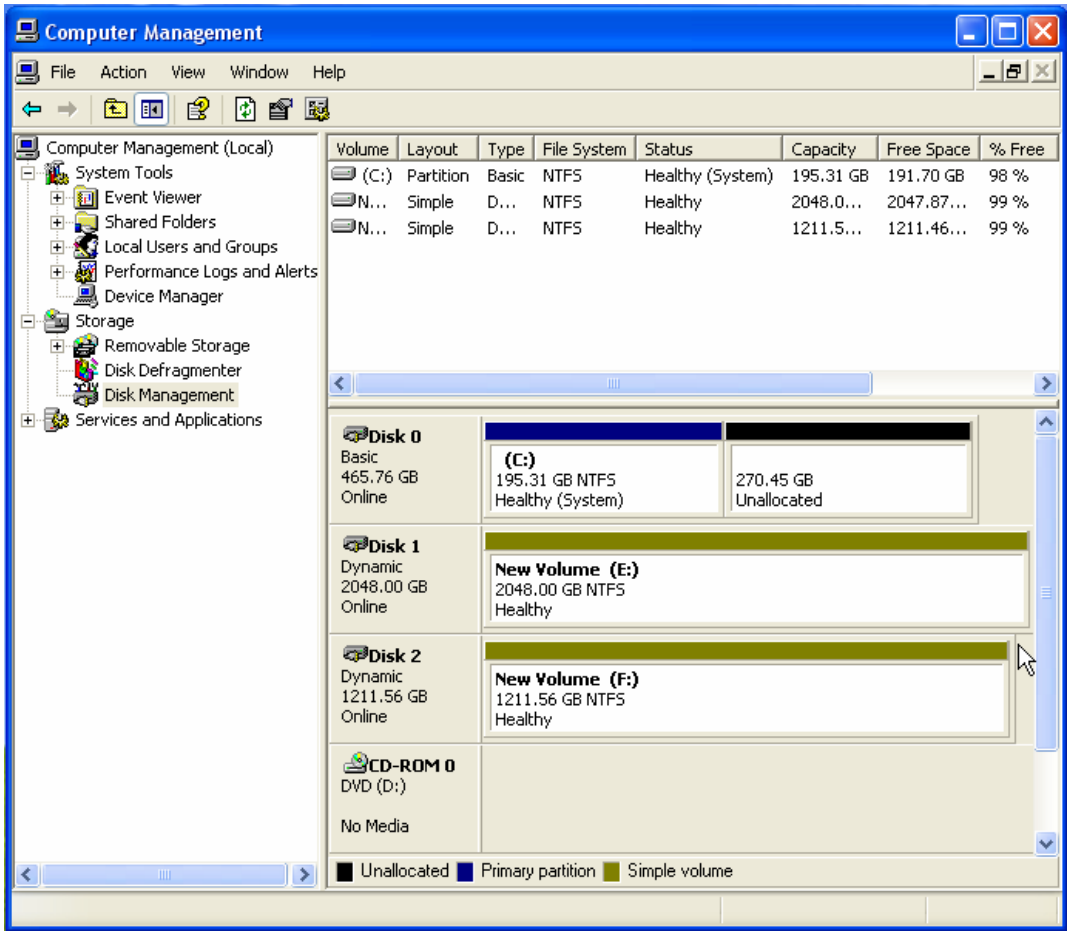


**Figure 5-25**

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# Chapter 6: Building a New TeraPac 3 RAID 5 Array from Scratch

# Building a New RAID 5 Array from Scratch

The discussions in this section assume that you have an existing system disk and – for one reason or another – need to setup your TeraPac 3 RAID array from scratch. For the purposes of this example, we have the TeraPac 3 connected to a MaxPac 8230; a similar procedure applies to a MaxPac 9200 / 9210. The *3ware* BIOS will report the presence of both the internal and external arrays, which – in this example – comprise four and eight drives, respectively, as illustrated in Figure 6-1.

1) Start to power-up the system. When you see the BIOS message *"<Alt-3> to access 3ware BIOS Manager"* (Figure 6-1) press and hold the <ALT> (alternate) key and – while still holding this key – press the number "3" key. This will invoke the *3ware* BIOS manager; in most cases, you will be presented with a warning screen as shown in Figure 6-2.

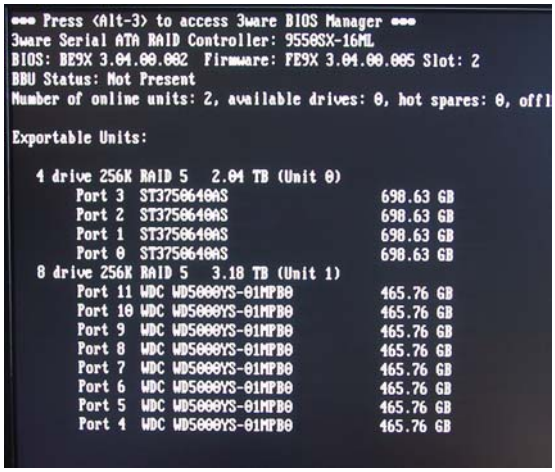


**Figure 6-1**

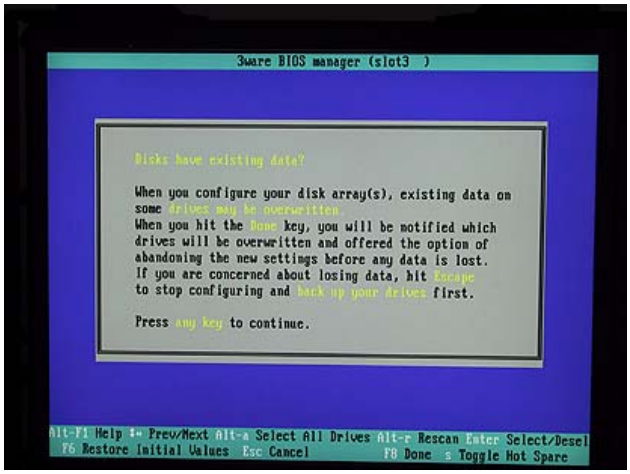


**Figure 6-2**

2) Press any key to continue, which will take you fully into the **3ware BIOS Manager**.

3) As mentioned earlier, the TeraPac 3 array of eight disks normally exceeds the Windows XP limit of 2 TB. This means that – prior to building the array – we must enable the **Auto-Carving** feature. This feature is listed in the **Controller Policies** section of **Settings** dialog as illustrated in Figure 6-3.


**Figure 6-3**

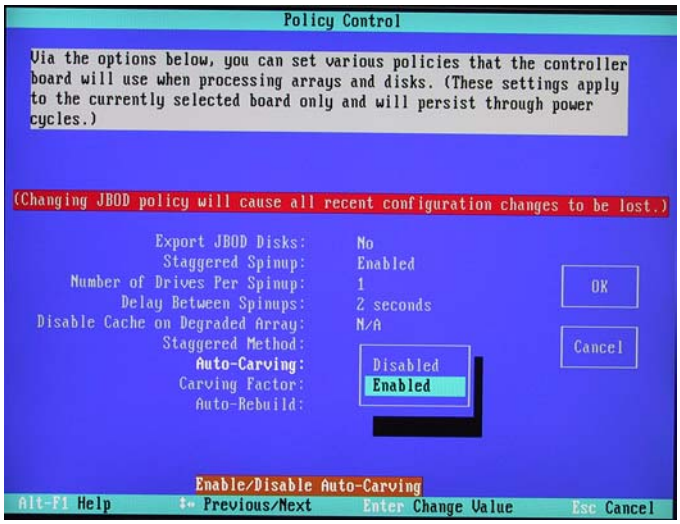


**Figure 6-4**

4) Enable the **Auto-Carving** feature and verify that the **Auto-Carving Factor** is set to 2048 (Figures 6-4 and 6-5).

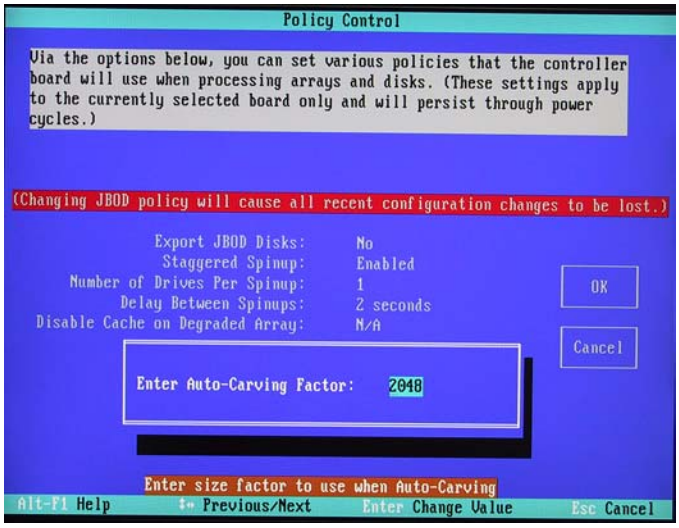


**Figure 6-5**

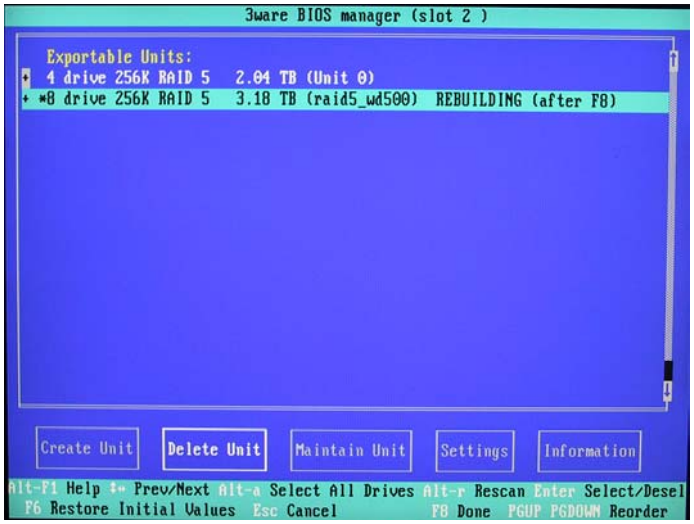


**Figure 6-6**

5) Since we want to fully build the 8-drive TeraPac 3 array, we will first delete the 8-drive unit (assuming a unit previously existed).

6) Using the up/down arrow keys, highlight the 8-drive array and use the <Enter> key to select it. You will now observe an asterisk (*) character next to this drive (Figure 6-6)

7) Using the <Tab> key, select the **Delete Unit** option and then use the <Enter> key to confirm the deletion of the 8-drive array (Figure 6-7).


Figure 6-7

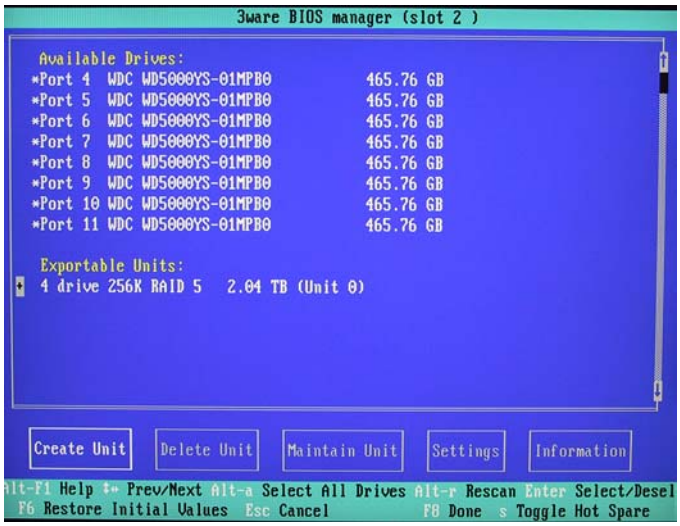


Figure 6-8

8) Observe that eight drives are now shown as being available for the creation of an array. Use <Alt-A> to select all of the drives; observe that asterisk (*) characters appear to the left of each drive's port number to indicate that the drive has indeed been selected (Figure 6-8).

9) Ensure that the **Create Unit** item is selected (the white box shown to the bottom left of the screen in Figure 6-8), and then press the <Enter> key to invoke the **Create Disk Array** screen (Figure 6-9)

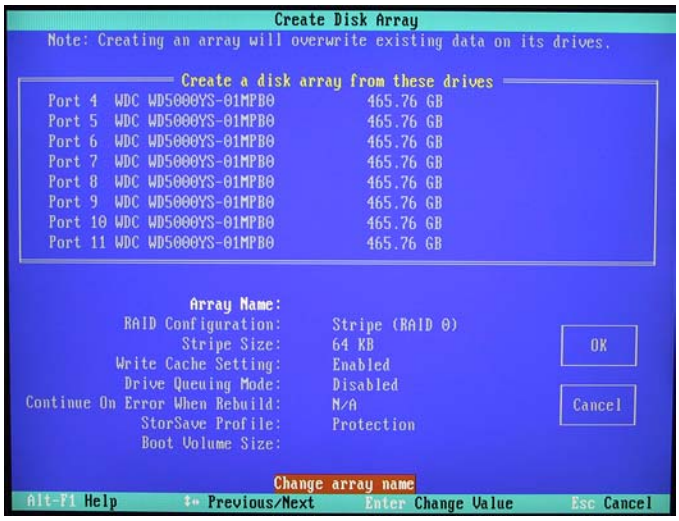


Figure 6-9

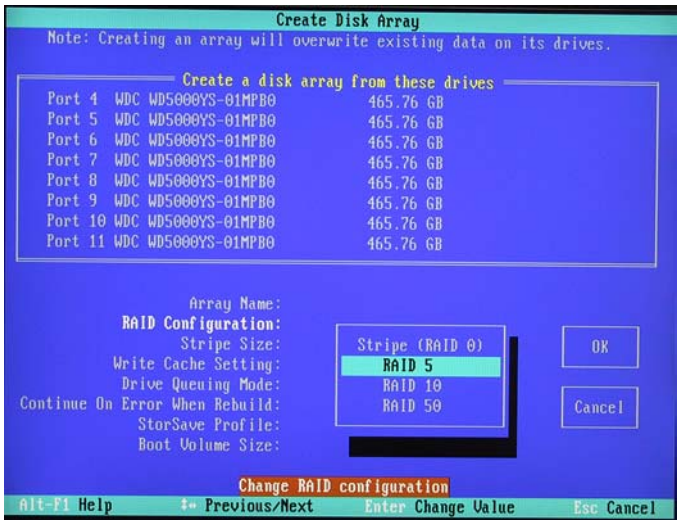


Figure 6-10

10) Use the up/down arrow keys to highlight the **RAID Configuration** item, and then press the <Enter> key to access an associated pop-up dialog. Use the up/down arrow keys to highlight the **RAID 5** option, and then press the <Enter> key to select this option (Figure 6-10).

**Note:** When the TeraPac 3 is connected to a MaxPac 9200/9210, a *3ware* 9650SE PCI Express controller will be used. This controller also supports RAID 6 (although slower than RAID 5, RAID 6 provides functionality if up to 2 drives fail in the array).

11) Use the up/down arrow keys to highlight the **Stripe Size** item, and then press the <Enter> key to access an associated pop-up dialog (Figure 6-11).

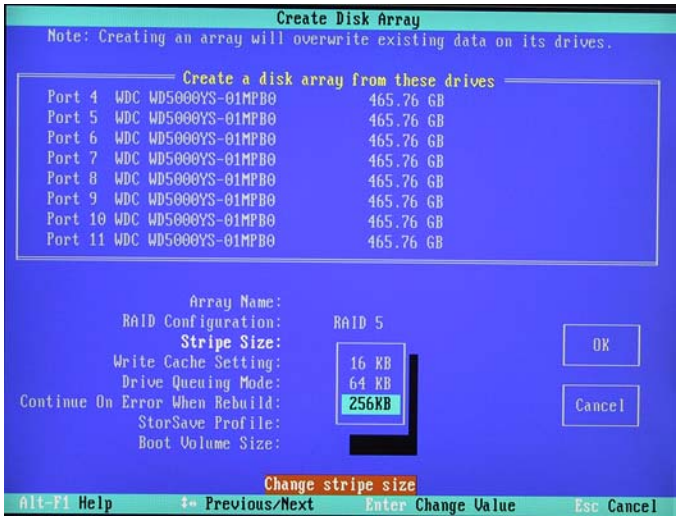


**Figure 6-11**

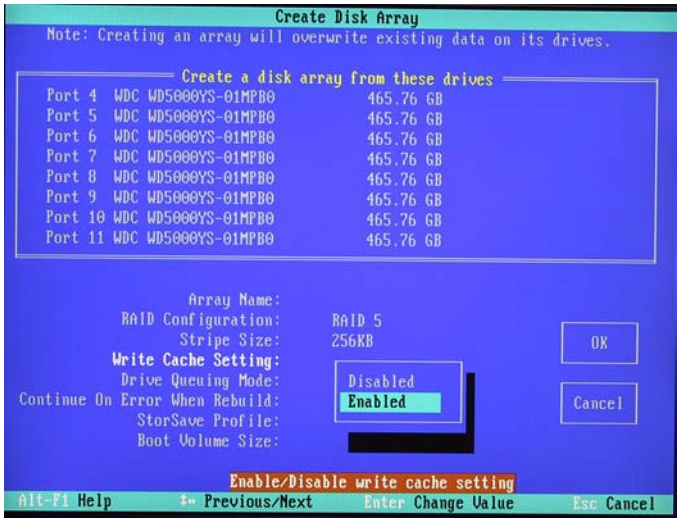


**Figure 6-12**

12) Use the up/down arrow keys to highlight the **256 KB** option, and then press the <Enter> key to select this option.

13) Use the up/down arrow keys to highlight the **Write Cache Setting** item, and then press the <Enter> key to access an associated pop-up dialog (Figure 6-12).

14) Use the up/down arrow keys to highlight the **Enabled** option, and then press the <Enter> key to select this option.

15) Use the up/down arrow keys to highlight the **StorSave Profile** item, and then press the <Enter> key to access an associated pop-up dialog (Figure 6-13).

**Note:** The **StorSave Profile** level settings adjust several different factors that affect protection and performance on a per-unit basis. These are defined in detail in *Chapter 8* of the 3*ware User Guide* included on the *3ware* CD.

16) Use the up/down arrow keys to highlight the **Balanced** option (Figure 6-13), and then press the <Enter> key to select this option.

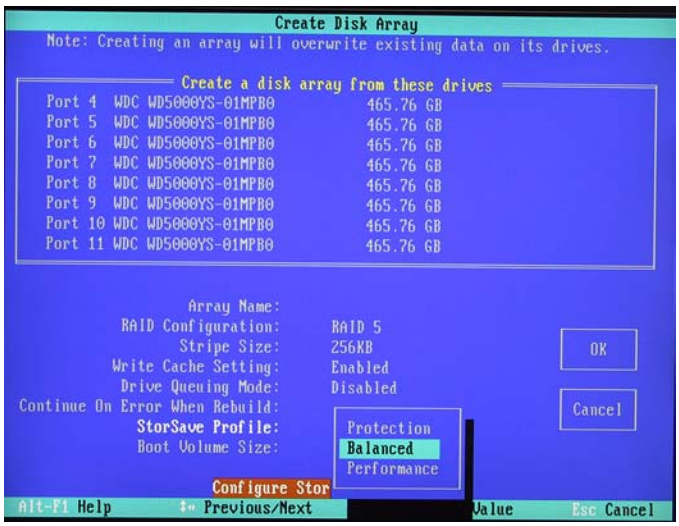


**Figure 6-13**

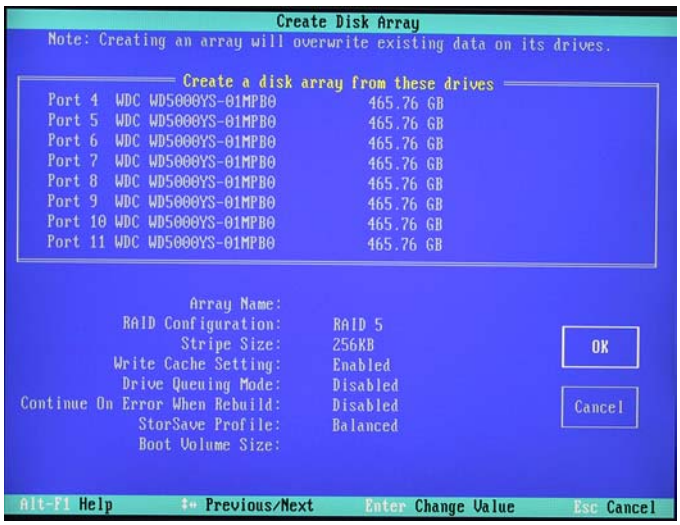


**Figure 6-14**

17) Use the up/down/right/left arrow keys to highlight the **OK** item (Figure 6-14) and then press the <Enter> key to save your changes.

18) You will be presented with a warning dialog as shown in Figure 6-15. Press the **Y** ("yes") key to allow the write cache to be enabled [note that this mode significantly improves performance, but it can result in a loss of data in the event of a power failure, so MaxVision STRONGLY recommends the use of an uninterruptible power supply (UPS) with your system and your TeraPac 3].

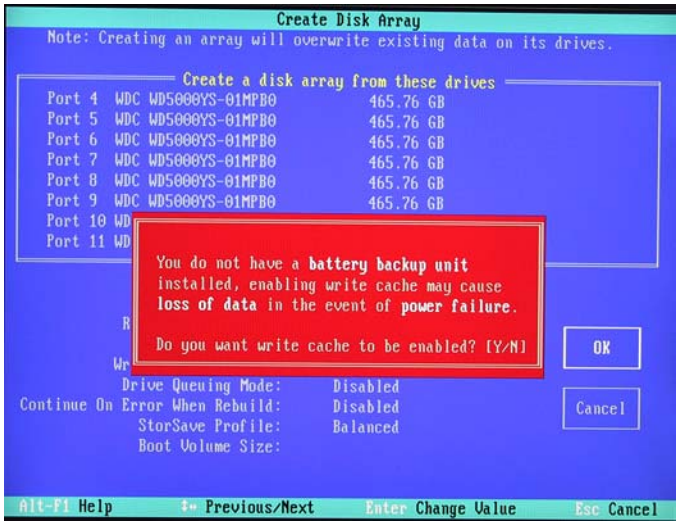


**Figure 6-15**

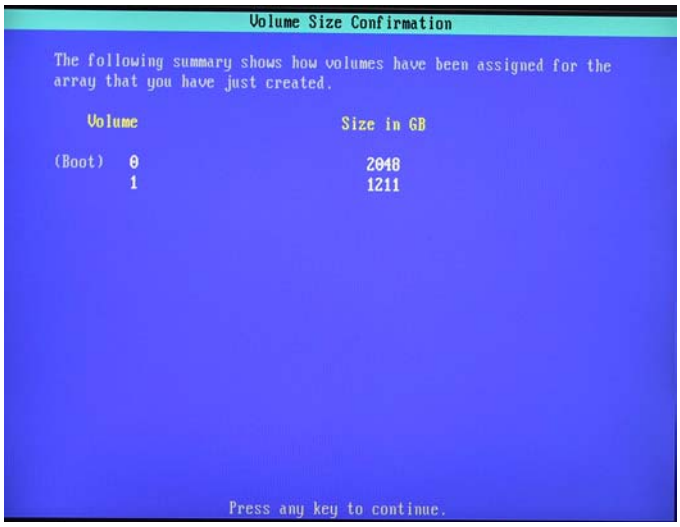


**Figure 6-16**

19) Observe that – in the case of our RAID 5 configuration based on eight 500 GB disks – the **Auto-Carve** feature has created two volumes so as to not exceed the 2 TB limit of Windows XP as illustrated in Figure 6-16.

20) At this point, you will be presented with a summary description of the RAID array you have defined (Figure 6-17).

21) Press the <F8> key to request that your array be established.


**Figure 6-17**

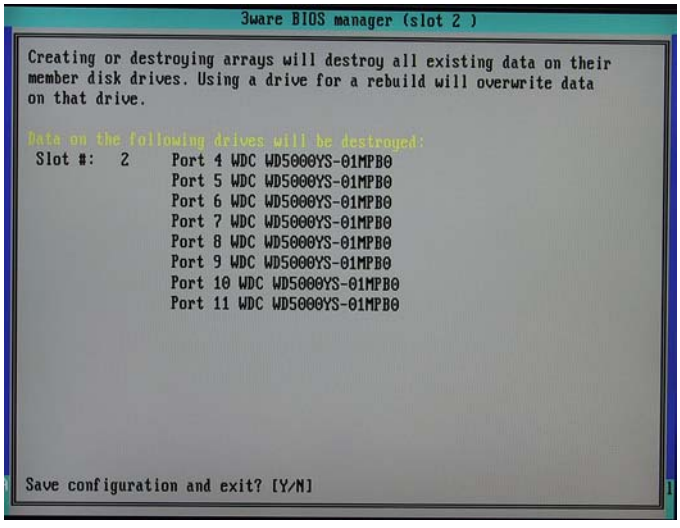


**Figure 6-18**

22) You will be presented with a warning screen as shown in Figure 6-18. Press the **Y** ("yes") key in order to establish your array.


**Figure 6-19**

23) Assuming an array previously existed on this disk set, the contents of the new array must be cleared (Figure 6-19). This step can take from 2 to 3 hours but your array will be totally initialized when complete. Once the array has been cleared, the MaxPac will automatically reboot itself in order to make your new RAID array available to the operating system. During the boot process, the BIOS will now report the existence of your new RAID array.

24) Once the system has booted up into Windows®, right-click on the **My Computer** icon and then select the **Manage** option. In the ensuing **Computer Management** dialog, click on the **Disk Management** item. As you have just created a new RAID array, this will automatically launch the **Initialize and Convert Disk Wizard** as shown in Figure 6-20.

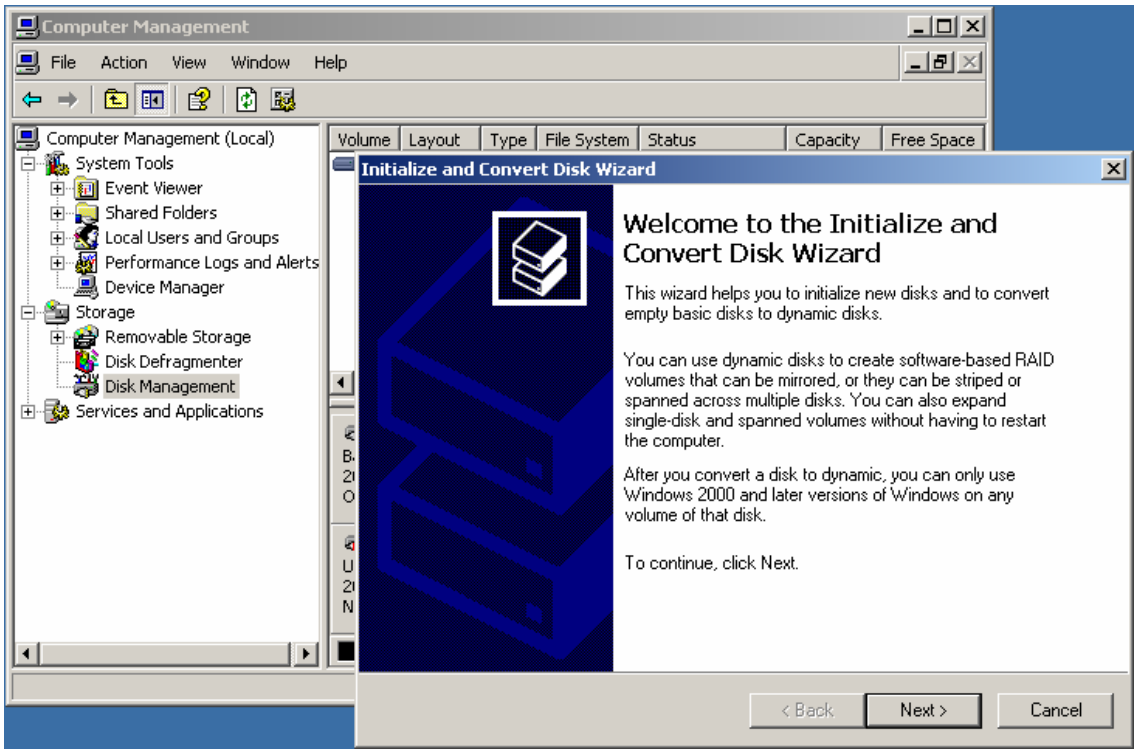


**Figure 6-20. The Initialize and Convert Disk Wizard**

25) Click the **Next** button to be presented with the **Completing the Wizard** screen as shown in Figure 6-23, and then click the **Finish** button to perform the operations and exit the wizard.

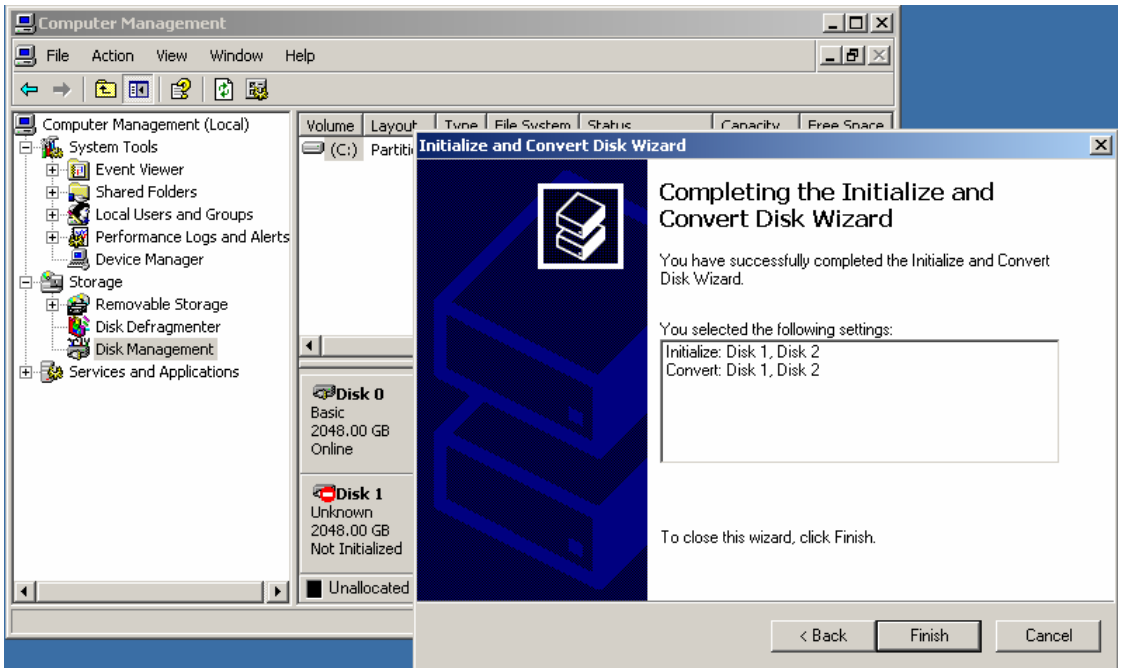


**Figure 6-23. The Completing the Wizard dialog**

26) Observe that the **Disk Management** area of the **Computer Management** dialog now shows a new set of **Dynamic** disk volumes (**Disk 1** and **2**), which are – as yet – unallocated (Figure 6-24).

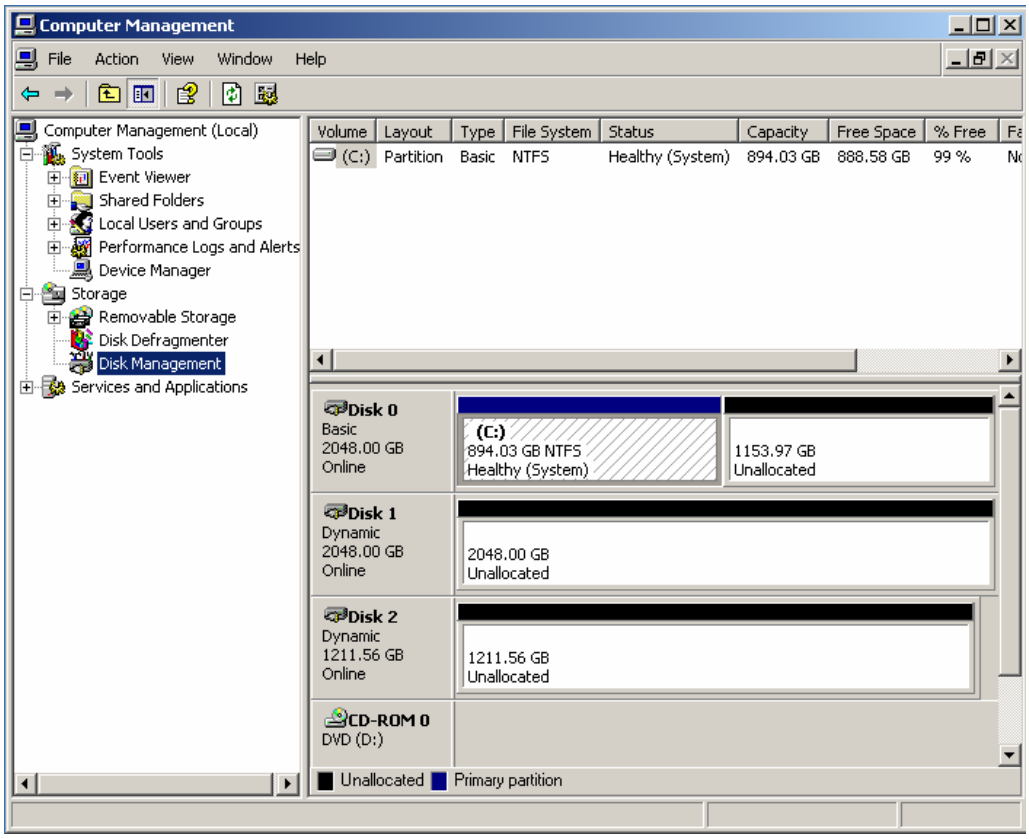


**Figure 6-24. Disks 1 & 2 – as yet - unallocated**

27) Right-click on the **Disk 1** area and then select the **New Volume** option from the ensuing pop-up menu as shown in Figure 6-25.

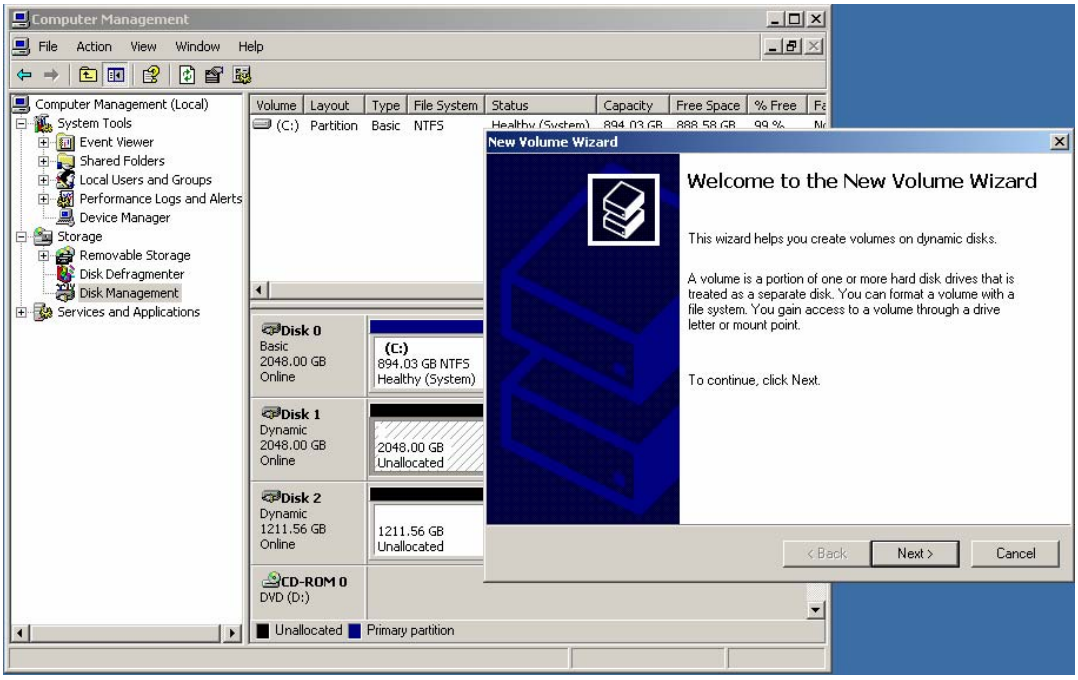


**Figure 6-25. Select the New Volume option**

28) Click the **Next** button to be presented with the **Select Disk** screen. Ensure that the **Disk 1** item is selected and appears in the **Selected** column on the right-hand side of the dialog as shown in Figure 6-26.

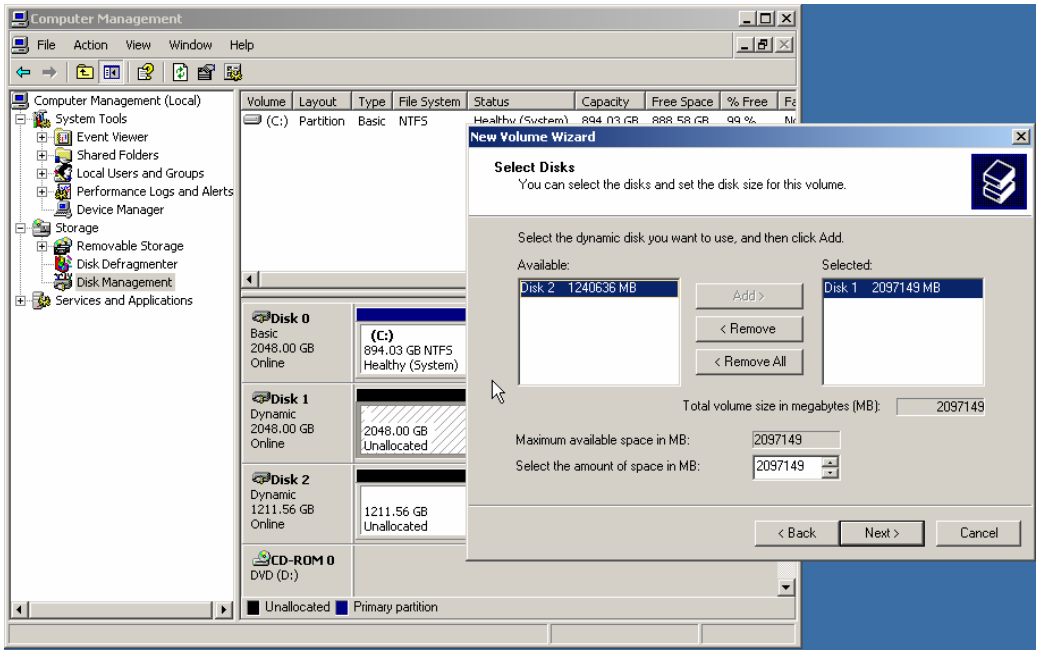


**Figure 6-26**

29) Click the **Next** button to be presented with the **Assign Drive Letter or Path** screen. Ensure that the **Assign the Following Drive Letter** item is selected and accept the default letter presented by the system (or enter a different letter if you require) as shown in Figure 6-27.

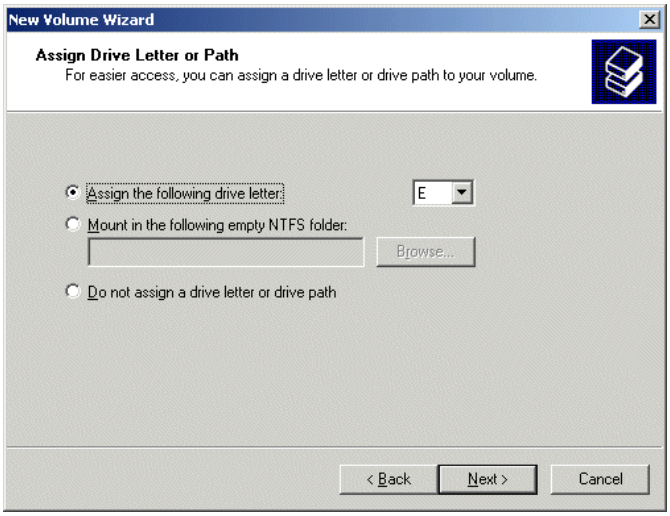


**Figure 6-27**

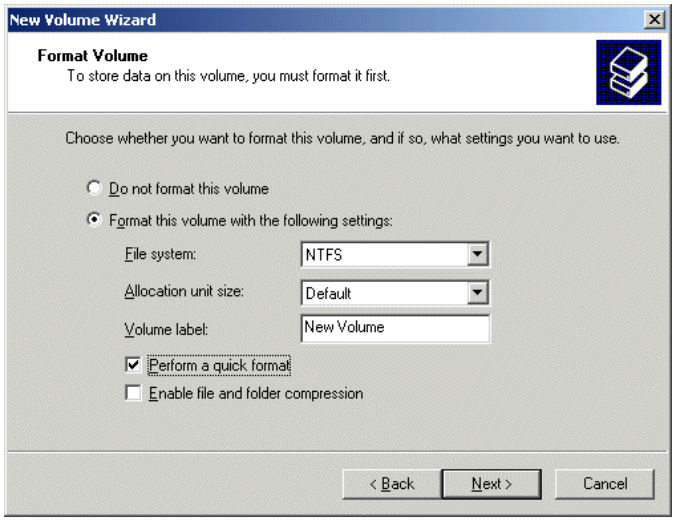


**Figure 6-28**

30) Click the **Next** button to be presented with the **Format Volume** screen. Click the **Format this volume with the following settings** item as shown in Figure 6-28. Ensure that the settings are **File system** = **NTFS**, **Allocation unit size** = **Default**, and **Volume Label** = user defined (the default is "New Volume"). Also ensure that the **Perform a quick format** item is selected.

31) Click the **Next** button to be presented with the **Completing the New Volume Wizard** screen as shown in Figure 6-29.

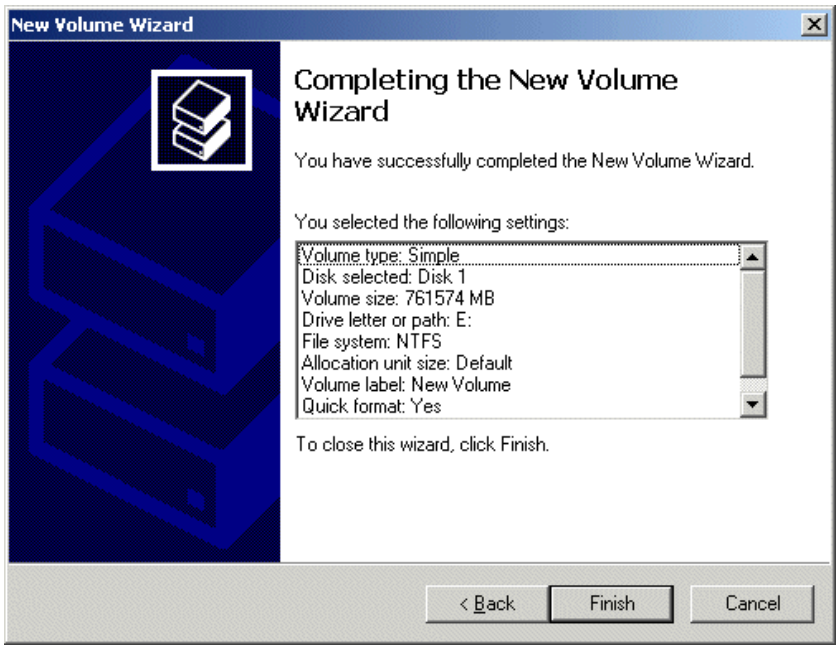


**Figure 6-29. The Completing the Wizard dialog**

32) Click the **Finish** button to perform all of the operations and exit the wizard.

33) Repeat steps 27) through 32) for the second volume (of the two created by **Auto-Carve**) labeled **Disk 2**

34) Observe that the **Disk Management** area of the **Computer Management** dialog now shows **Disks 1 & 2** as being **Dynamic**, **Online**, and **Healthy** as illustrated in Figure 6-30.

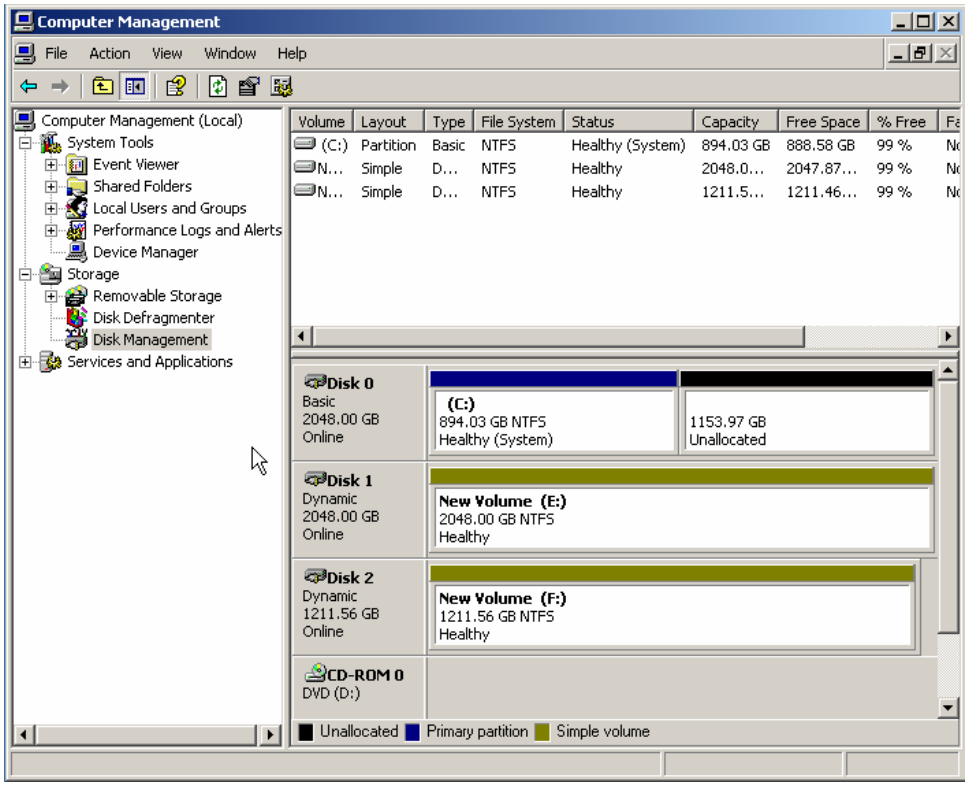


**Figure 6-30. Disks 1 and 2 are now shown as being Dynamic, Online, and Healthy**

35) Observe that the 3DM2 utility shows that the single 3.18 TB array is broken up into Volume 0 of 2 TB and Volume 1 of 1.18 TB as illustrated in Figure 6-31.

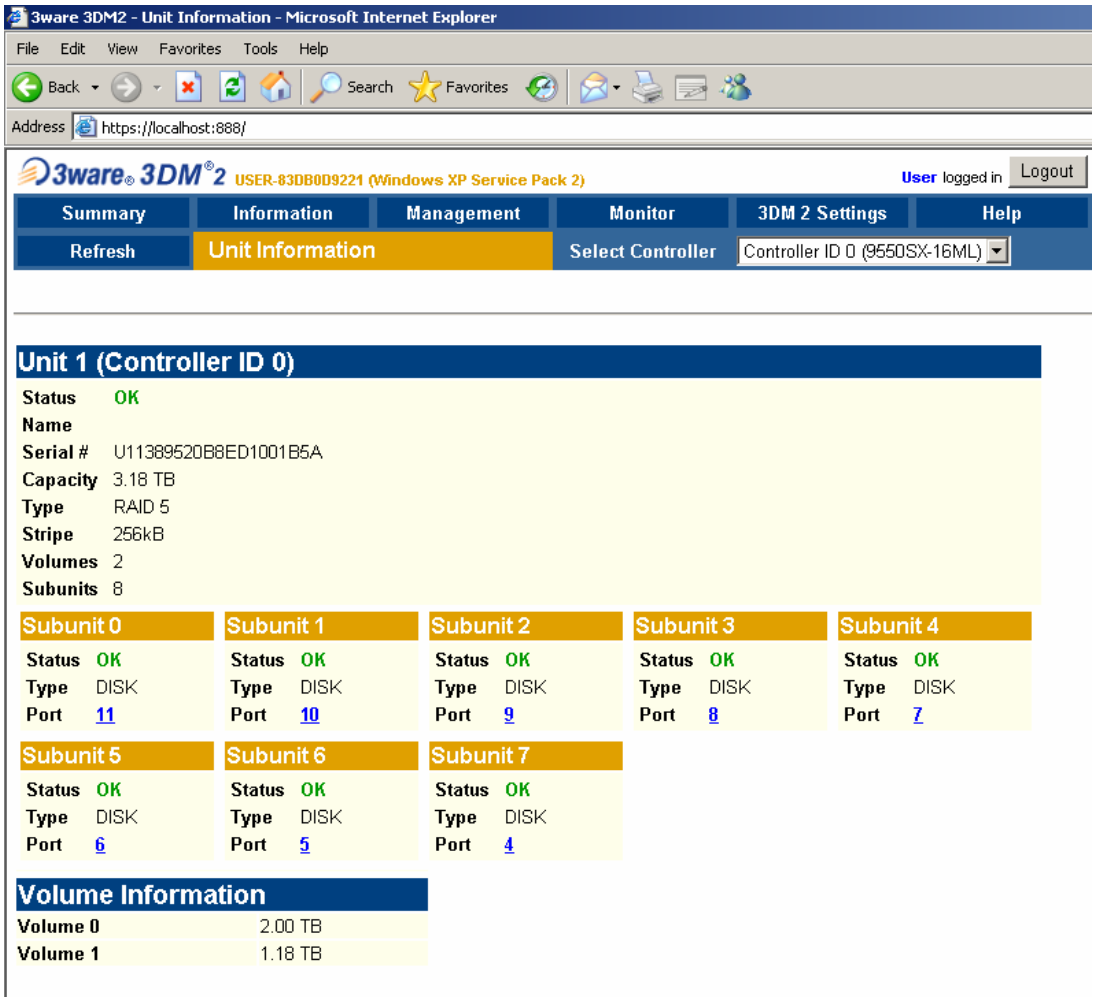


**Figure 6-31**

# Chapter 7: Detecting, Isolating, and Replacing a Failed TeraPac 3 Disk

# Rebuilding an Existing (Failed) 3ware RAID 5 Array

The discussions in this section assume that you originally had a good, working TeraPac 3 RAID 5 array, but a drive has failed and needs to be replaced. For the purposes of this example, we have the TeraPac 3 connected to a MaxPac 8230; a similar procedure applies to a MaxPac 9200 / 9210. The *3ware 3DM2* utility will report the presence of both the internal and external arrays, which – in this example – comprise four and eight drives, respectively.

Initially, we will start with a good array. Double-click the **Connect to 3DM 2** icon on your desktop and login (as Administrator) to the ensuing webpage using the default password (which is **3ware**), you will see that the status of your array looks something like that shown in Figure 7-1.

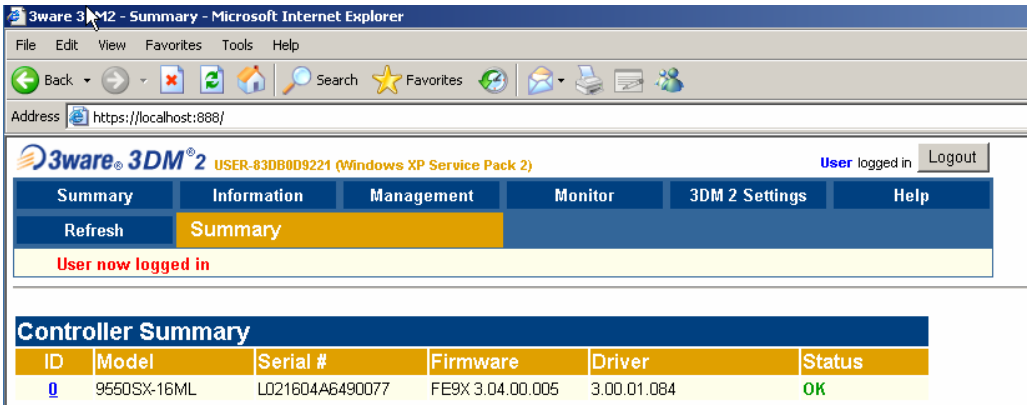


**Figure 7-1**

By clicking on Unit 1 we are able to see the detailed composition of our TeraPac 3 array as illustrated in Figure 7-2.

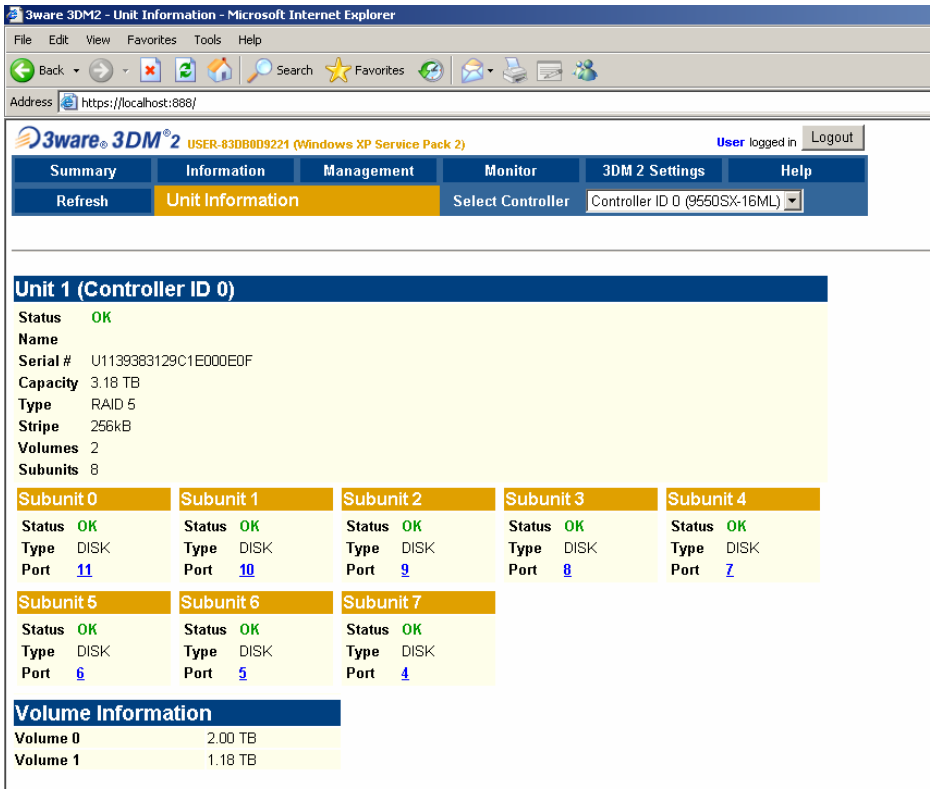


**Figure 7-2**

Once you have observed this good array, exit out of the 3DM 2 web interface. At some stage, one of the disks in the array may start to degrade or go completely off-line. For the purposes of these discussions, we are going to remove the disk labeled Disk #7 (the eighth drive in the right most position detailed in Figure 7-3).


**Figure 7-3**

1) While the MaxPac / TeraPac combo is powered-up and you are in Windows, remove Disk #7 as illustrated in Figure 7-4, thereby simulating a catastrophic failure on this disk.

**Figure 7-4**

2) Observe that the relationship between **Disk Numbers** and **Port Numbers** is detailed in Table 7-1.

| Disk # | Port # (8230) | Port # (9200/10) |
|---|---|---|
| 0 | 4 | 0 |
| 1 | 5 | 1 |
| 2 | 6 | 2 |
| 3 | 7 | 3 |
| 4 | 8 | 4 |
| 5 | 9 | 5 |
| 6 | 10 | 6 |
| 7 | 11 | 7 |

**Table 7-1. Relationship between disk and port numbers**

3) A few seconds after removing **Disk # 7**, a pop up error message indicates that **Port # 11** has failed resulting in the degradation of the RAID 5 array. As we see from Table 7-1, **Port #11** correlates to **Disk #7** in the case of a MaxPac 8230, which is the system used in this example.

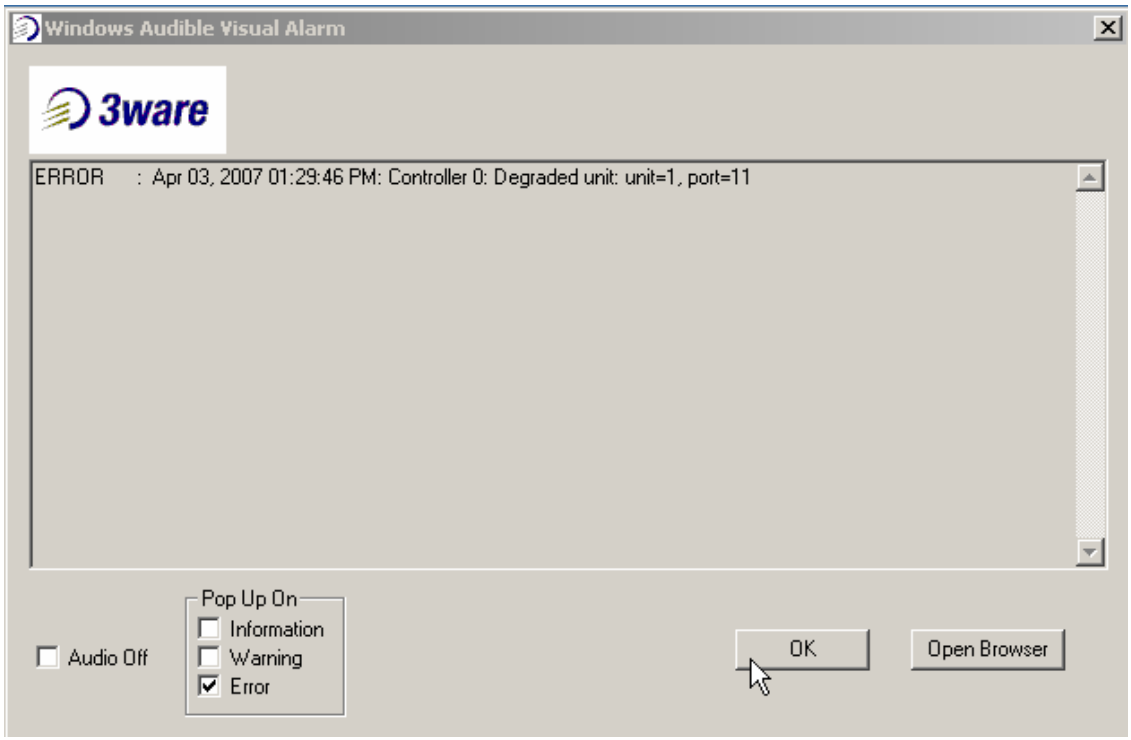


**Figure 7-5**

4) Observe that the 3DM2 utility now indicates the array is in a degraded state (Figure 7-6). At this point the RAID 5 array has no redundancy.

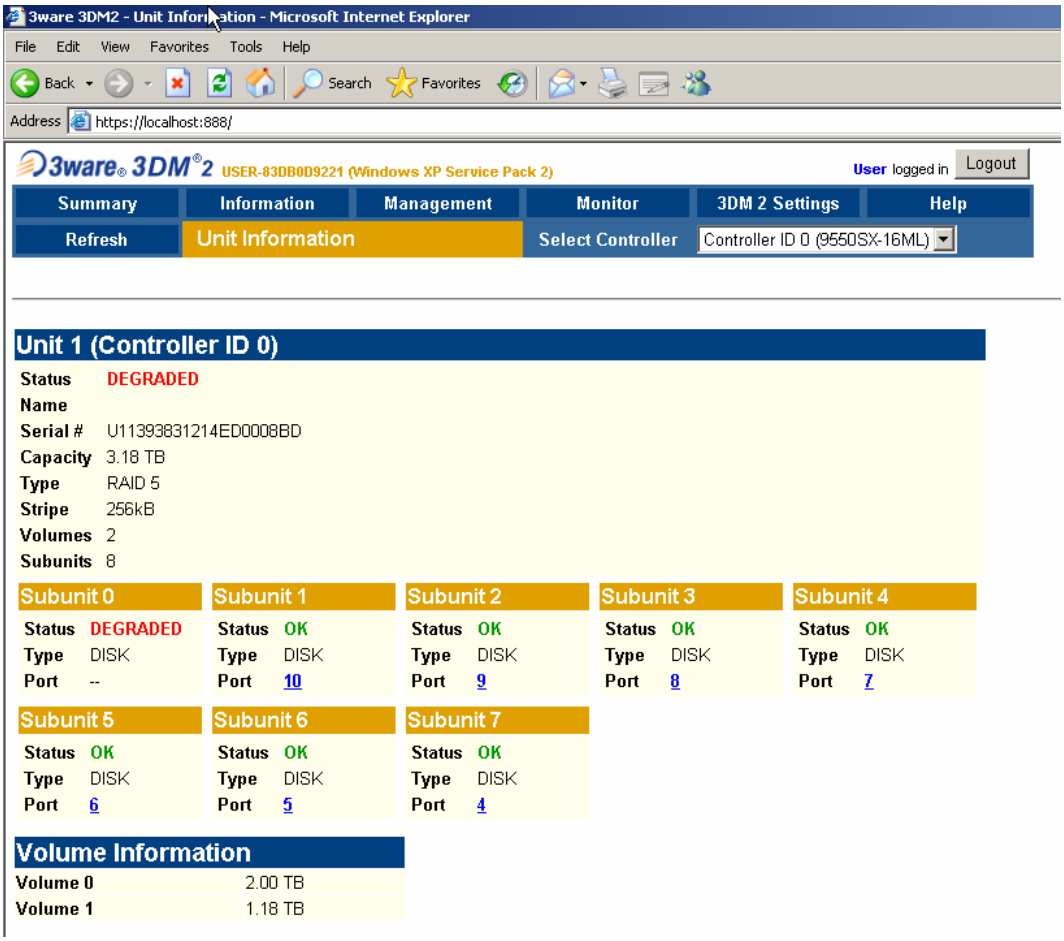


**Figure 7-6**

5) Power-down the MaxPac / TeraPac combo and replace the failed disk with another disk of the same type and capacity.

6) Power-up the MaxPac / TeraPac combo after replacing the simulated failed disk. Double-click the **Connect to 3DM 2** icon on your desktop and login to the ensuing webpage using your administrator password (note that you may need to contact your IT department in order to obtain this password).

**Note:** The replacement disk may or may not have previously been part of another *3ware* RAID array. If the disk is new and has never been part of a *3ware* array, it will show up as an available drive resulting in an immediate rebuild process starting as illustrated in Figure 7-7. Alternatively, if the replacement disk was previously been part of another 8-disk RAID 5 array, *3ware* (as a precaution) requires that the INOPERABLE Array (with the 1 disk) be deleted to make the disk available for the rebuild as illustrated in Figures 7-8 through 7-14.

**Note:** The rebuild can take up to 13 hours for very large disks. You may use the RAID 5 array during the rebuild but performance will decease and no redundancy will exist until the completion of the rebuld.

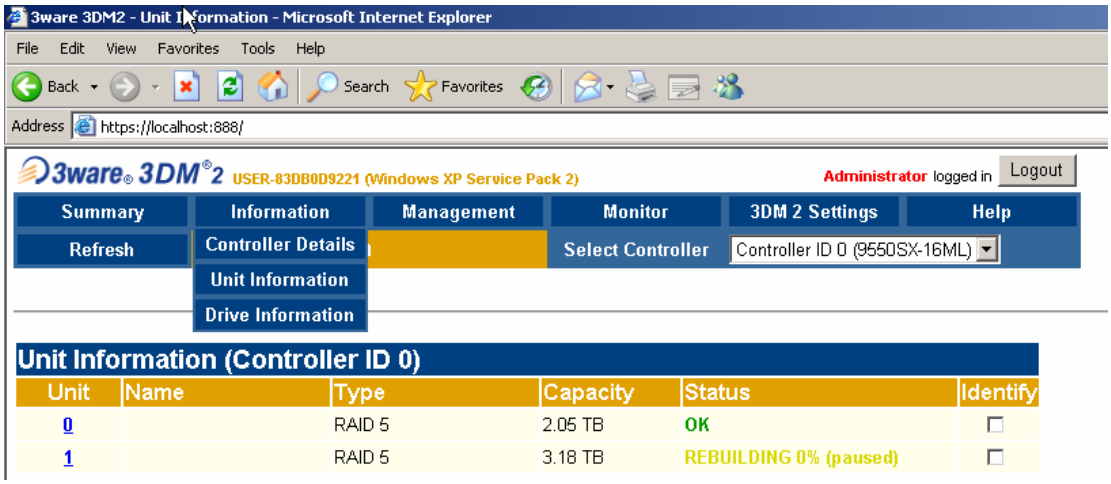


**Figure 7-7**

7) As discussed above, if the replacement disk had previously been part of another RAID 5 array, the rebuild will not start immediately start. In this case, once you have logged in as the administrator, you will see that an ERROR still exists as shown in Figure 7-8.

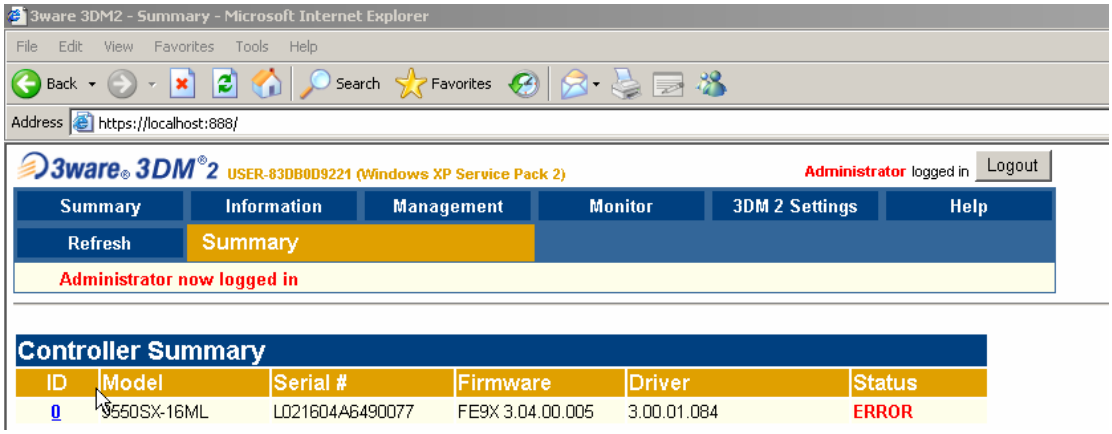


**Figure 7-8**

8) Click on ID 0 to view the details of the arrays. Our TeraPac 3 array is listed as **Degraded** and the replacement disk is listed as part of a **Previous INOPERABLE** RAID 5 array (Figure 7-9).

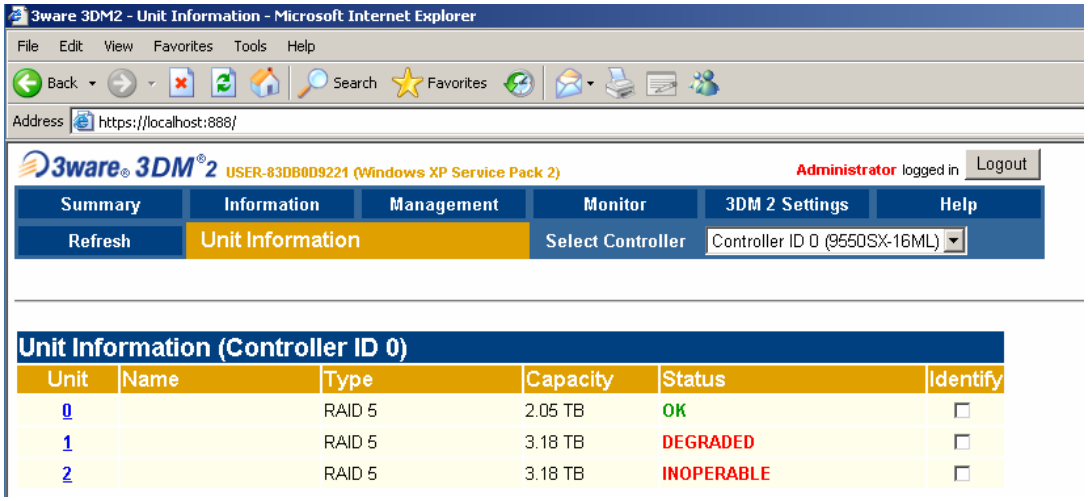


**Figure 7-9**

9) Now go into the Management Maintenance section of 3DM2 check the Unit 2 checkbox and select **Delete Unit** as illustrated in Figure 7-10

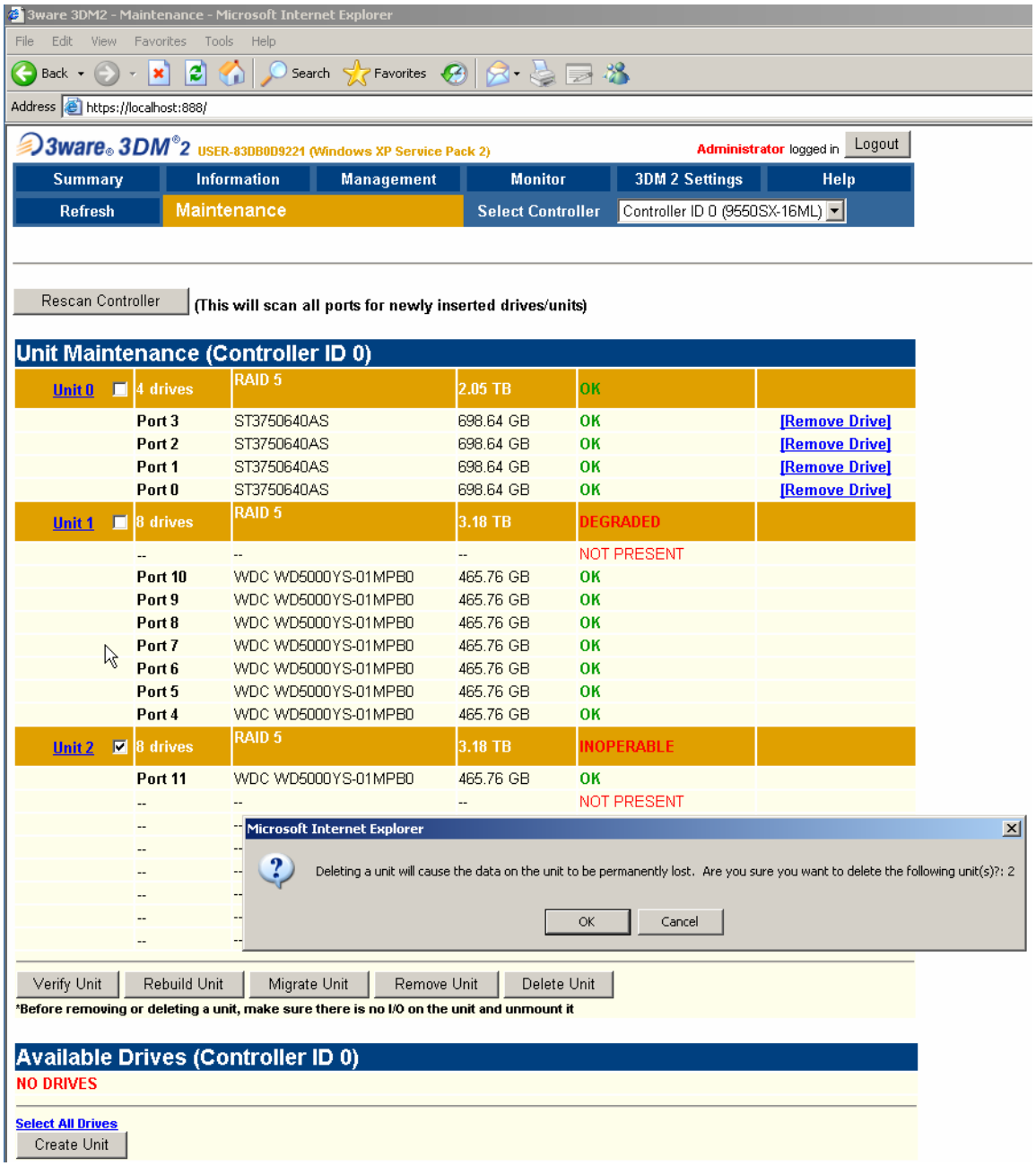


**Figure 7-10**

10) Observe that our replacement disk is now listed as an available drive (Figure 7-11)..

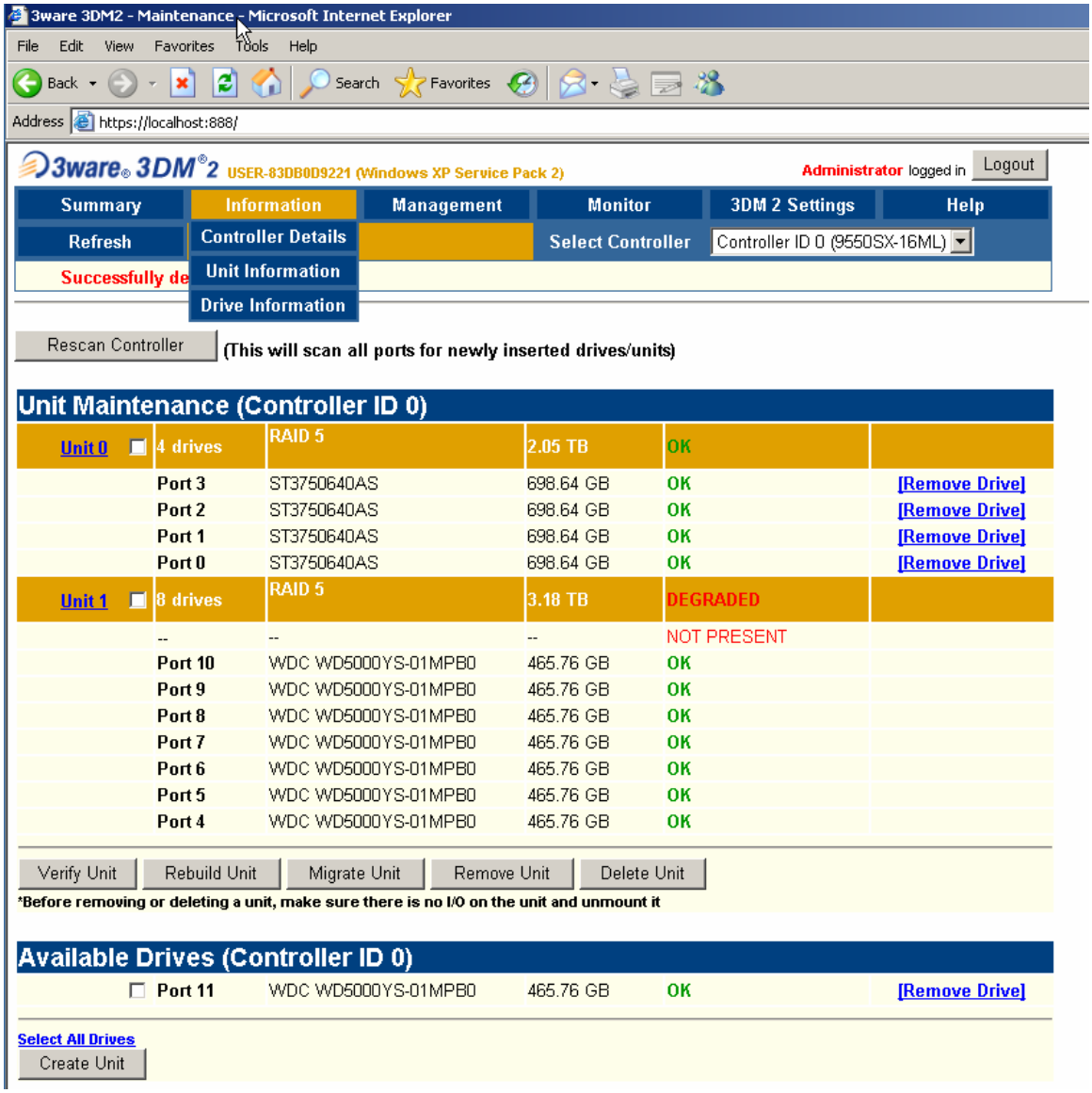


**Figure 7-11**

11) Check the **Unit 1** and **Port 11** checkboxes (Figure 7-12).

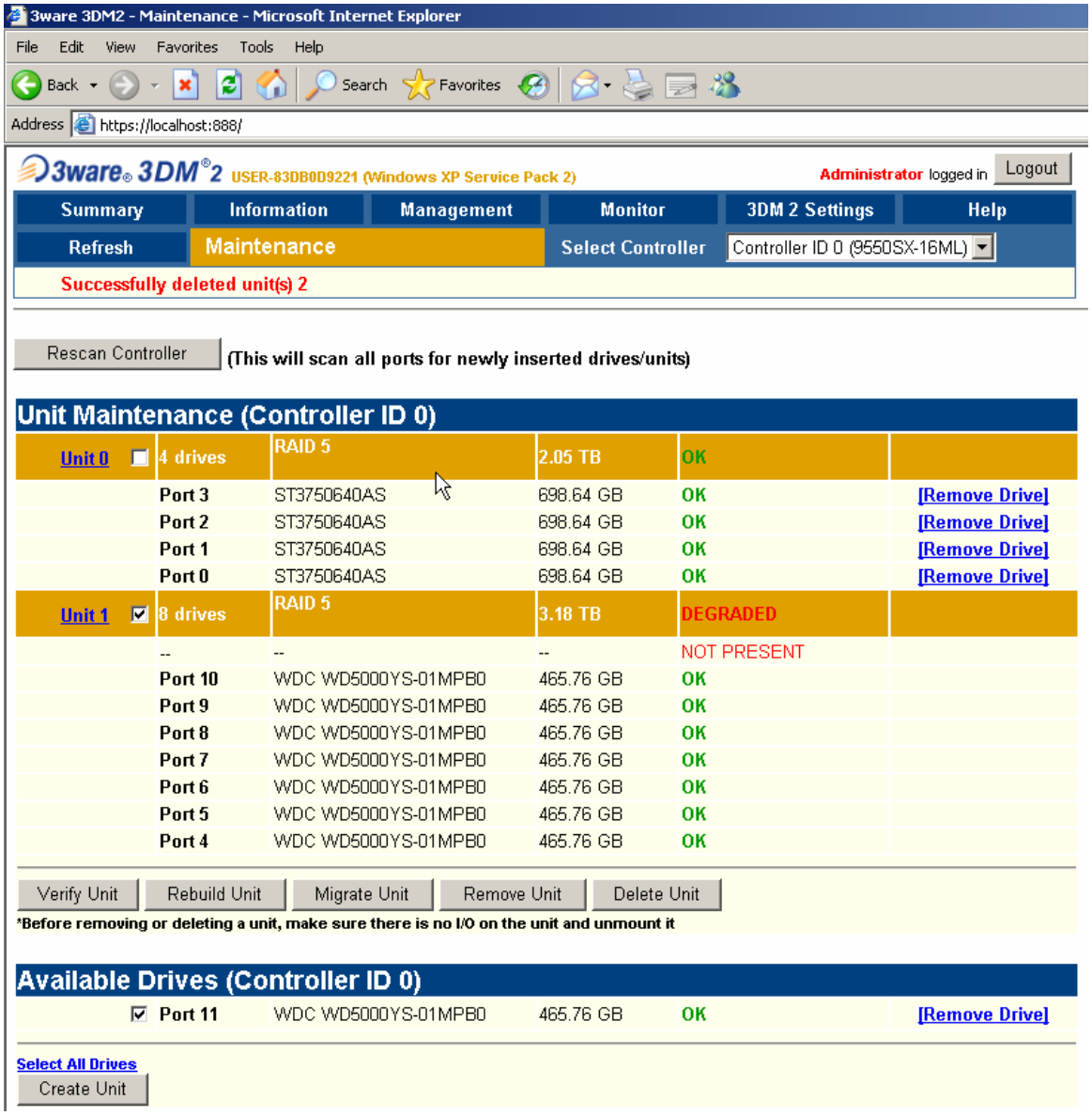


**Figure 7-12**

12) Select the **Rebuild Unit** option and observe the confirmation popup. Confirm that **Port 11** will be used to rebuild the array (Figure 7-13).

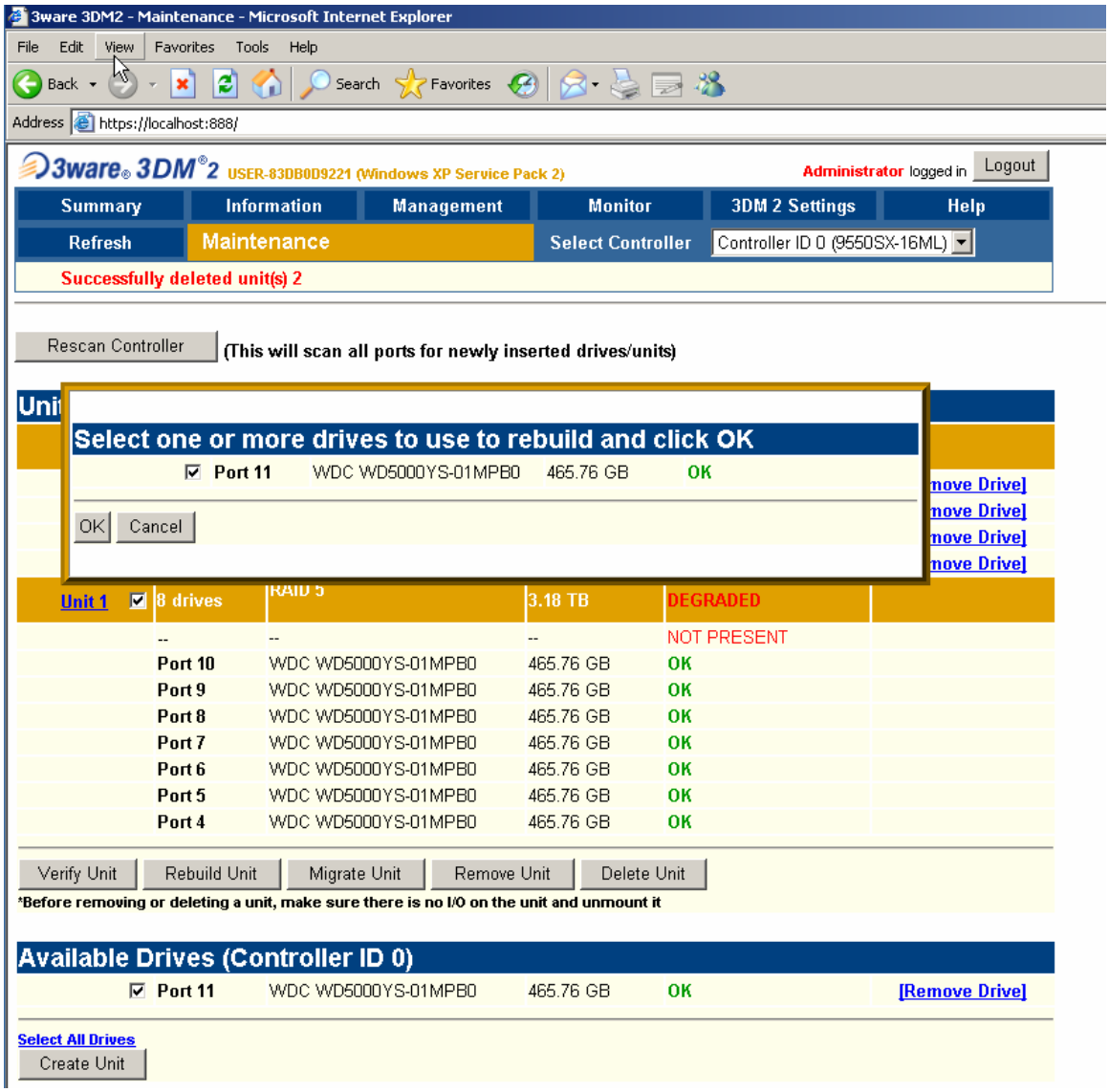


**Figure 7-13**

13) Now the rebuild will begin as illustrated in Figure 7-14.

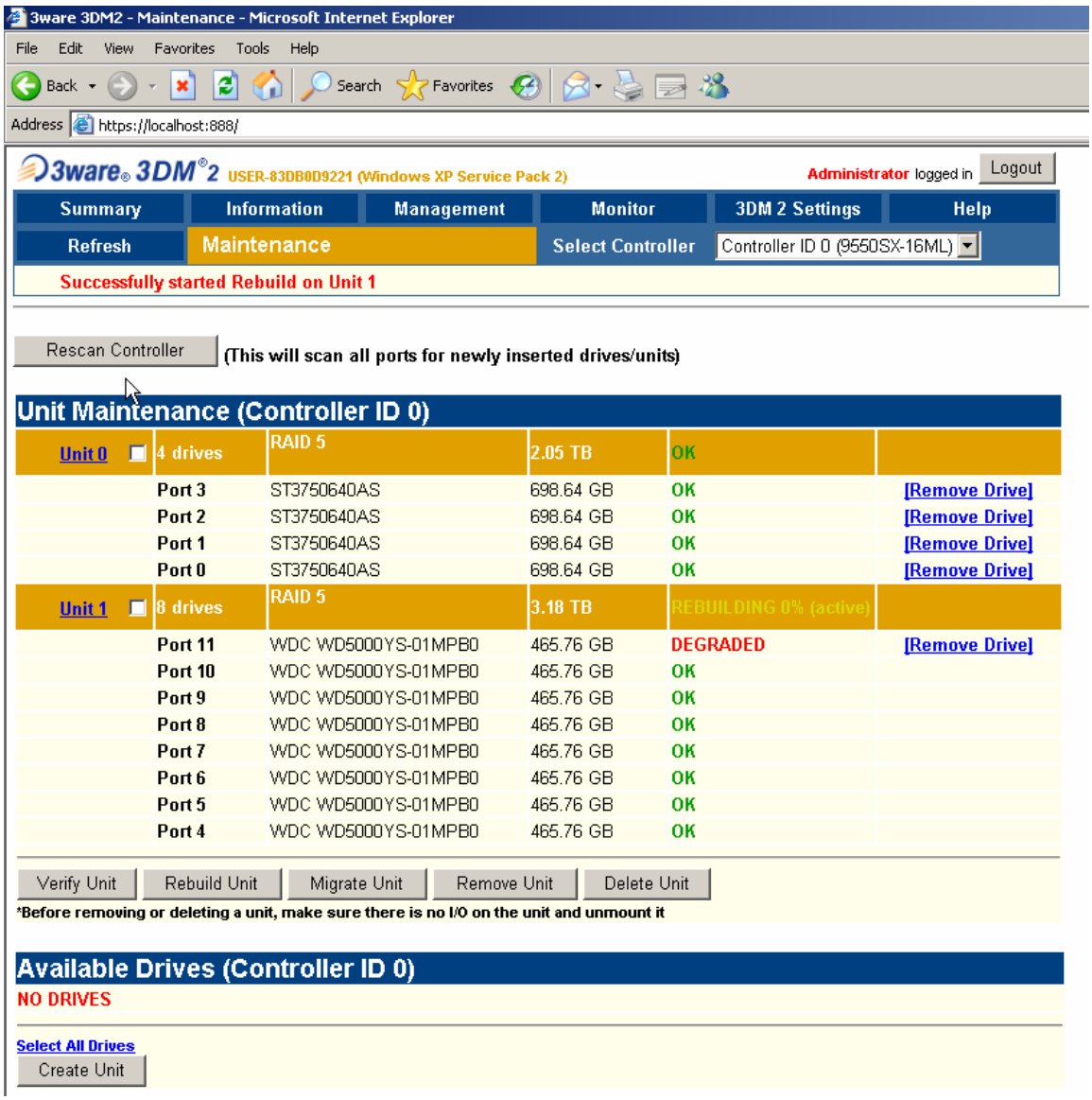


**Figure 7-14**

**Note:** The rebuild can take up to 13 hours for very large disks. You may use the RAID 5 array during the rebuild but performance will decease and no redundancy will exist until the completion of the rebuld.

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# Chapter 8: Module Replacement Procedures

# Introduction

The discussions in this chapter will illustrate the disassembly of the TeraPac 3 chassis in order to replace the SATA backplane or the power supply. These are the most likely components to fail (other than a disk failure as discussed in *Chapter 7*).

## Replacing the TeraPac Backplane

1) Remove the Baghdad Filter by loosening the 2 knurled screws (Figure 8-1).

**Figure 8-1**

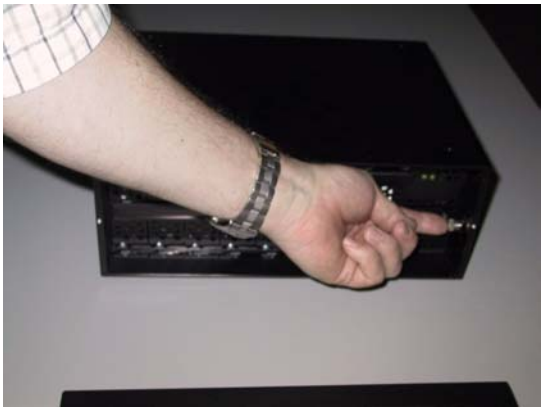

**Figure 8-2**

2) Remove the drive assembly retaining bar by loosening the knurled screw on the right-hand side as illustrated in Figure 8-2.

3) Remove both 4-drive sets as illustrated in Figure 8-3.

**Figure 8-3**

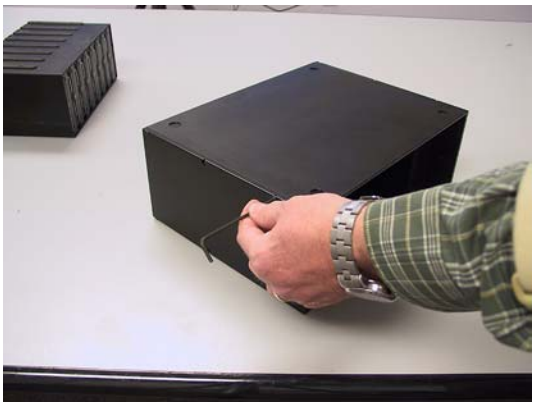

**Figure 8-4**

4) Remove the 6 hex head screws with an Allen wrench in order to remove the left side of the TeraPac 3 chassis (Figures 8-4 and 8-5). Note that the sides are aligned to the top and bottom of the chassis with short slots. It may be necessary to bump the side to break free of these slots after removing the hex screws.

**Figure 8-5**

**Figure 8-6**

5) Remove the top 3 hex head screws from the right side of the TeraPac 3 chassis (Figure 8-6).

6) Remove the top of the chassis as illustrated in Figure 8-7 (pull the top cover to the left to break free of the slot as the top is removed).

**Figure 8-7**

**Figure 8-8**

7) Now, the long protective side panel and narrow front panel can be removed from the left and front of the power supply (Figure 8-8).

8) In order to remove the SATA backplane, a Phillips #1 screwdriver must be used to removed four screws from the top and 8 screws from the bottom of the backplane as illustrated in Figures 8-9 and 8-10.

**Figure 8-9**

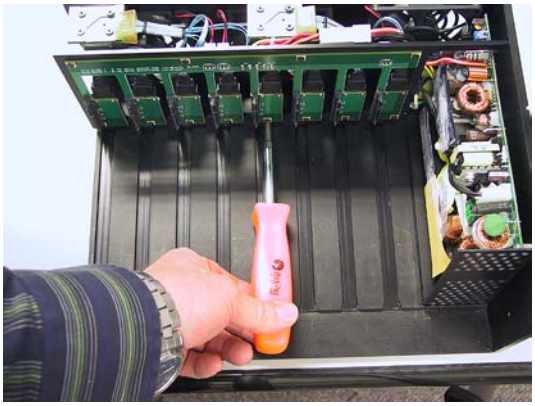

**Figure 8-10**

9) Remove the two left-most fan power connections (Figure 8-11) and the right fan power connection (Figure 8-12)

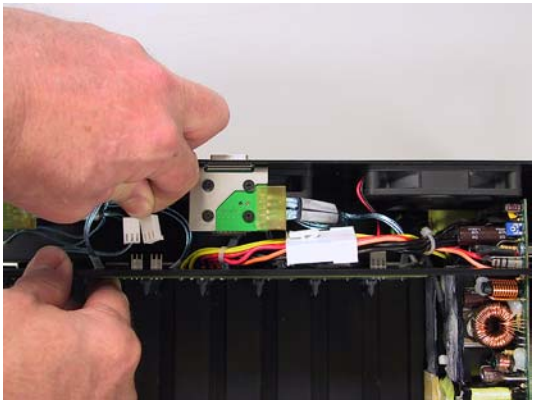

**Figure 8-11**

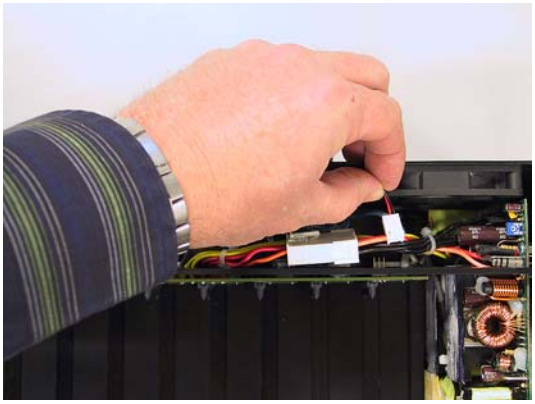

**Figure 8-12**

10) Remove the main power connection as shown in Figure 8-13.

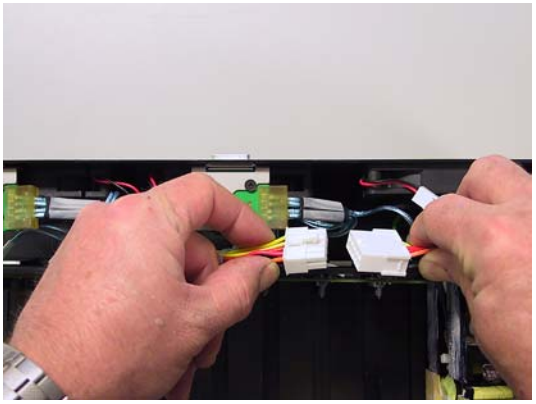

**Figure 8-13**

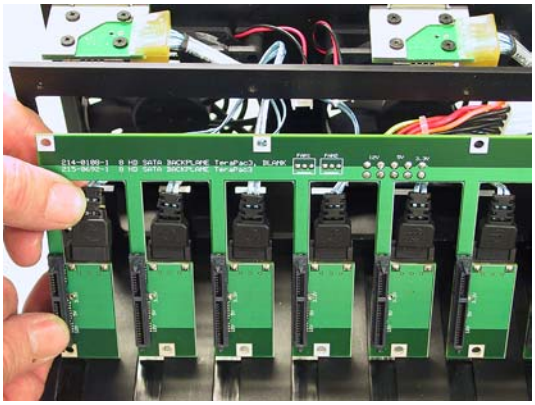

**Figure 8-14**

11) Remove each of the 8 SATA data connections as illustrated in Figure 8-14.

12) Now the SATA Backplane can be removed (Figure 8-15). Perform steps 1) through 11) in the reverse order with the replacement Backplane provided by MaxVision support.

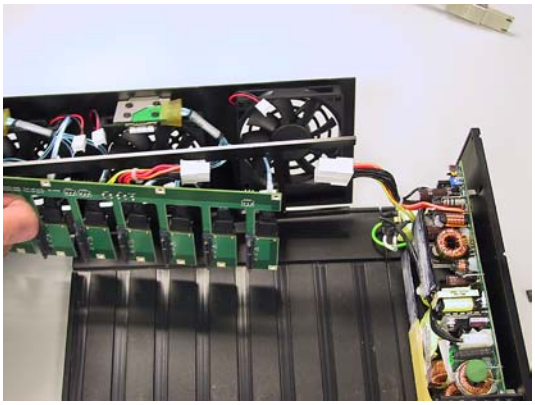

**Figure 8-15**

## Replacing the TeraPac Power Supply

1) In order to replace the power supply, first remove the backplane as discussed in the previous topic.

2) In preparation for the replacement of the power supply remove the AC power connection from the power supply as illustrated in Figure 8-16.

**Figure 8-16**

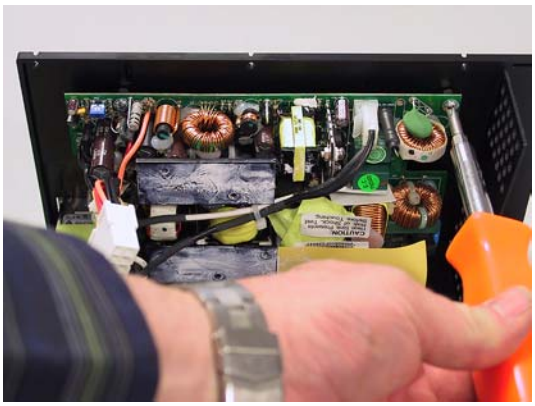

**Figure 8-17**

3) Remove each of the screws securing the power supply with a Phillips #2 screwdriver (Figures 8-17 and 8-18).

**Figure 8-18**

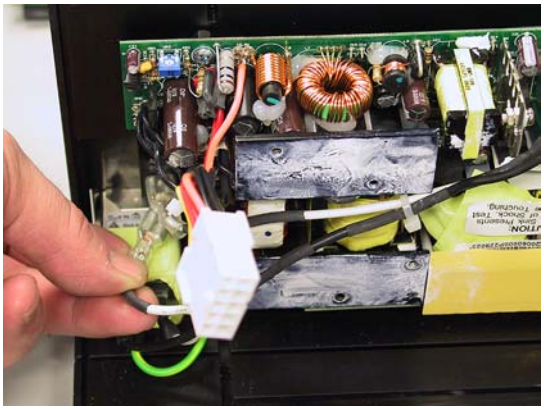

**Figure 8-19**

4) Perform steps (1) through (3) in the reverse order with the replacement power supply provided by MaxVision support.

5) Remember that the green ground wire must be secured to the power supply with the bottom left-most screw holding the power supply to the chassis side (Figure 8-19).

6) When reattaching the TeraPac 3 sides and top, make sure that the bottom screws on the right-hand side are attached but a little loose. Next, replace the top cover making sure that the power supply protective panels align with the slots in the top cover. Finally, tighten all of the screws.

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# Appendix A: Regular System Maintenance

## Maintaining (Cleaning) the "Baghdad Filter"

The Baghdad Filter is designed to filter all air intake at the front of the TeraPac 3. Filtered air flows through the disk array and is exits by the 3 rear fans. The filter should be cleaned as mandated by local conditions (a good rule of thumb is when the filters look physically dirty).

1) Remove the Baghdad Filter by loosening the 2 knurled screws (Figure A-1).

**Figure A-1**


**Figure A-2**

2) The filter recharge kit (MaxVision Part Number 228-0003-0) comprises a pump spray cleaner and bottle containing replacement oil (Figure A-2). Place the filter element on a working surface that is protected by some form of absorbent, disposable material.

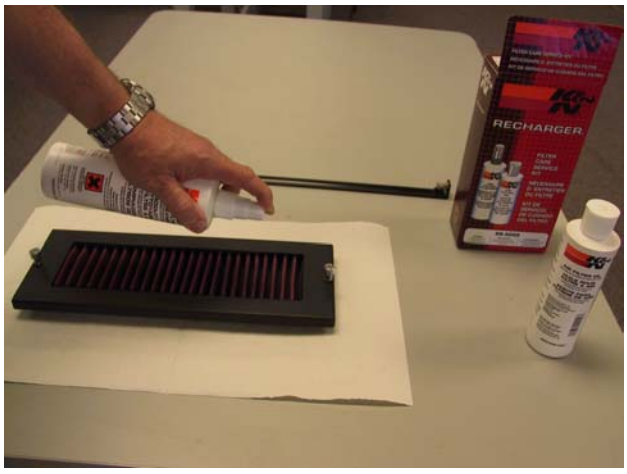


**Figure A-3**


**Figure A-4**

3) It is recommended that you first tap the filter element on the work surface to dislodge any large embedded dirt particles, and then gently brush it with a soft bristle brush. Next, spray the cleaner onto both sides of the filter element (Figure A-3), leave for ten minutes, and then rinse the element using a low-pressure water source (tap water is OK).

**Note:** Always apply the water from the "clean" side of the filter element.

**Note:** The use of other cleaning materials (including high-pressure air) may damage and/or reduce the effectiveness of the filter element.

4) Shake off any excess water and then let the filter element dry naturally.

5) Apply replacement oil on the "dirty" side of the filter element (Figure A-4). Note that the cotton in the filter element will absorb and distribute the oil into an even film; thus, it is important to use only a single pass for each area of the filter and to not over-spray the filter.

**Note:** The filter oil is a compound of mineral and animal oil blended with special polymers to form a very efficient barrier. Red dye is added to show just where you have applied the oil (this red color will eventually fade, but the oil will remain and filter the air).

6) Let the filter stand for 20 minutes and then touch-up any spots that do not visibly show the red dye contained in the oil.

7) Reattach the filter assembly to the TeraPac 3 attaching it with the 2 knurled screws.

# Appendix B: Contacting MaxVision Support (RMA and Serial Numbers)

## Repairing/Replacing Products/Accessories

MaxVision will repair or replace products/accessories due to defects in material or workmanship, or any failure of the hardware system to conform to written specifications. Warranty repairs will be performed at MaxVision's service center. Any replacement parts/products shall be new or refurbished. Any repaired or replaced product will not extend the original warranty term of the product. Additionally, this warranty period will not be extended as a result of the purchase of any additional parts/products from MaxVision Corporation.

## Contacting Technical Support and RMA Numbers

During the warranty period, MaxVision will provide technical support for hardware diagnosis via email (maxvision.support@maxvision.com) or the technical support and customer service hotline (800-533-5805). If MaxVision's technical support determines that the product is defective, MaxVision will issue a *Return Material Authorization (RMA)* number to the customer. The customer is required to ship the product referencing the RMA number on the outside of the original (or equivalent) packaging with a copy of MaxVision's invoice enclosed. The return shipment must be sent insured and prepaid to

**MaxVision Corporation**
**495 Production Avenue**
**Madison, AL 35758**
**USA**

MaxVision will ship the repaired or replaced product to the customer with freight prepaid if the customer's address is within United Stated of America (excluding Alaska, Hawaii, Puerto Rico and U.S. possessions). Shipments to other locations will be shipped at the customers expense. MaxVision must receive notice of all events before the warranty period expires. NOTE: MaxVision will not be responsible for data on the hard-disk drive. Before you ship the product(s) to MaxVision, please back up your data from the hard-disk drive(s)or any other storage device(s) in the product(s).

## Next Business Day Delivery/On-site Service for Parts

For contracts with next business day parts delivery/on-site clauses, in order to ensure receipt of parts by the next business day, the problem must be resolved between the customer and MaxVision's technical support department before noon, Central time, if parts are available. For calls resolved after noon Central time, the receipt of parts by the customer may take one additional business day.