



# Vanguard III

**FireWire800/1394b & USB v2.0/1.1**

**RAID 1 & 0**

**User's Guide**



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## Chapter 1 Introduction

The NitroAV Vanguard III RAID (**R**edundant **A**rray of **I**ndependent **D**rives) hardware RAID Storage System combines a high performance 1394b Firewire800 interface with the flexibility of choosing RAID 1 (mirroring) and RAID 0 (striping) depending on your storage requirements. In RAID 1 mode, the Vanguard III mirrors data across two hard drives to help protect your data in the event of a hard drive failure.

If data redundancy is not required, RAID 0 striping gives high speed performance and large working volume sizes for even the most demanding applications.

The Vanguard III storage system provides all of this flexibility in a small easy to use package, perfect for power users and small to medium servers.

### 1-1 Functions and Features

The Vanguard III RAID storage system is an economical and beneficial choice providing high capacity hardware RAID for 1394b Firewire 800 and USB 2.0 high performance hot plug and play interfaces. The Vanguard III is also backwards compatible to FireWire400/1395a and USB v1.1. In addition, the Vanguard II has the following features.

#### **Ease of Use**

※ **Plug & play**

Designed for ease of use for both installation and maintenance, this unit features hot pluggable EIDE drive carriers constructed of high quality stainless steel. FireWire800 and USB 2.0 interfaces are plug and play compatible with most current operating systems.

※ **Hot Swap Design**

Using RAID 1, in the event of a hard drive failure the defective hard drive can be replaced without affecting access to data.

※ **Auto Rebuilding**

Simply replacing the defective drive will initiate an automatic re-mirroring process in RAID 1 while allowing access to the data. No user intervention or utilities are required.

※ **Independent OS, Easy Installation**

The Vanguard II RAID storage system can be used with a variety of current operating systems using the native FireWire or USB Storage drivers. Supports Windows 98 Second Edition or later, Macintosh 9.1 or later, MacOS X and most current distributions of the Linux operating system. Please note that operating system level customer support for Linux is not provided due to the number of different distributions available. Please contact your distribution provider for operating system level Linux support.

※ **LCD (Liquid crystal display) Screen**

Current drive and unit status is provided by an easy to read LCD display.

## 1-2 Product Specifications

<b>Vanguard III Storage System</b>	
Hardware RAID	8032 microprocessor RAID ASIC
RAID level	RAID 0, 1
Host interface	1394a                      1394b+ USB2.0
Host transfer rate	50/56 MB/sec              80/56 MB/sec
HDD interface	ATA133/UDMA133 E-IDE
Hot swappable trays	2 x (1" height E-IDE drive)
Cooling Fan	6cm Ball Bearing Fan
Operating temperature	0°C ~ 55°C
Input voltage	90 – 240V
Dimension (mm)	147(W) x 270(L) x 115(H)
Weight	4.5kg (without hard drives)
Material	Aluminum Case
LCD display	Blue light
HD Hot swappable	Yes
Auto rebuilding	Yes

## Chapter 2 Hardware Installation

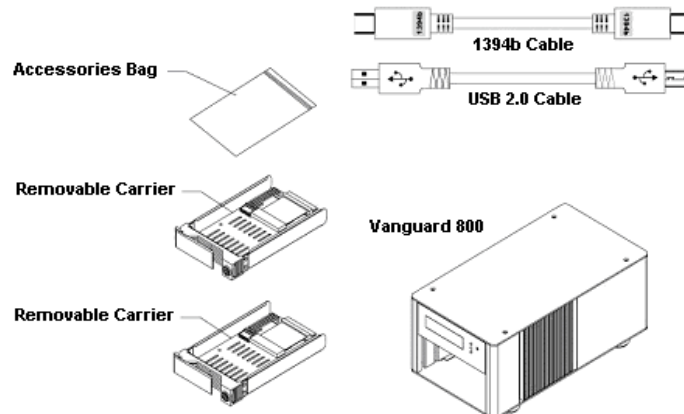
### 2-1 Package Contents

Your Vanguard III package includes the following items. Please contact our distributors in case of any missing or damaged items.

Item	Quantity
Vanguard III Storage System	1
Removable Carrier	2
Simple User's Guide	1
1 Meter 1394b Cable	1
1 Meter USB 2.0 Cable	1
Accessories bag (Enclosure Kit)	1

( Including 8 x 6#-32 screws and key x 1 for enclosure kits )

The following are included with your Vanguard III



## **2-2 System Requirements**

※ Hardware Requirements

1. Macintosh or PC with FireWire IEEE-1394b or USB 2.0 interfaces (1394a interface requires an optional bilingual cable, sold separately)
2. Standard ATA100/133 IDE hard drives

※ Operating System Requirements

Windows 98SE, Windows ME, Windows 2000, Windows X & XP Pro

Macintosh OS 9.1 & MacOS X or later

(USB 2.0 and FireWire 800 require Macintosh OS 10.2.3 or later)

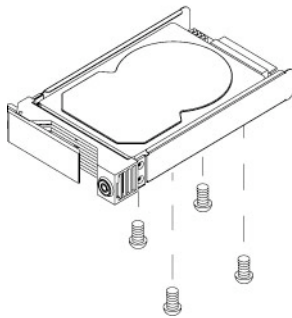
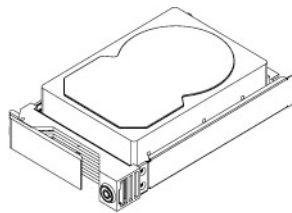
## **2-3 Considerations**

1. While it may be possible to use your Vanguard III with dissimilar hard drive mechanisms, it is highly recommended to match the drives as closely as possible to avoid complications which may lead to a degradation of performance or reliability.
2. Vanguard III supports 48-bit LBA and tested with up to 400GB drives (currently largest available drive shipping).
3. It is important to decide the desired RAID configuration before using your Vanguard III storage system. Changing the RAID type will result in a loss of any data on the Vanguard III.
4. We recommend using high quality drives in this unit. Compromising on the quality of the drives can result in a loss of performance or reliability.
5. Both hard drives will need to have their jumper settings set to the Master mode.

## **2-4 Installing a Hard Drive in the Carrier**

(Does not apply to units ordered with drives already installed)

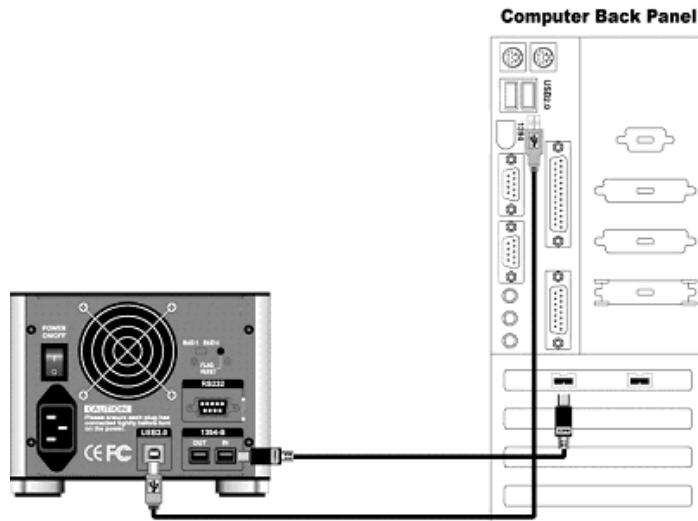
- Set Master/Slave jumpers to **MASTER** (factory default).
- Connect the power cord and the Removable Carrier's EIDE/IDE interface cable to the HDD.
- Insert the HDD into the Removable Carrier.
- Top drive bay is considered the Primary bay and the lower is the Secondary bay.
- Fasten the HDD to the carrier using the four 6#-32 screws. Position the power and data cables as flat and close to the Carrier assembly as possible to prevent damage when inserting and removing the drive from the enclosure. Please refer to the following illustration.



## **2-5. Connecting the Vanguard III**

- Turn the Vanguard III power off.
- Set the unit for the appropriate RAID level. (See next page)
- Connect either the 1394b or the USB 2.0 cable to the appropriate port on your computer. **Do not connect both cables.**
- Turn the Vanguard III power on.
- Turn the computer's power on.

Notice: Please make sure your system has installed the 1394 or USB2.0 interface and Driver. **Do not connect both cables.**



## Chapter 3

### How to Use Vanguard III

#### 3-1 RAID Level Setup

The Vanguard III can be set for either RAID 1 or RAID 0. It is important to determine which RAID level before using the unit. Changing the RAID level will result in a loss of the data that is on the unit. If data redundancy is required, please select the RAID 1 option. This will mirror the two drives so that they appear as one single drive. If non-redundant, faster or higher capacity is required, select RAID 0. Note that RAID 0 has no redundancy. Any drive failure will result in a loss of data. The RAID level is set by using a small switch on the back of the unit. The unit must be powered off to set the switch.

##### Factory Default

- Operation Mode Switch                      RAID 1

##### Setup RAID 1

- **Installing two new Hard Disks**

1. Install two Removable carriers with hard disk into the Vanguard III.
2. Use the appropriate formatting procedure for the operating system being used.
3. When the two installed hard disks have different capacities, the Vanguard III will set the capacity based on the size of the smaller volume.

- **Replacing a Defective Drive in RAID 1**

It is important to match the original drive as closely as possible. If an exact match is not available, select a drive that is larger in capacity and as close as possible in performance. The **Auto-Rebuild** Function is automatic and will copy data to the new hard drive and reestablish the RAID 1 mirror. It is strongly recommended that you backup any data before replacing the defective drive.

1. The Vanguard III will indicate the failed drive on the LCD and an audible alarm will sound. The alarm can be muted by pressing the small white switch on the front panel.
2. Remove the defective drive by sliding it out in its tray. Remove the 4 screws that secure the drive and mount the drive as described in the section "Installing the Hard Drive" section.
3. Gently insert the Removable Carrier with the new HDD into the empty bay of the Vanguard III.
4. Within a few seconds, the Vanguard III will automatically perform the **Auto-Rebuild** function. (Refer to Chapter 4 Automatic Rebuild Function).
5. After the **Auto-Rebuild**, the unit should return to its ready state. All data should be available during the rebuild.

## **Setup RAID 0**

For RAID 0, both drives must be the same manufacturer and model. Please note the following points:

- The capacity of the two drives is combined to become one logical drive.
- RAID 0 does not provide data redundancy.
- RAID 0 does offer higher performance than RAID 1.
- When using RAID 0, it is very important to maintain current backups of your data. Any drive failure will result in a loss of data.

### **Notice:**

1. It is important to properly dismount the Vanguard III before turning it off or unplugging it from the host computer. This can be done by shutting down the computer or by the following procedures.

Macintosh:

Drag the icon of the volume to the trash.

Windows:

Use the "Removable Device" icon in the systray (bottom right of the screen near the time/date).

2. Before removing any additional devices connected to the Vanguard III, be sure that they are also dismounted and that they do not rely on the Vanguard for power.

## **3-2 Windows Systems**

Once you have installed your hard drives and configured the RAID type, the Vanguard III can now be connected to the computer.

1. Find the IEEE 1394 or USB2.0 port on the rear panel of your PC.
2. Connect the IEEE 1394 cable to the IEEE 1394 port of Vanguard III or the USB2.0 cable to the USB2.0 port. **Do not connect both cables.**
3. Attach the power cord to the Vanguard III.
4. Power on the Vanguard III.
5. Power on the computer.
6. Wait a few seconds. Windows will detect the device and install the appropriate drivers. Windows users may be asked to insert the Windows installation CD-ROM.
7. Windows users can use the Stop or Eject device icon in the systray to verify the device is present.
8. If running Windows 98 SE, you may need to download the update patch from Microsoft web site at <http://windowsupdate.microsoft.com>

<http://www.microsoft.com/windows98/downloads/corporate.asp>

Select Windows 98 Second Edition 1394 Storage Supplement and follow the instructions to download the update patch.

The unit is now format using the appropriate formatting utility.

### **3-3 Macintosh Systems**

Once you have installed your hard drives and configured the RAID type, the Vanguard III can now be connected to the computer.

1. Locate the built-in the 1394 or USB port on your Macintosh computer. Connect the 1394 cable to the 1394 port or connect the USB2.0 cable to the USB2.0 port. **Do not connect both cables.**
2. Connect the other end of the 1394 cable to the 1394 port of Vanguard III.
3. Attach the power cord to the Vanguard III.
4. Power on the Vanguard III.
5. Power on your Macintosh computer.
6. You Macintosh should prompt you to format the drive.

### **3-4 LCD Status Displays**

- Primary drive failed.

Pri HDD : Fail Sec HDD : OK
--------------------------------

- Secondary drive failed.

Pri HDD : OK Sec HDD : Fail
--------------------------------

- Both Drives have Faild.

Pri HDD : Fail Sec HDD : Fail
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Primary Disk capacity > Secondary Disk capacity.

Unable to rebuild data from primary disk to secondary  
with RAID 1.

Wrong Capacity  
PRI > SEC

Secondary. Disk capacity > Primary Disk capacity.

Unable to rebuild data from secondary disk to primary  
with RAID 1.

Wrong Capacity  
SEC > PRI

#### Temperature Alarm

The T character show on upper right corner of LCD.

Pri HDD : OK T  
Sec HDD : OK

- Fan Failure Alarm

The F character show on lower right corner of LCD.

Pri HDD : OK  
Sec HDD : OK F

## Chapter 4

### System maintenance

#### 4-1. Hot Swappable and Auto Rebuilding of RAID1

The Vanguard III supports automatic rebuilding of RAID 1 volumes in the event of a single drive failure. Simply replacing the failed drive will trigger the rebuilding function which will mirror the functional drive's data to the replacement drive.

##### Off-line back up

NitroAV does not recommend using the RAID 1 option for the creation of duplicate hard drives.

## Appendix A

### Questions & Answers

**Q: What happens if power is lost during the automatic rebuild of a RAID 1 volume?**

**A:** In case of power failure during the **automatic rebuild**, the RAID controller will remember the rebuilding progress percentage and resume where the process was interrupted.

**Q: When rebuilding the RAID 1 volume, can I access the data.**

**A:** The data should be visible from the host computer. There may be a performance drop.

**Q: The buzzer alarm keeps sounding during Vanguard III operation.**

**A:** Check the front panel for diagnostic messages.  
Take appropriate action to address the error.

**Q: How to turn on/off the audible alarm?**

**A:** Use a sharp pointed object to turn off buzzer alarm on the front panel (Refer to Section 2-4 Part Description)

**Q: Why do the responses of the computer system slow down when Vanguard III is under rebuilding at RAID 1 Mode?**

**A:** Part of the RAID Systems throughput is used to mirror the data. This will result in a performance loss during the rebuild process.

**Q. How do I format a new, unformatted Hard Disk in the Vanguard III Windows 98 SE & Windows ME?**

**A:** Connect the Vanguard III to the 1394 bus and boot Windows 98, select Start-> Run and type FDISK and click OK to run the partitioning utility.

Select **【Y】** on the first screen for enabling large disk support NOTE: If any 1394 hard drive has been unplugged during the current Windows session, FDISK will often crash and exit at this point. If this

happens, restarting Windows with the drive plugged in and trying again.

- 3). Select option 5 to choose which disk to format. – This should be one without a drive letter. Ensure the disk you chose becomes the active disk (number appears at top of screen).
- 4). Select option 1 to create a DOS partition or logical DOS drive.
- 5). Select option 1 again to create a primary DOS partition
- 6). Follow the on screen instructions to partition the drivers as required.
- 7). Exit FDISK and ignore the request to restart the PC, this only applies to fixed drives.
- 8). Unplug the drive from the 1394 bus then reconnect it, the drive should now appear as an icon in the My Computer window.
- 9). Right clicks on the new drive icon and select Format from the menu.
- 10). Select the full option and click start.
- 11). Once complete, the drive is ready for normal operation.

To partition multiple drives, connect then all to the bus prior to booting Windows. (Be careful to ensure that enough bus power is available for those devices that require it.)

### **Windows 2000/ Windows XP**

- 1). If it is not already installed, install the Windows 2000/ Windows XP recovery console.
- 2). Plug in the drive and start the PC in recovery console mode
- 3). Once logged in to the recovery console, type DISKPART at the command prompt (for additional help on using this utility see Windows 2000/ Windows XP online help)
- 4). The drive should be listed when the utility starts. Select the drive to be partitioned and press ENTER
- 5). Follow the on screen instructions to partition drive as required
- 6). Note the letter assigned to the drive and exit the DISKPART utility
- 7). Format the drive using the FORMAT command at the command prompt. To perform a quick format type:  
FORMAT /Q < drive\_letter>: /FS: FAT32 (For example FORMAT /Q G:/FS: FAT32)  
The /FS: switch specifies files system (FAT, FAT32, NTFS). For cross compatibility with Windows 98, FAT32 should be used. If the switch is omitted, the file system defaults to NTFS.
- 8). The drive is now ready for normal operation under Windows 2000/ Windows XP. Windows 2000/ Windows XP recovery console dose not seem to be fully aware of new devices being connected to the bus while it is running. For this reason, partition of multiple drives should be done by attaching all drives prior to start the recovery console. (See final note in Window 98 section).

### **How do I install the Windows 2000/ Windows XP Recovery Console?**

In order to partition a new drive with Windows 2000/ Windows XP, the recovery console must be installed. This is explained the following text (extracts from Windows 2000/ Windows XP online help).

## **Recovery Console overview**

The Windows 2000/ Windows XP Recovery Console is a command-line console that you can start from the Windows 2000/ Windows XP Setup program.

Using the Recovery Console, you can start and stop services, format drives, read and write data on a local drive (including drives formatted to use NTFS), and perform many other administrative tasks. The Recovery Console is particularly useful if you need to repair your system by copying a file from a floppy disk or CD-ROM to your hard drive, or if you need to reconfigure a service that is preventing your computer from starting properly. Because the Recovery Console is quite powerful, it should only be used by advanced users who have a thorough knowledge of Windows 2000/ Windows XP.

In addition, you must be an administrator to use the Recovery Console.

You can install the Recovery Console on your computer to make it available in case you are unable to restart Windows 2000/ Windows XP.

You can then select the Recovery Console option from the list of available operating systems.

After you start the Recovery Console you will have to choose which drive you want to log on to (if you have a dual-boot or multiple-boot system) and you will have to log on with your administrator password.

- **Apple G3, G4**

- 1). Ensure the following optional device extensions are installed:

- FireWire Support (version 2.1 or higher)

- FireWire Enabler (version 2.1 or higher)

- FWSBP 2Disk Driver (or other suitable SBP-2 disk driver)

(To view installed extensions select Control Panel -> Extensions Manager from the Apple menu)

- 2). Simply plug in the drive. The G3 will detect an uninitialized drive and ask if you want to initialize it. Click OK and the drive will be ready for normal operation.

Multiple drives can be initialized either one by one or by simultaneous connection (The initialization application will simply be run for each unformatted drive connected).

Note: the format for 1394 hard drives for the G3, G4 is different from the format used on internal hard drives (using the above drivers).