



XL-RAID  
USB and eSATA to SATA II  
RAID Subsystem

Installation and Configuration  
Manual

Revision 1.0

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## Preface

### About this manual

This manual provides information regarding the quick installation and hardware features of the RAID subsystem. This document also describes how to use the storage management software. Information contained in the manual has been reviewed for accuracy, but not for product warranty because of the various environment/OS/settings. Information and specifications will be changed without further notice.

This manual uses section numbering for every topics being discussed for easy and convenient way of finding information in accordance with the user's needs. The following icons are being used for some details and information to be considered in going through with this manual:



#### NOTES:

These are notes that contain useful information and tips that the user must give attention to in going through with the subsystem operation.



#### IMPORTANT!

These are the important information that the user must remember.



#### WARNING!

These are the warnings that the user must follow to avoid unnecessary errors and bodily injury during hardware and software operation of the subsystem.



#### CAUTION:

These are the cautions that user must be aware to prevent damage to the equipment and its components.

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### Changes

The material in this document is for information only and is subject to change without notice.

## Before You Begin

Before going through with this manual, you should read and focus to the following safety guidelines. Notes about the subsystem's controller configuration and the product packaging and delivery are also included.

### Safety Guidelines

To provide reasonable protection against any harm on the part of the user and to obtain maximum performance, user is advised to be aware of the following safety guidelines particularly in handling hardware components:

Upon receiving of the product:

- ☞ Place the product in its proper location.
- ☞ To avoid unnecessary dropping out, make sure that somebody is around for immediate assistance.
- ☞ It should be handled with care to avoid dropping that may cause damage to the product. Always use the correct lifting procedures.

Upon installing of the product:

- ☞ Ambient temperature is very important for the installation site. It must not exceed 30 C. Due to seasonal climate changes; regulate the installation site temperature making it not to exceed the allowed ambient temperature.
- ☞ Before plugging-in any power cords, cables and connectors, make sure that the power switches are turned off. Disconnect first any power connection if the power supply module is being removed from the enclosure.
- ☞ Outlets must be accessible to the equipment.
- ☞ All external connections should be made using shielded cables and as much as possible should not be performed by bare hand. Using anti-static hand gloves is recommended.
- ☞ In installing each component, secure all the mounting screws and locks. Make sure that all screws are fully tightened. Follow correctly all the listed procedures in this manual for reliable performance.

### Controller Configuration

This RAID subsystem supports single controller configuration.

### Packaging, Shipment and Delivery

- ☞ Before removing the subsystem from the shipping carton, you should visually inspect the physical condition of the shipping carton.
- ☞ Unpack the subsystem and verify that the contents of the shipping carton are all there and in good condition.
- ☞ Exterior damage to the shipping carton may indicate that the contents of the carton are damaged.

If any damage is found, do not remove the components; contact the dealer where you purchased the subsystem for further instructions.

## Unpacking the Subsystem

The package contains the following items:

- RAID subsystem unit
- One power cord
- One RJ-45 Ethernet cable
- One external serial cable (RJ-11 to DB9)
- One external SATA cable
- One USB cable
- Installation Reference Guide
- Spare screws, etc.



## Chapter 1 Introduction



### The RAID Subsystem

#### Unsurpassed Value

- ① Most cost-effective SATA II RAID Subsystem

#### Application Flexibility

- ① Extends useful life by adapting to future IT requirements

#### Easy Installation, upgrade & Maintenance

- ① Provide a fast and easy way to install and upgrade the storage. Simplified maintenance reduces ongoing IT labor costs.

#### Exceptional Manageability

- ① Graphical User Interface (GUI) provides easy way for users to remotely manage and configure the storage
- ① Menu-driven LCD front panel makes it convenient for users to locally manage the storage

#### Green Power Concept

- ① Saves power by adopting the new technology "MAID" (Massive Arrays of Idle Disks).



## 1.1 Key Features

### Subsystem Features:

- ③ eSATA (3Gbps) / USB 2.0 (480Mbps) dual host interface
- ③ Multiple Volumes for host access.
- ③ Over 2TB support
- ③ Supports hot spare and automatic hot rebuild
- ③ Allows online capacity expansion within the enclosure
- ③ Local audible event notification alarm
- ③ Supports password protection
- ③ Built-in serial port interface for remote event notification
- ③ Tagged command queuing for 256 commands, allows for overlapping data streams
- ③ Transparent data protection for all popular operating systems

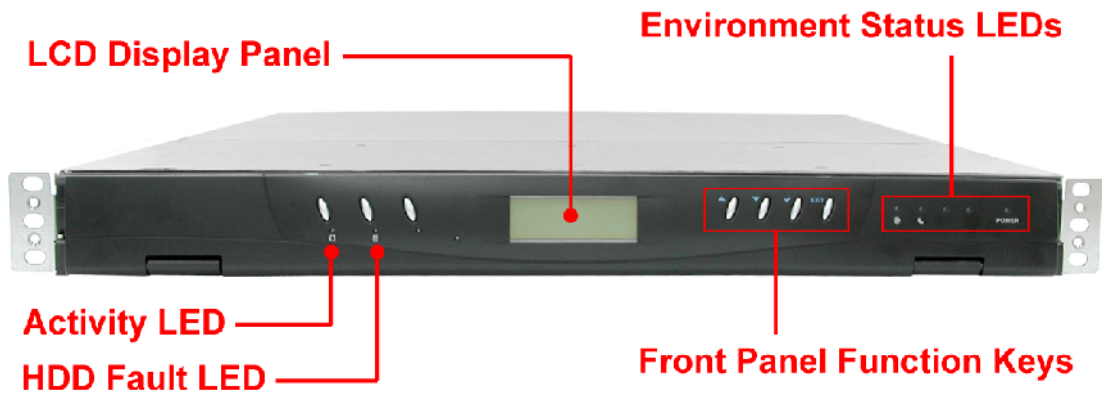
### RAID Management:

- ③ Smart-function LCD panel
- ③ Environmental monitoring unit
- ③ Real time drive activity and status indicators
- ③ Web-based GUI management utility

## 1.2 Identifying Parts of the RAID Subsystem

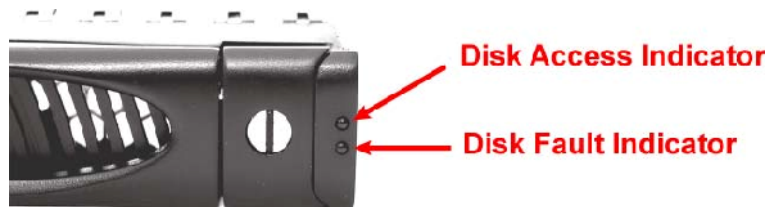
The illustrations below identify the various parts of the subsystem.

### 1.2.1 Front View



## 1. HDD Status Indicator

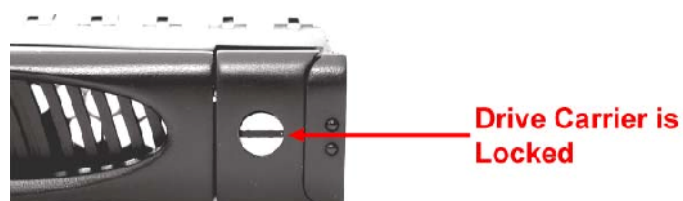
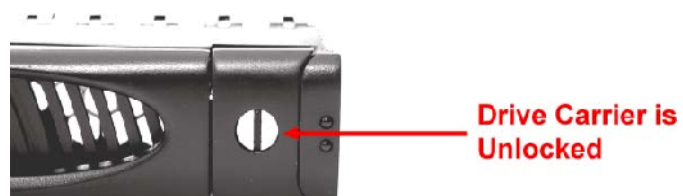
There are two LED indicators for each disk drive.



| Part           | Function  |
|----------------|---|
| HDD Status LED | No LED light indicates power is on and hard drive status is good for this slot. Red means no disk drive inserted or disk drive is Faulty. |
| HDD Access LED | LED will blink blue when the hard drive is being accessed.  |




## 2. Lock Indicator

Every Drive Tray is lockable inside the slots. Open the door lock. When the lock indicator is in vertical position (arrow points downwards), the drive tray is unlocked. When the lock indicator is in horizontal position (arrow points to the left), the drive tray is locked. To lock a drive tray, use a special key and turn the lock indicator.







### 3. Front Panel Function Keys

Use the function keys to navigate through the menu options available.

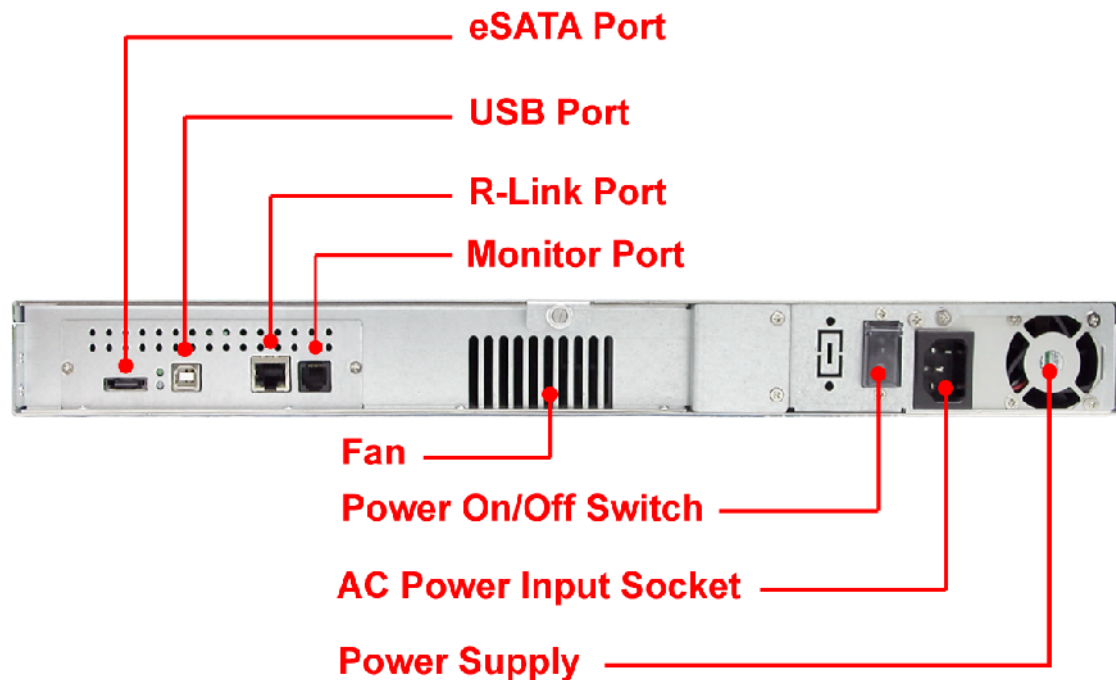
| Parts   | Function   |
|---|--|
| Up and Down Arrow buttons   | Use the Up or Down arrow keys to go through the information on the LCD screen. This is also used to move between each menu when you configure the subsystem. |
| Select button    | This is used to enter the option you have selected.  |
| Exit button <b>EXIT</b>   | Press this button to return to the previous menu.  |

### 4. Environment Status LEDs



| Parts  | Function  |
|--|---|
| Power LED <b>POWER</b>   | Green LED indicates power is ON.  |
| Fault LED       | Red blinking LED indicates a problem within the internal subsystem, such as over temperature.                                 |
| Sleep Mode LED  | Red LED is normal and subsystem is not in sleep mode. Red blinking LED means subsystem is in sleep mode (spin down idle HDD). |
| Activity LED    | This LED will blink blue when the RAID controller is busy / active.   |
| HDD Fault LED   | This LED will blink red when there is HDD failure.  |

## 1.2.2 Rear View



### 1. eSATA Port

The subsystem has one external SATA II port for connecting to the host system or server.

### 2. USB Port

The subsystem has one USB 2.0 port for connecting to the host system or server.

### 3. R-Link Port: Remote Link through RJ-45 Ethernet for remote management

The subsystem is equipped with one 10/100 Ethernet RJ45 LAN port. You use a web browser to manage the RAID subsystem through Ethernet for remote configuration and monitoring.

Link LED: Green LED indicates Ethernet is linking.

Access LED: The LED will blink orange when the 100Mbps Ethernet is being accessed.

### 4. Monitor Port

The subsystem is equipped with a serial monitor port allowing you to connect a PC or terminal.

### 1.3 Technical Specifications

| Feature  | Specification                                      |
|--|--|
| Form-factor  | 1U 19-inch rackmount chassis                       |
| RAID processor                                     | 400MHz storage I/O processor                       |
| RAID level   | 0, 1, 0+1, 3, 5 and JBOD                           |
| Cache memory                                       | 128MB  |
| No. of Channels (Host and Drive)                   | 2 and 4  |
| Host bus interface                                 | USB 2.0 / eSATA                                    |
| Drive bus interface                                | SATA II (Up to 3.0Gbps)                            |
| Data transfer rate                                 | Up to 480Mbits (USB 2.0) / Up to 3.0Gbps (SATA II) |
| Back plane board                                   | SATA II  |
| Hot-swap drive tray                                | Four (4) 1-inch trays                              |
| Power supply                                       | 220W power supply w/PFC                            |
| Cooling fan  | 1  |
| Password protection                                | Yes  |
| Audible alarm                                      | Yes  |
| Failed drive indicators                            | Yes  |
| Failed drive auto rebuild                          | Yes  |
| Online consistency check                           | Yes  |
| Online expansion                                   | Yes  |
| Array Roaming                                      | Yes  |
| Online RAID level/ stripe size migration           | Yes  |
| Instant availability and background initialization | Yes  |
| Environment monitor                                | Yes  |
| Auto spare support                                 | Yes  |
| Bad block auto-remapping                           | Yes  |
| Remote management                                  | Yes  |
| MAID support                                       | Yes  |
| Power requirements                                 | AC 90V ~ 264V full range<br>6A ~ 3A, 50Hz ~ 60Hz   |
| Relative Humidity:                                 | 10% ~ 85% Non-condensing                           |
| Operating Temp:                                    | 10°C ~ 40°C (50°F ~ 104°F)                         |
| Physical Dimensions:                               | 44.4(H) x 486.4(W) x 569(D)mm                      |
| Weight   | 7.6Kg (without drives)                             |

## 1.4 RAID Concepts

### RAID Fundamentals

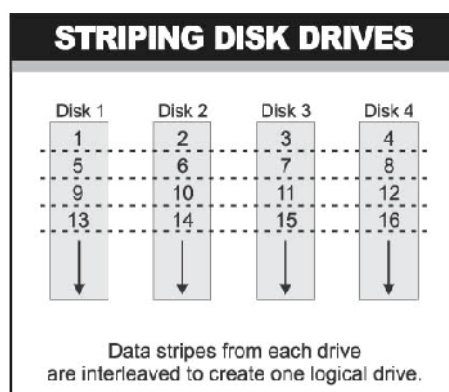
The basic idea of RAID (Redundant Array of Independent Disks) is to combine multiple inexpensive disk drives into an array of disk drives to obtain performance, capacity and reliability that exceeds that of a single large drive. The array of drives appears to the host computer as a single logical drive.

Five types of array architectures, RAID 1 through RAID 5, were originally defined; each provides disk fault-tolerance with different compromises in features and performance. In addition to these five redundant array architectures, it has become popular to refer to a non-redundant array of disk drives as a RAID 0 arrays.

### Disk Striping

Fundamental to RAID technology is striping. This is a method of combining multiple drives into one logical storage unit. Striping partitions the storage space of each drive into stripes, which can be as small as one sector (512 bytes) or as large as several megabytes. These stripes are then interleaved in a rotating sequence, so that the combined space is composed alternately of stripes from each drive. The specific type of operating environment determines whether large or small stripes should be used.

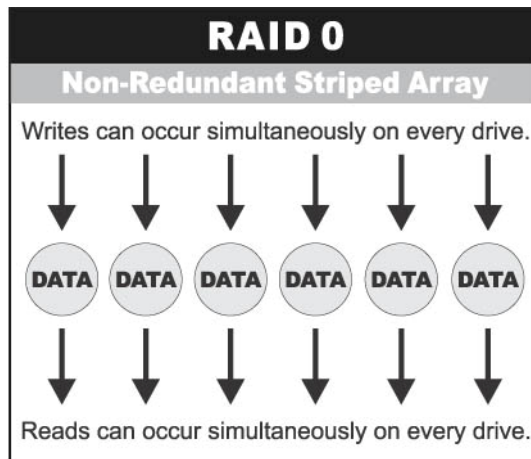
Most operating systems today support concurrent disk I/O operations across multiple drives. However, in order to maximize throughput for the disk subsystem, the I/O load must be balanced across all the drives so that each drive can be kept busy as much as possible. In a multiple drive system without striping, the disk I/O load is never perfectly balanced. Some drives will contain data files that are frequently accessed and some drives will rarely be accessed.



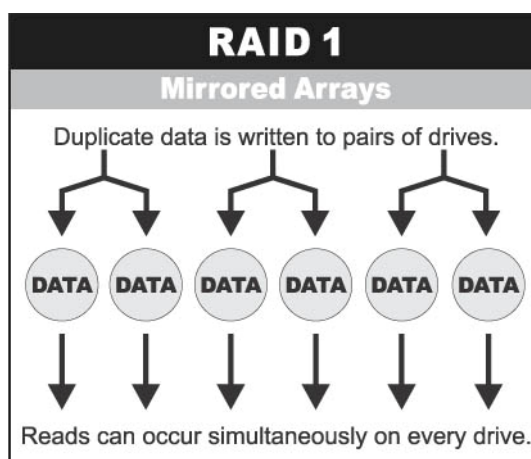
By striping the drives in the array with stripes large enough so that each record falls entirely within one stripe, most records can be evenly distributed across all drives. This keeps all drives in the array busy during heavy load situations. This situation allows all drives to work concurrently on different I/O operations, and thus maximize the number of simultaneous I/O operations that can be performed by the array.

## Definition of RAID Levels

RAID 0 is typically defined as a group of striped disk drives without parity or data redundancy. RAID 0 arrays can be configured with large stripes for multi-user environments or small stripes for single-user systems that access long sequential records. RAID 0 arrays deliver the best data storage efficiency and performance of any array type. The disadvantage is that if one drive in a RAID 0 array fails, the entire array fails.

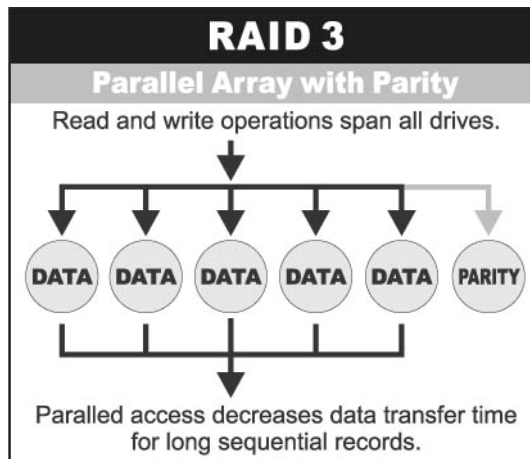


RAID 1, also known as disk mirroring, is simply a pair of disk drives that store duplicate data but appear to the computer as a single drive. Although striping is not used within a single mirrored drive pair, multiple RAID 1 arrays can be striped together to create a single large array consisting of pairs of mirrored drives. All writes must go to both drives of a mirrored pair so that the information on the drives is kept identical. However, each individual drive can perform simultaneous, independent read operations. Mirroring thus doubles the read performance of a single non-mirrored drive and while the write performance is unchanged. RAID 1 delivers the best performance of any redundant array type. In addition, there is less performance degradation during drive failure than in RAID 5 arrays.

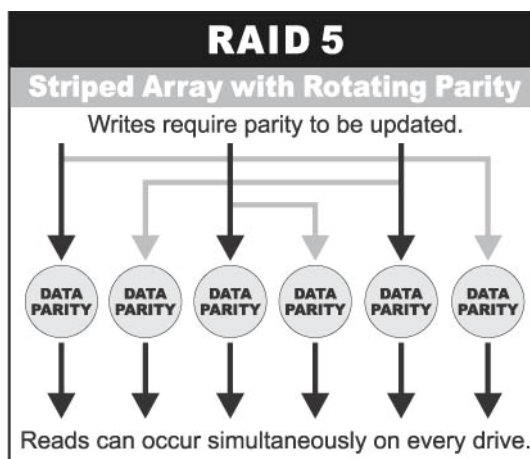




RAID 3 sector-stripes data across groups of drives, but one drive in the group is dedicated to storing parity information. RAID 3 relies on the embedded ECC in each sector for error detection. In the case of drive failure, data recovery is accomplished by calculating the exclusive OR (XOR) of the information recorded on the remaining drives. Records typically span all drives, which optimizes the disk transfer rate. Because each I/O request accesses every drive in the array, RAID 3 arrays can satisfy only one I/O request at a time. RAID 3 delivers the best performance for single-user, single-tasking environments with long records. Synchronized-spindle drives are required for RAID 3 arrays in order to avoid performance degradation with short records. RAID 5 arrays with small stripes can yield similar performance to RAID 3 arrays.



Under RAID 5 parity information is distributed across all the drives. Since there is no dedicated parity drive, all drives contain data and read operations can be overlapped on every drive in the array. Write operations will typically access one data drive and one parity drive. However, because different records store their parity on different drives, write operations can usually be overlapped.



Dual-level RAID achieves a balance between the increased data availability inherent in RAID 1 and the increased read performance inherent in disk striping (RAID 0). These arrays are sometimes referred to as RAID 0+1 or 1+0.

## In summary:

- ⑩ RAID 0 is the fastest and most efficient array type but offers no fault-tolerance. RAID 0 requires a minimum of one drive.
- ⑩ RAID 1 is the best choice for performance-critical, fault-tolerant environments. RAID 1 is the only choice for fault-tolerance if no more than two drives are used.
- ⑩ RAID 3 can be used to speed up data transfer and provide fault-tolerance in single-user environments that access long sequential records. However, RAID 3 does not allow overlapping of multiple I/O operations and requires synchronized-spindle drives to avoid performance degradation with short records. RAID 5 with a small stripe size offers similar performance.
- ⑩ RAID 5 combines efficient, fault-tolerant data storage with good performance characteristics. However, write performance and performance during drive failure is slower than with RAID 1. Rebuild operations also require more time than with RAID 1 because parity information is also reconstructed. At least three drives are required for RAID 5 arrays.

## RAID Management

The subsystem can implement several different levels of RAID technology. RAID levels supported by the subsystem are shown below.

| RAID Level | Description   | Min. Drives |
|------------|---|-------------|
| 0          | Block striping is provide, which yields higher performance than with individual drives. There is no redundancy. | 1           |
| 1          | Drives are paired and mirrored. All data is 100% duplicated on an equivalent drive. Fully redundant.            | 2           |
| 3          | Data is striped across several physical drives. Parity protection is used for data redundancy.                  | 3           |
| 5          | Data is striped across several physical drives. Parity protection is used for data redundancy.                  | 3           |
| 1 + 0      | Combination of RAID levels 0 and 1. This level provides redundancy through mirroring and striping.              | 4           |

## 1.5 Array Definition

### 1.5.1 Raid Set

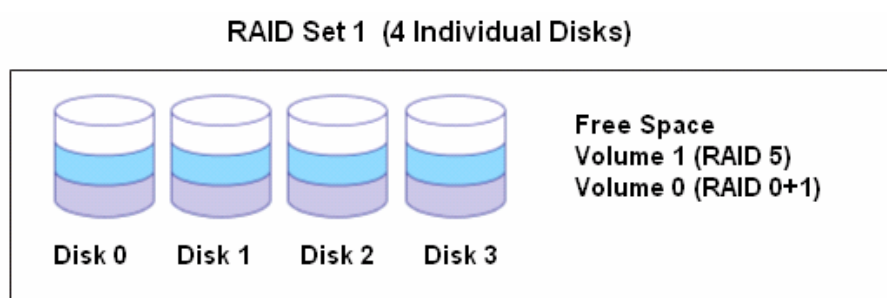
A Raid Set is a group of disk drives containing one or more logical volumes called Volume Sets. It is not possible to have multiple Raid Sets on the same disk drives.

A Volume Set must be created either on an existing Raid Set or on a group of available individual disk drives (disk drives that are not yet a part of a Raid Set). If there are existing Raid Sets with available raw capacity, new Volume Set can be created. New Volume Set can also be created on an existing Raid Set without free raw capacity by expanding the Raid Set using available disk drive(s) which is/are not yet Raid Set member. If disk drives of different capacity are grouped together in a Raid Set, then the capacity of the smallest disk will become the effective capacity of all the disks in the Raid Set.

### 1.5.2 Volume Set

A Volume Set is seen by the host system as a single logical device. It is organized in a RAID level with one or more physical disks. RAID level refers to the level of data performance and protection of a Volume Set. A Volume Set capacity can consume all or a portion of the raw capacity available in a Raid Set. Multiple Volume Sets can exist on a group of disks in a Raid Set. Additional Volume Sets created in a specified Raid Set will reside on all the physical disks in the Raid Set. Thus each Volume Set on the Raid Set will have its data spread evenly across all the disks in the Raid Set. Volume Sets of different RAID levels may coexist on the same Raid Set.

In the illustration below, Volume 1 can be assigned a RAID 5 level while Volume 0 might be assigned a RAID 0+1 level.



### 1.5.3 Easy to Use Features

#### 1.5.3.1 Instant Availability/Background Initialization

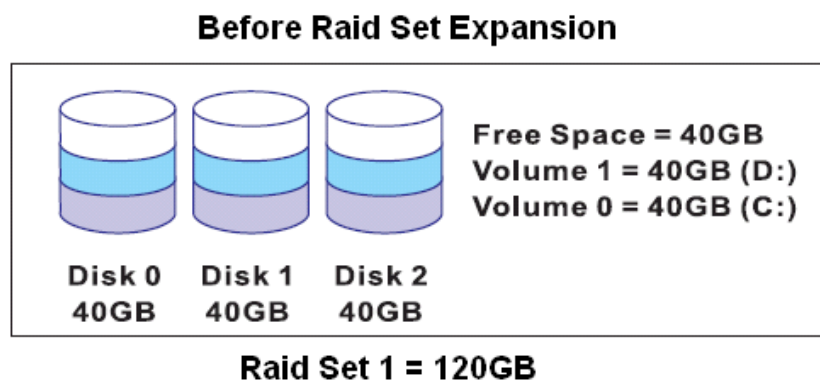
RAID 0 and RAID 1 Volume Set can be used immediately after the creation. But the RAID 3, 5 and 6 Volume Sets must be initialized to generate the parity. In the Background Mode initialization, the initialization proceeds as a background task, the Volume Set is fully accessible for system reads and writes. The operating system can instantly access to the newly created Volume Sets without waiting for the initialization to be completed. One disadvantage of this is that the initialization process takes longer time. In Foreground Mode initialization, the initialization process is faster but must be completed first before the Volume Set is ready for system access.

#### 1.5.3.2 Array Roaming

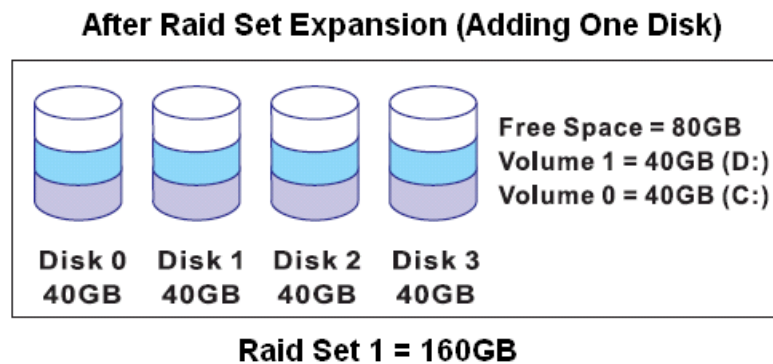
The RAID subsystem stores configuration information both in NVRAM and on the disk drives. This protects the configuration settings in the case of a disk drive or controller failure. Array roaming allows the administrator the ability to move a complete Raid Set to another system without losing RAID configuration and data on that Raid Set. If a RAID enclosure fails to work, the Raid Set disk drives can be moved to another enclosure and inserted in any order.

#### 1.5.3.3 Online Capacity Expansion

Online Capacity Expansion makes it possible to add one or more physical drives to a Raid Set, while the server is in operation, eliminating the need to backup and restore after reconfiguring the Raid Set. When disks are added to a Raid Set, unused capacity is added at the end of the Raid Set. Data on the existing Volume Sets residing on that Raid Set is redistributed evenly across all the disks. A contiguous block of unused capacity is made available on the Raid Set. The unused capacity can be used to create additional Volume Set. The expansion process is illustrated as follows.



The RAID subsystem controller redistributes the original Volume Set over the original and newly added disks, using the same RAID level configuration. The unused capacity on the expand Raid Set can then be used to create an additional Volume Sets, with a different RAID level setting as needed by user.



#### 1.3.3.4 Online RAID Level and Stripe Size Migration

User can do migration on both the RAID level and Stripe Size of an existing Volume Set while the server is online and the Volume Set is in use. Online RAID level/stripe size migration can prove helpful during performance tuning activities as well as in the event that additional physical disks are added to the RAID subsystem. For example, in a system using two drives in RAID level 1, you could add capacity and retain fault tolerance by adding one drive. With the addition of third disk, you have the option of adding this disk to your existing RAID logical drive and migrating from RAID level 1 to 5. The result would be parity fault tolerance and double the available capacity without taking the system off.

## 1.5.4 High Availability

### 1.5.4.1 Creating Hot Spares

A hot spare drive is an unused online available drive, which is ready to replace a failed disk drive. In a RAID level 1, 0+1, 3, 5 or 6 Raid Set, any unused online available drive installed but not belonging to a Raid Set can be defined as a hot spare drive. Hot spares permit you to replace failed drives without powering down the system. When the RAID subsystem detects a drive failure, the system will do automatic and transparent rebuild using the hot spare drives. The Raid Set will be reconfigured and rebuilt in the background while the RAID subsystem continues to handle system request. During the automatic rebuild process, system activity will continue as normal, however, the system performance and fault tolerance will be affected.



**IMPORTANT:** The hot spare must have at least the same or more capacity as the drive it replaces.

### 1.5.4.2 Hot-Swap Disk Drive Support

The RAID subsystem has built-in protection circuit to support the replacement of SATA II hard disk drives without having to shut down or reboot the system. The removable hard drive tray can deliver "hot swappable" fault-tolerant RAID solution at a price much less than the cost of conventional SCSI hard disk RAID subsystems. This feature is provided in the RAID subsystem for advance fault tolerant RAID protection and "online" drive replacement.

### 1.3.4.3 Hot-Swap Disk Rebuild

The Hot-Swap feature can be used to rebuild Raid Sets with data redundancy such as RAID level 1, 0+1, 3, 5 and 6. If a hot spare is not available, the failed disk drive must be replaced with a new disk drive so that the data on the failed drive can be rebuilt. If a hot spare is available, the rebuild starts automatically when a drive fails. The RAID subsystem automatically and transparently rebuilds failed drives in the background with user-definable rebuild rates. The RAID subsystem will automatically continue the rebuild process if the subsystem is shut down or powered off abnormally during a reconstruction process.

## Chapter 2 Getting Started

### 2.1 Preparing the Subsystem and Powering On

Here are the basic steps to prepare the RAID subsystem for use.

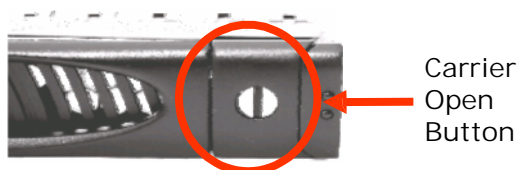
1. Attach network cable to the R-Link port and connect the other end of network cable to your network hub/switch. Or as alternative for configuration, you may connect the serial cable to the Monitor port and to the serial port of your host/server.
2. Connect the USB cable / eSATA cable to the USB port / eSATA port of the RAID subsystem and to the host system or server that will use the storage.
3. Connect the power cord to the AC input socket. Plug the other end of power cord to the power source.
4. Press the power on switch at the rear of the subsystem.

### 2.2 Installing Hard Drives

This section describes the physical locations of the hard drives supported by the subsystem and gives instructions on installing a hard drive. The subsystem supports hot-swapping allowing you to install or replace a hard drive while the subsystem is running.

Each Drive Carrier has a locking mechanism. When the Lock Groove, which is located in carrier open button, is horizontal, the Drive Carrier is locked. When the Lock Groove is vertical, the Drive Carrier is unlocked. Lock and unlock the Drive Carriers by using a flat-head screw driver.

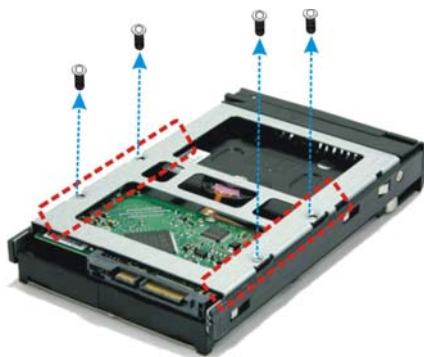
- a. Make sure the lock indicator is in unlocked position. To pull out a disk tray, press the carrier open button.



- b. Pull out an empty disk tray. Pull the lever handle outwards to remove the carrier from the enclosure.
- c. Place the hard drive in the disk tray.



- d. Install the mounting screws on the bottom part to secure the drive in the disk tray.



- e. Slide the tray into a slot.
- f. Close the lever handle until you hear the latch click into place.



## Chapter 3 RAID Configuration

The subsystem has a setup configuration utility built in containing important information about the configuration as well as settings for various optional functions in the subsystem. This chapter explains how to use and make changes to the setup utility.

### Configuration Methods

There are three methods of configuring the subsystem. You may configure through the following methods:

- VT100 terminal connected through the controller's serial port
- Front panel touch-control keypad
- Web browser-based Remote RAID management via the R-Link Ethernet port



**IMPORTANT!** The subsystem allows you to access the utility using only one method at a time. You cannot use more than one method at the same time.

### 3.1 Configuring Through a Terminal

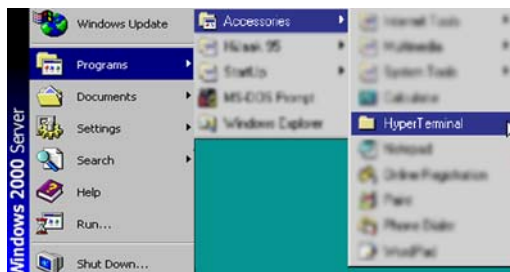
Configuring through a terminal will allow you to use the same configuration options and functions that are available from the LCD panel. To start-up:

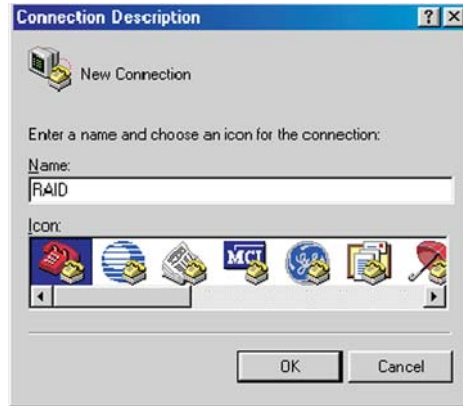
1. Connect a VT100 compatible terminal or a PC operating in an equivalent terminal emulation mode to the monitor port located at the rear of the subsystem.



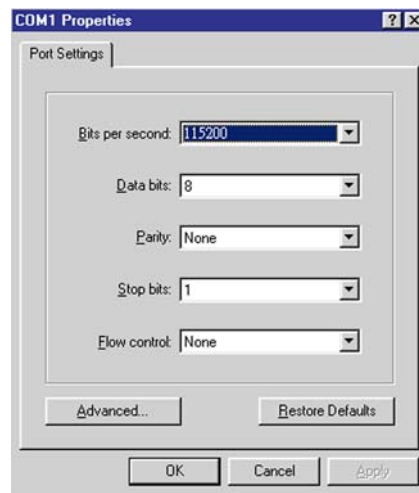
**NOTE:** You may connect a terminal while the subsystem's power is on.

2. Power-on the terminal.
3. Run the VT100 program or an equivalent terminal program.

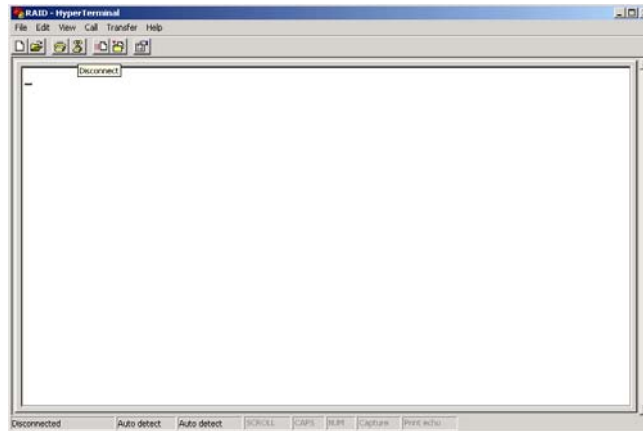




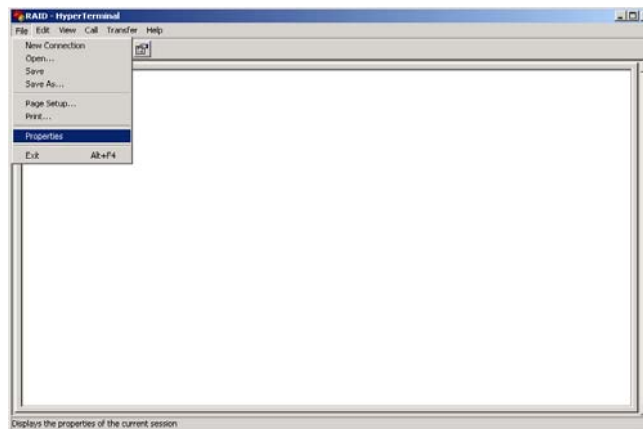
4. The default setting of the monitor port is 115200 baud rate, 8 data bit, non-parity, 1 stop bit and no flow control.



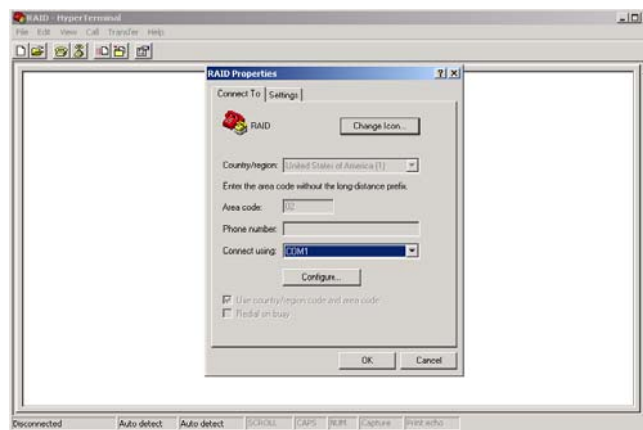
5. Click  disconnect button.



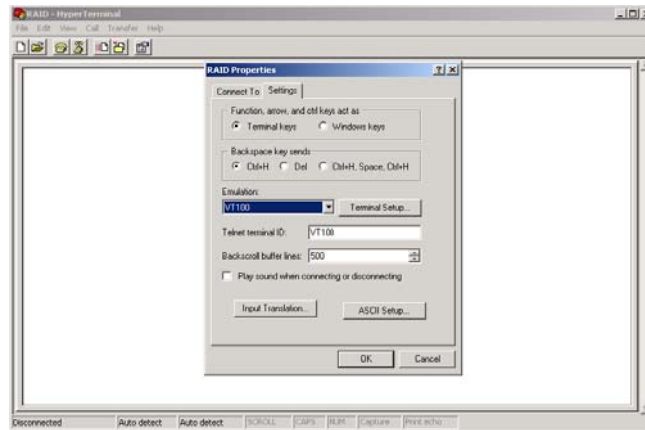
6. Open the File menu, and then open Properties.



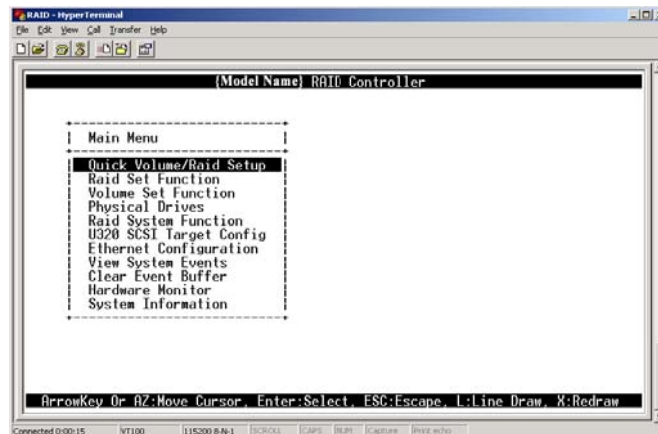
7. Open the Settings Tab.



8. Configure the settings are follows:
  - “Function, arrow and ctrl keys act as”: Terminal Keys
  - “Backspace key sends”: Ctrl + H
  - “Emulation”: VT100
  - “Telnet terminal ID”: VT100
  - “Back scroll buffer lines”: 500
  - Click OK.



9. Now, the VT100 is ready to use. After you have finished the VT100 Terminal setup, you may press the “X” key (in your Terminal) to link the RAID subsystem and Terminal together. Press “X” key to display the disk array Monitor Utility screen on your VT100 Terminal.
10. The Main Menu will appear.

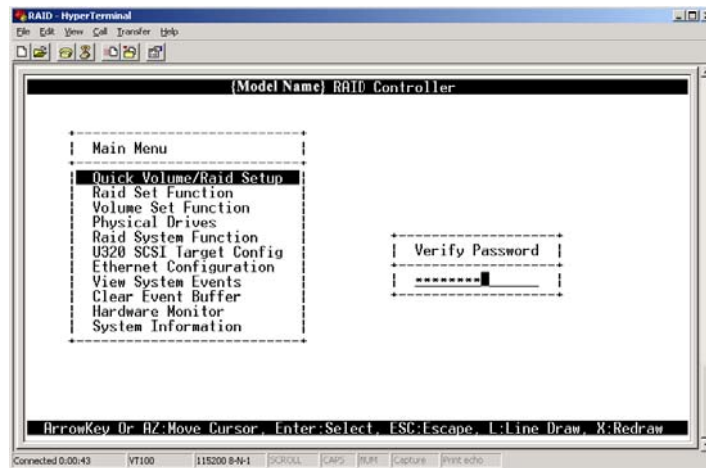


## Keyboard Function Key Definitions

- “A” key - to move to the line above
- “Z” key - to move to the next line
- “Enter” key - Submit selection function
- “ESC” key - Return to previous screen
- “L” key - Line draw
- “X” key - Redraw

## Main Menu

The main menu shows all function that enables the customer to execute actions by clicking on the appropriate link.



**NOTE:** The password option allows user to set or clear the RAID subsystem's password protection feature. Once the password has been set, the user can only monitor and configure the RAID subsystem by providing the correct password. The password is used to protect the RAID subsystem from unauthorized access. The controller will check the password only when entering the Main menu from the initial screen. The RAID subsystem will automatically go back to the initial screen when it does not receive any command in twenty seconds. The RAID subsystem's factory default password is set to 00000000.

## VT100 terminal configuration Utility Main Menu Options

Select an option and the related information or submenu items display beneath it. The submenus for each item are shown in Section 3.3. The configuration utility main menu options are:



| Menu Option                     | Description  |
|---------------------------------|--|
| Quick Volume And Raid Set Setup | Create a RAID configuration which consists of all physical disks installed |
| Raid Set Functions              | Create a customized Raid Set   |
| Volume Set Functions            | Create a customized Volume Set   |
| Physical Drive Functions        | View individual disk information   |
| Raid System Functions           | Setting the Raid system configurations                                     |
| Ethernet Configuration          | Setting the Ethernet configurations  |
| Views System Events             | Record all system events in the buffer                                     |
| Clear Event Buffer              | Clear all event buffer information   |
| Hardware Monitor                | Show all system environment status   |
| System Information              | View the controller information  |

## 3.2 Configuring Using the LCD Panel

The LCD Display front panel function keys are the primary user interface for the Disk Array. Except for the "Firmware update", all configurations can be performed through this interface. The LCD provides a system of screens with areas for information, status indication, or menus. The LCD screen displays up to two lines at a time of menu items or other information. The RAID subsystem's factory default password is set to 00000000.

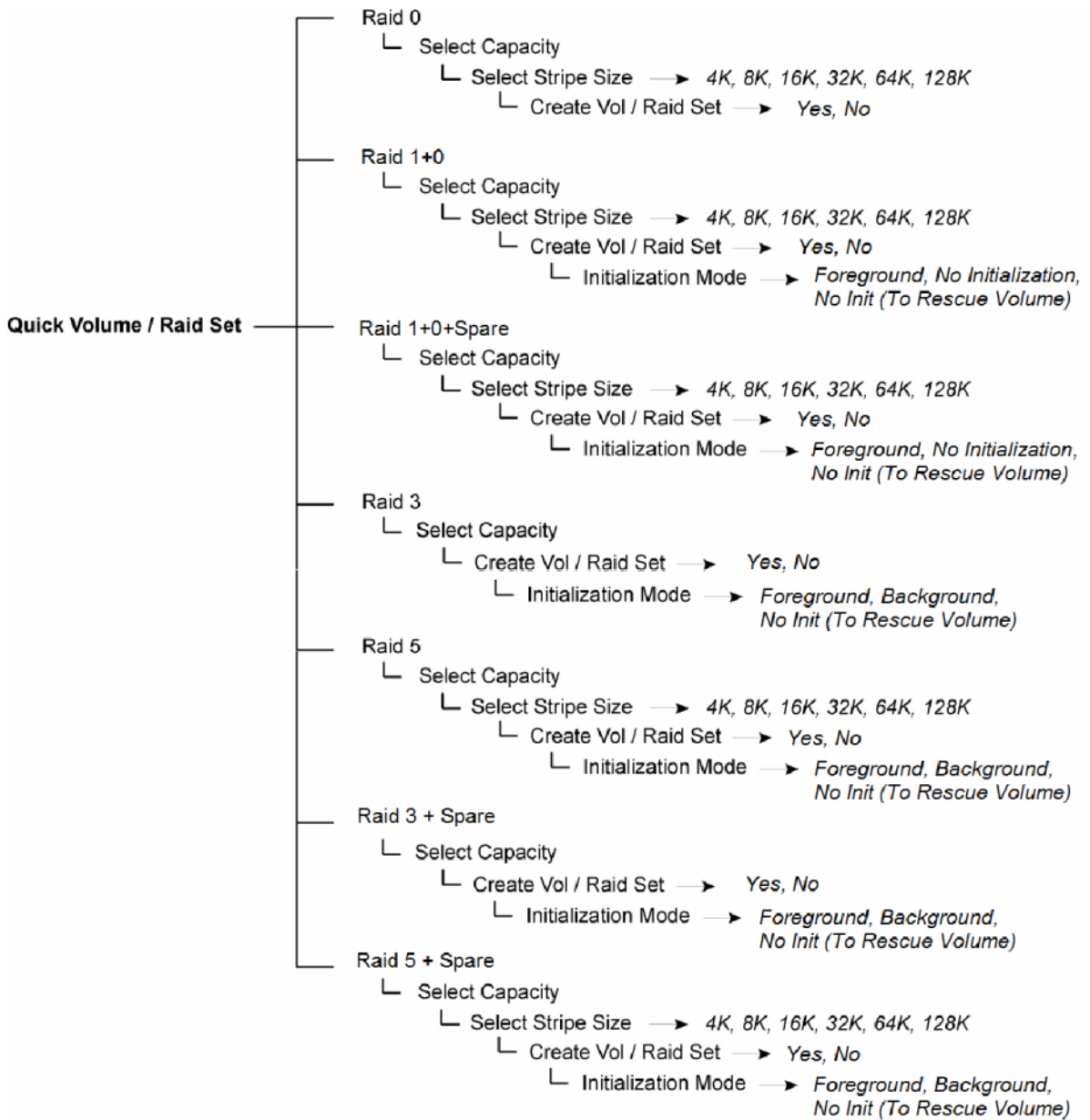
## Front Panel Function Keys

The four function keys at the top of the front panel perform the following functions:

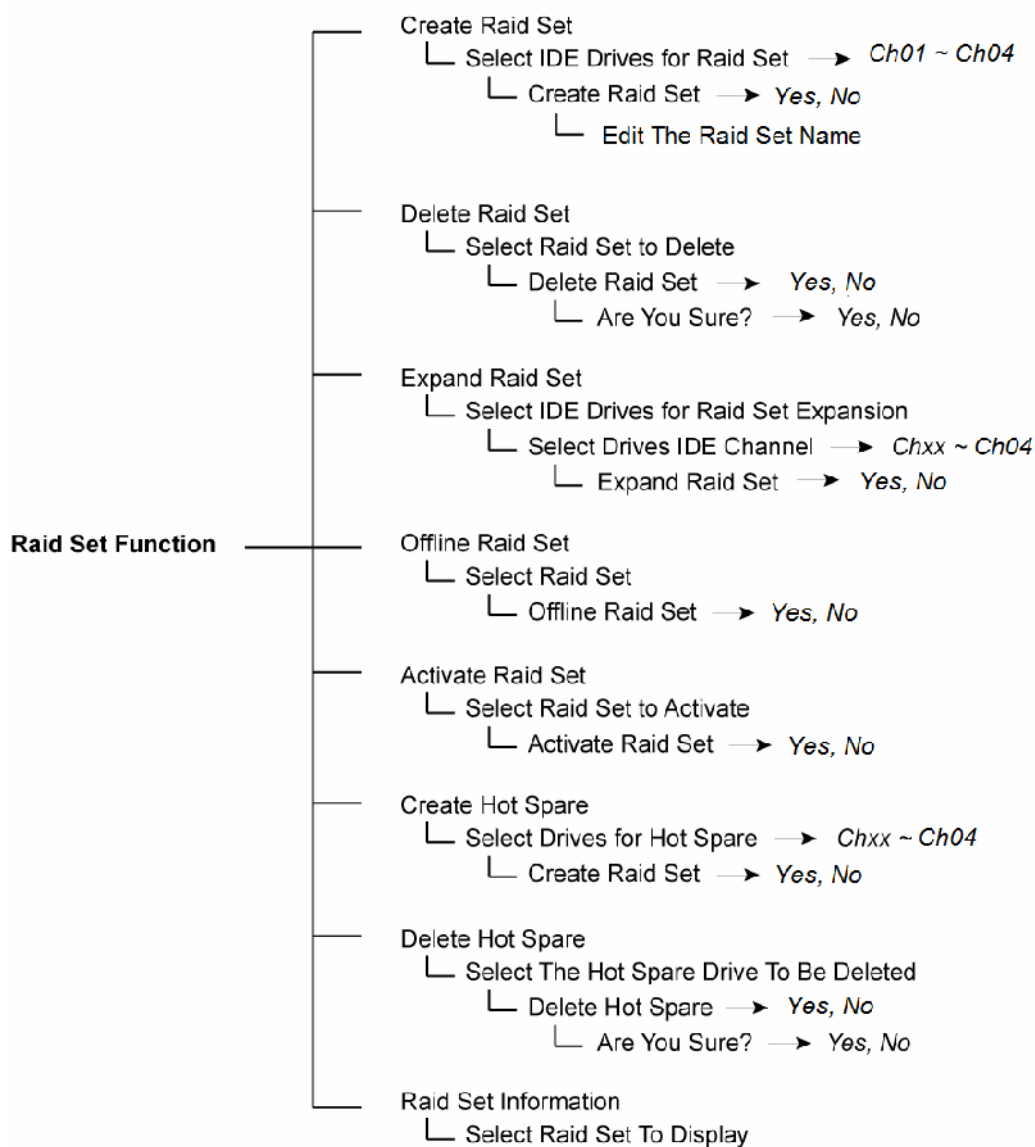
| Parts  | Function   |
|--|--|
| Up and Down<br>Arrow buttons  | Use the Up or Down arrow keys to go through the information on the LCD screen. This is also used to move between each menu when you configure the subsystem. |
| Select button                 | This is used to enter the option you have selected.  |
| Exit button <b>EXIT</b>  | Press this button to return to the previous menu.  |

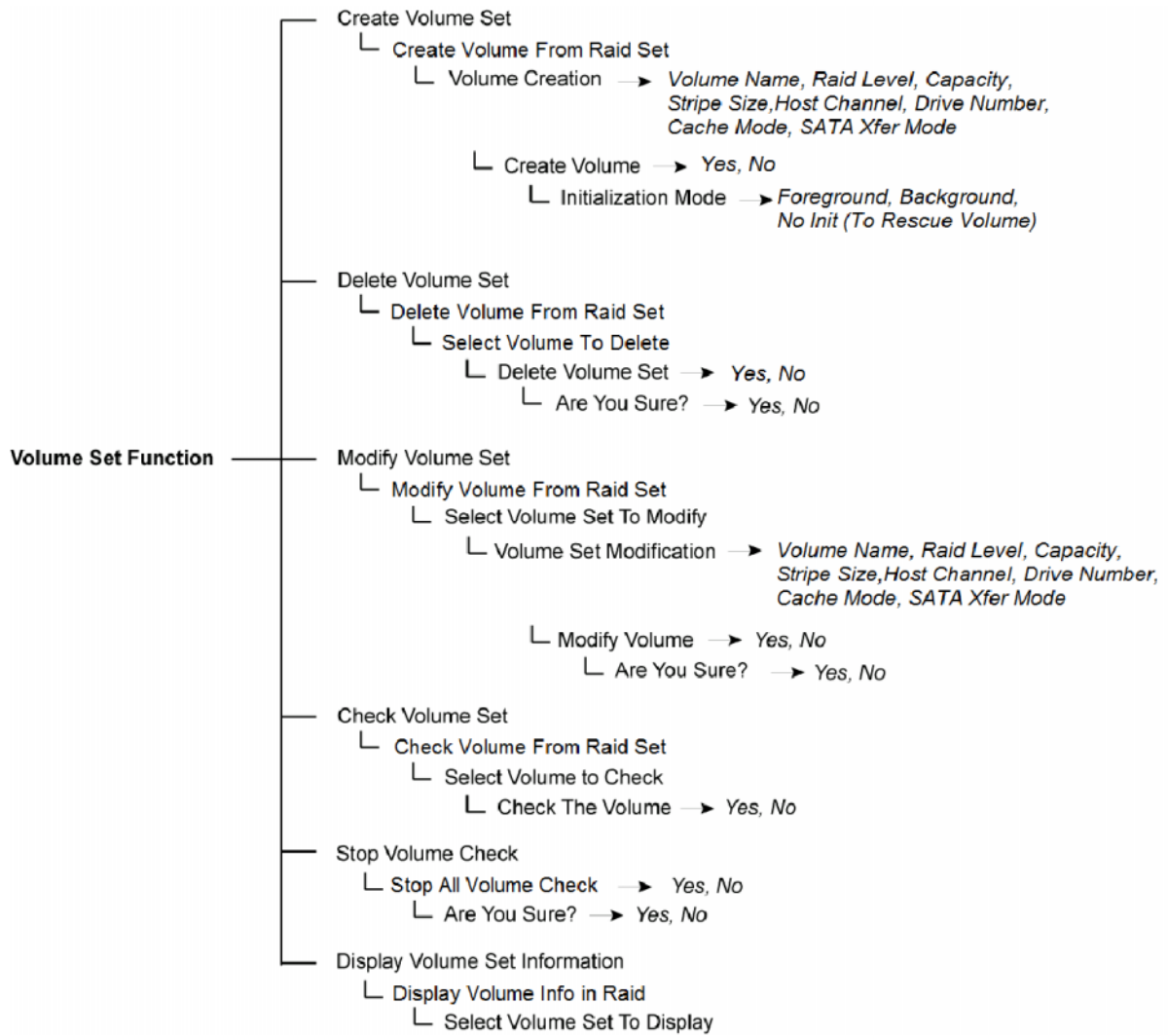
### 3.3 Menu Diagram

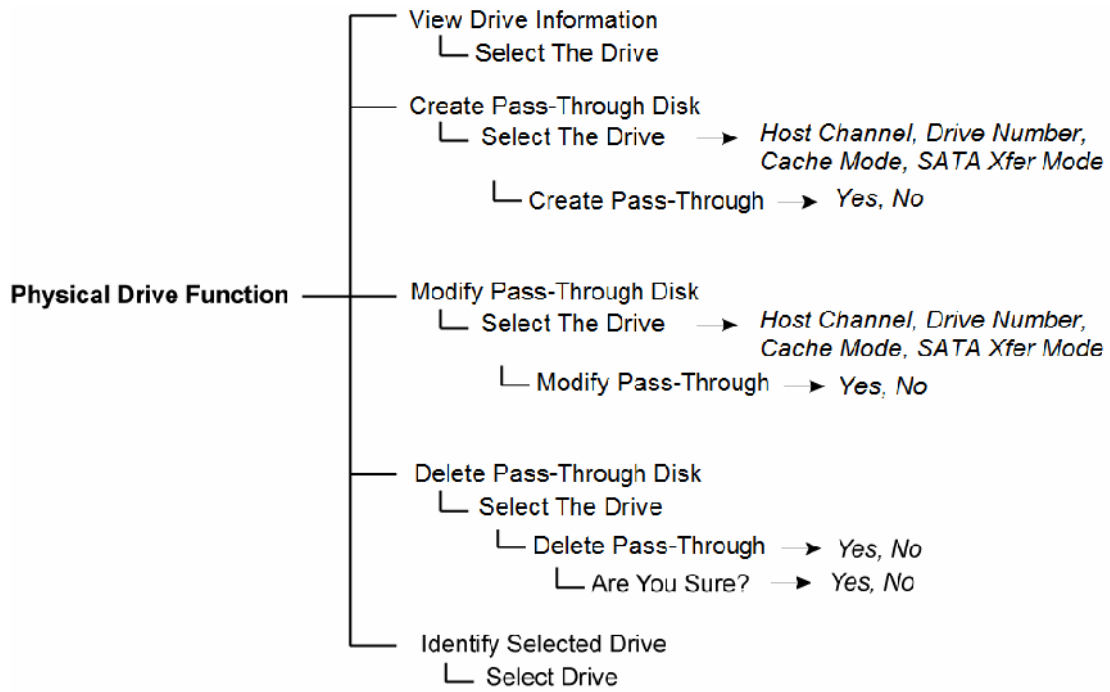
The following tree diagram is a summary of the various configurations and setting functions that can be accessed through the terminal monitor. Also, almost the same menu can be accessed through the LCD panel.

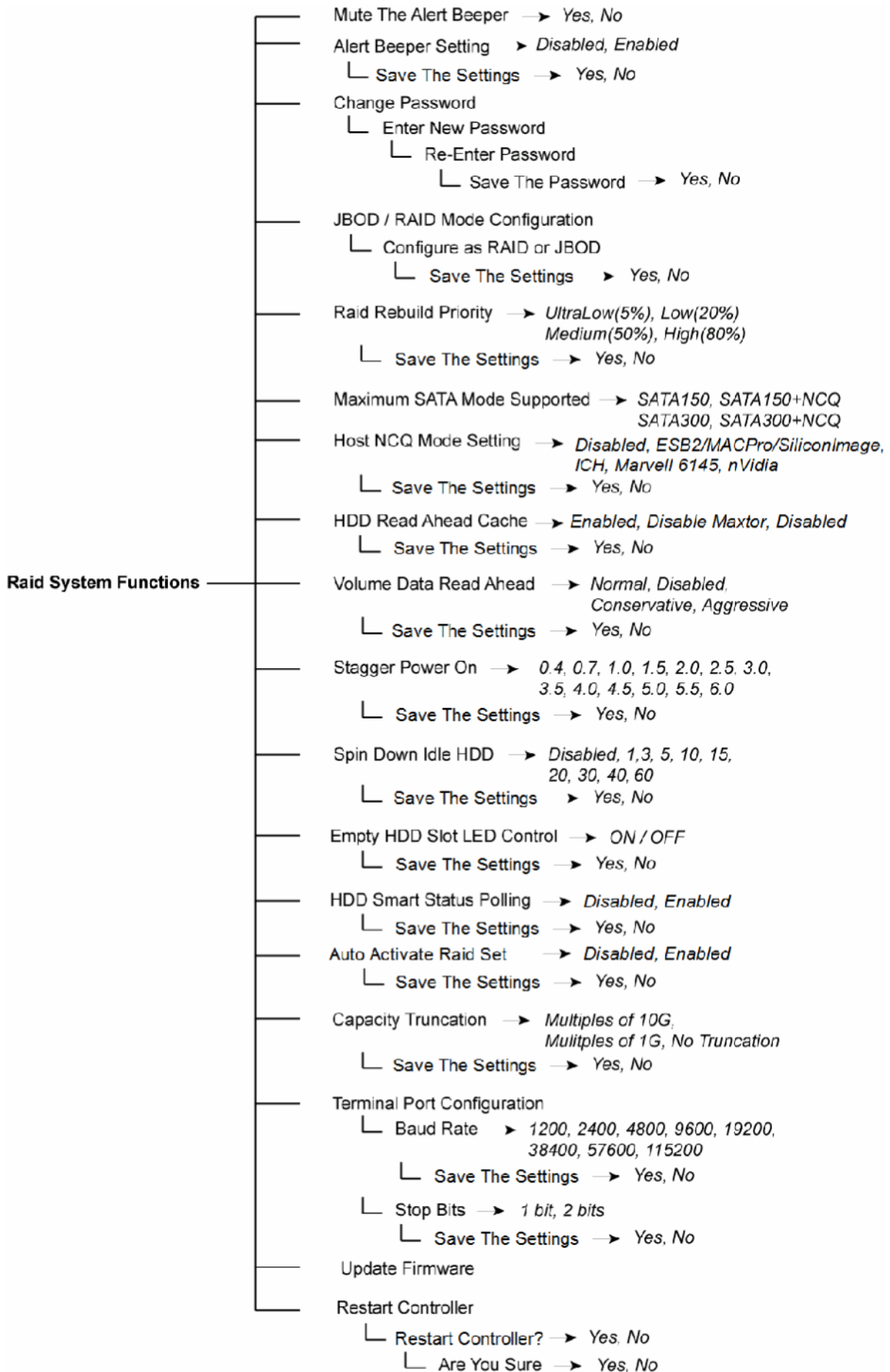


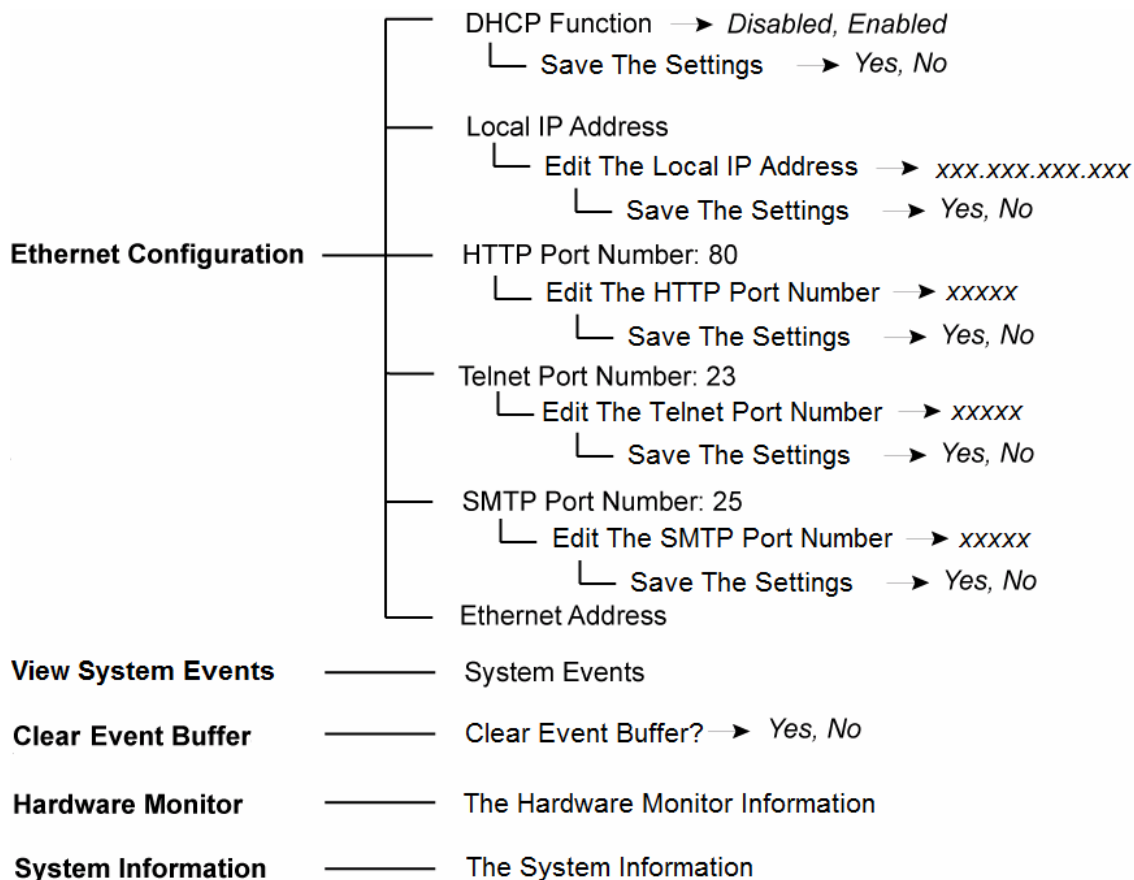












**NOTE: This subsystem can detect up to 4 Volume Sets in each Host Channel (total 8 Volume Sets). The Volume Set size can be over 2 Terabytes. Use OS: Windows 2003 SP1 or later, Windows XP SP1 or later, Windows Vista, Mac OS 10 or later, and Linux kernel 2.6 or later.**

### 3.4 Web browser-based Remote RAID management via R-Link Port

The RAID subsystem can be configured with RAID Manager, a web browser-based application which utilizes the web browser installed on your operating system. The web browser-based RAID Manager can be used to manage all the RAID function.

To configure the RAID subsystem on a remote machine, you need to know its IP Address. Launch your web browser by entering `http://[IP Address]` in the remote web browser.



**IMPORTANT!** The Ethernet default IP is "192.168.001.100". DHCP function is "Enabled". You can configure the correct IP Address through the LCD panel or the terminal "Ethernet Configuration" menu.

Note that you must be logged in as administrator with local admin rights on the remote machine to remotely configure it. The RAID subsystem controller default User Name is "admin" and the Password is "00000000".

| Raid Set | IDE Channels | Volume Set(Ch/Dev#) | Volume State | Capacity |
|----------|--------------|---------------------|--------------|----------|
|          |              |                     |              |          |

| Channel              | Usage | Capacity | Model            |
|----------------------|-------|----------|------------------|
| <a href="#">Ch01</a> | Free  | 82.35B   | HES7283060FLA330 |
| <a href="#">Ch02</a> | Free  | 82.36B   | HES7283060FLA330 |
| <a href="#">Ch03</a> | Free  | 82.36B   | HES7283060FLA330 |
| Ch04                 | N.A.  | N.A.     | N.A.             |

## Main Menu

The main menu shows all function that enables the user to execute actions by clicking on the appropriate link.

| Individual Category  | Description  |
|----------------------|--|
| Quick Function       | Create a RAID configuration, which consists of all physical disks installed. The Volume Set Capacity, Raid Level, and Stripe Size can be modified during setup.    |
| Raid Set Functions   | Create customized Raid Sets.   |
| Volume Set Functions | Create customized Volume Sets and allow modification of parameters of existing Volume Sets   |
| Physical Drives      | Create pass through disks and allow modification of parameters of existing pass through drives. This also provides a function to identify a respective disk drive. |
| System Controls      | For setting the RAID system configurations.  |
| Information          | To view the controller and hardware monitor information. The Raid Set hierarchy can also be viewed through the Raid Set Hierarchy item.                            |

## Configuration Procedures

Below are a few practical examples of concrete configuration procedures.

### 3.5 Quick Create

The number of physical drives in the RAID subsystem determines the RAID levels that can be implemented within the Raid Set. You can create a Raid Set associated with exactly one Volume Set. The user can change the RAID level, Capacity, Volume Initialization Mode and Stripe Size. A hot spare option is also created depending upon the existing configuration. Tick on the Confirm The Operation and click on the Submit button in the Quick Create screen, the Raid Set and Volume Set will start to initialize.

If the Volume Set size is over 2TB, an option "Greater Two TB Volume Support" will be automatically provided in the screen as shown in the above example. There are two options to select: "No" and "Yes".

Greater Two TB Volume Support:

No: Volume Set capacity is set to maximum 2TB.

Yes: Volume Set capacity can be set over 2TB.



**NOTE:** In Quick Create, the Raid Set is automatically configured based on the number of disks in your system. Use the Raid Set Function and Volume Set Function if you prefer to customize your Raid Set and Volume Set.



**NOTE:** When Quick Create is used, the Volume Set will be mapped by default to both host channels "SATA&USB/0". After the initialization is done, please use the Modify Volume Set function to modify the host channel as you need.



## 3.6 Raid Set Functions

Use the Raid Set Function and Volume Set Function if you prefer to customize your system. User can manually configure and has full control of the Raid Set and Volume Set setting, but it will take longer to set up than when using the Quick Create function. Select the Raid Set Function to manually configure the Raid Set for the first time or to delete existing Raid Set and reconfigure a Raid Set. The maximum number of RAID Sets that can be created depends on the number of disk channels in the RAID subsystem. For 4-bay RAID subsystem, four Raid Sets can be created.

### 3.6.1 Create Raid Set

The screenshot shows the RAID Manager web interface. On the left is a navigation menu with categories: Quick Function, RAID Set Functions, Volume Set Functions, Physical Drive, System Controls, and Information. The RAID Set Functions category is expanded, showing options like Create, Delete, Expand, Offline, Activate, Create Hot Spare, Delete Hot Spare, and Remove Raid Set. The main content area is titled 'RAID Manager' with a password field 'XXXXXXXX'. Below the title is a section 'Select The IDE Drives For RAID Set' containing a table of IDE drives. The table has columns for Select, Channel, Capacity, and Model. Three drives are listed, all with 80 GB capacity and model HD6728080PLA330. Below the table is a text input field for 'Raid Set Name' with the value 'Raid Set # 00'. At the bottom, there is a checked checkbox for 'Confirm The Operation' and two buttons: 'Submit' and 'Reset'.

| Select                              | Channel   | Capacity | Model           |
|-------------------------------------|-----------|----------|-----------------|
| <input checked="" type="checkbox"/> | IDE Ch. 1 | 80 GB    | HD6728080PLA330 |
| <input checked="" type="checkbox"/> | IDE Ch. 2 | 80 GB    | HD6728080PLA330 |
| <input checked="" type="checkbox"/> | IDE Ch. 3 | 80 GB    | HD6728080PLA330 |

Raid Set Name:

Confirm The Operation

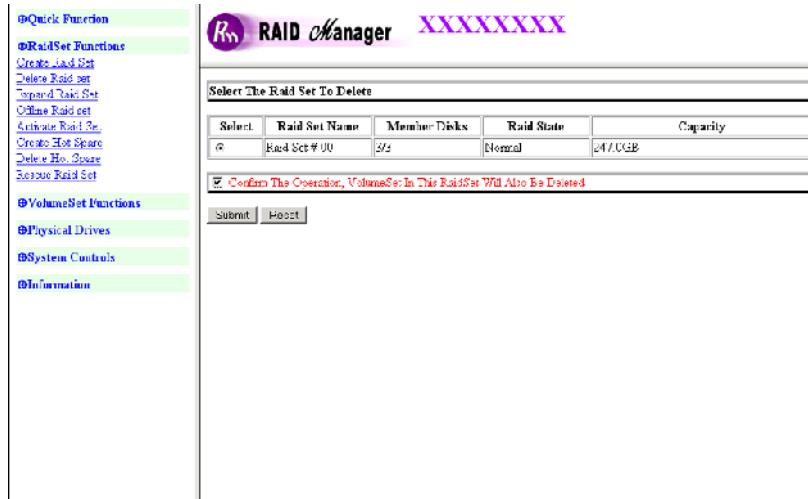
To create a Raid Set, click on the Create Raid Set link. A "Select The IDE Drives For RAID Set" screen is displayed showing the IDE drives in the RAID subsystem. Check the "Select" option to include a physical drive to the current Raid Set. Enter the preferred Raid Set Name (1 to 16 alphanumeric characters) to define a unique identifier for the Raid Set. The default Raid Set name will always appear as Raid Set # 00 for first Raid Set.

Tick on the Confirm The Operation option and click on the Submit button in the screen. The Raid Set will start to initialize.

### 3.6.2 Delete Raid Set

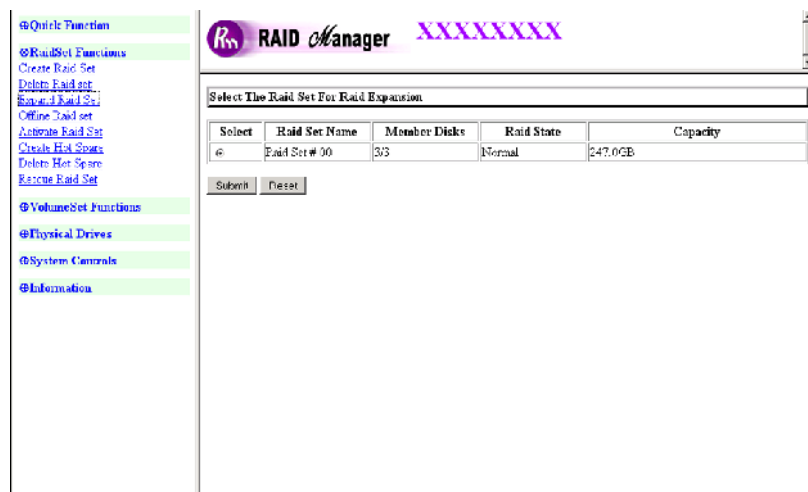
To delete a Raid Set, click on the Delete Raid Set link. A "Select The RAID SET To Delete" screen is displayed showing all Raid Sets existing in the current subsystem. Check the Raid Set number you want to delete in the Select column.

Tick on the Confirm The Operation option and click on the Submit button to process with deletion.



### 3.6.3 Expand Raid Set

Use this option to expand a Raid Set when one or more disk drives is/are added to the subsystem. This function is active when at least one drive is available.



To expand a Raid Set, click on the Expand Raid Set link. Select the Raid Set which you want to expand.

Tick on the available disk(s) and check Confirm The Operation. Click on the Submit button to add the selected disk(s) to the Raid Set.



NOTE: Once the Expand Raid Set process has started, user cannot stop it. The process must be completed.



NOTE: If a disk drive fails during Raid Set expansion and a hot spare is available, an auto rebuild operation will occur after the Raid Set expansion is completed.

The screenshot shows the RAID Manager interface. On the left is a navigation menu with categories: Quick Function, RAID Set Functions, Volume Set Functions, Physical Drives, System Controls, and Information. The main window title is 'RAID Manager XXXXXXXX'. The central area displays 'RAID Expansion on: Raid Set #00; Member Disks: 3'. Below this is a table with columns: Select, Channel, Capacity, and Model. One row is visible with a checked 'Select' box, Channel 'IDE CH:04', Capacity '32 GB', and Model 'FTES7280R0PTL.A3FC'. Below the table is a red warning box that says 'Confirm The Operation' and two buttons: 'Submit' and 'Reset'.

The screenshot shows the RAID Manager interface. The main window title is 'RAID Manager XXXXXXXX'. The central area displays 'Raid Set # 00: Total Disks - 4, Disks Before Expansion - 3'. Below this is a section titled 'Change The Volume Attribute During Raid Expansion?' which contains a table with columns: Volume Name, Raid Level, and Stripe Size. There are four rows of volume information. At the bottom of this section are three buttons: 'YES', 'NO', and 'Reset'.

| Volume Name     | Raid Level | Stripe Size |
|-----------------|------------|-------------|
| Volume --VOL#00 | Raid E     | 64 KByte    |
| Volume --VOL#01 | Raid E     | 64 KByte    |
| Volume --VOL#02 | Raid E     | 64 KByte    |
| Volume --VOL#03 | Raid E     | 64 KByte    |

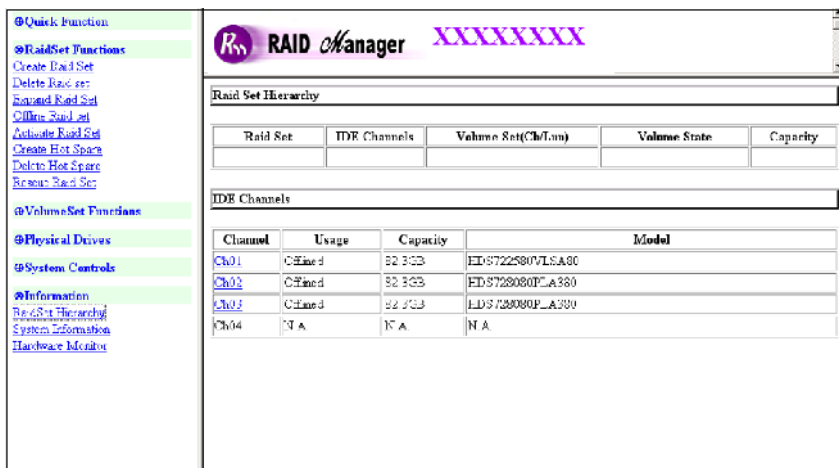
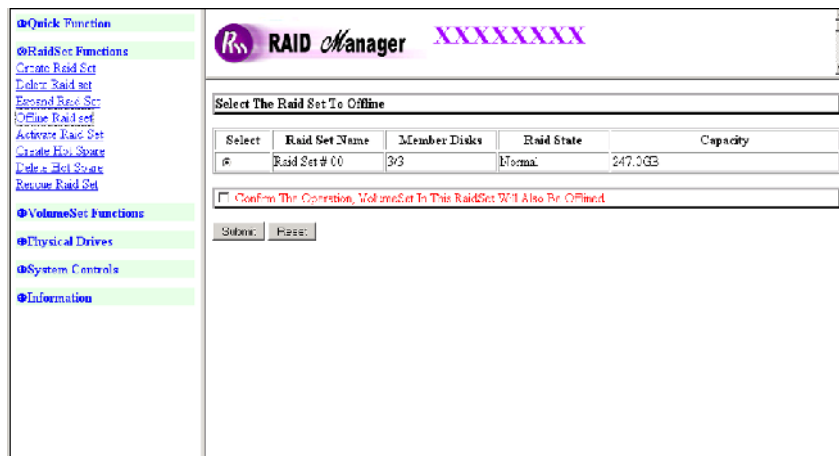
Migration occurs when a disk is added to a Raid Set. Migrating status is displayed in the Raid Set status area of the Raid Set information. Migrating status is also displayed in the Volume Set status area of the Volume Set Information for all Volume Sets under the Raid Set which is migrating.

### 3.6.4 Offline Raid Set

If user wants to offline (and move) a Raid Set while the RAID subsystem is powered on, use the Offline Raid Set function. After completing the function, the HDD state will change to “Offline” Mode.

To offline a Raid Set, click on the Offline Raid Set link. A “Select The RAID SET To Offline” screen is displayed showing all existing Raid Sets in the subsystem. Select the Raid Set which you want to offline in the Select column.

Tick on the Confirm The Operation, and then click on the Submit button to offline the selected Raid Set.



### 3.6.5 Activate Incomplete Raid Set

When Raid Set State is "Normal", this means there is no failed disk drive.

| Raid Set Information |               |
|----------------------|---------------|
| Raid Set Name        | Raid Set # 00 |
| Member Disks         | 3             |
| Total Raw Capacity   | 240.0GB       |
| Free Raw Capacity    | 0.0GB         |
| Min Member Disk Size | 80.0GB        |
| Raid Set Power State | Operating     |
| Raid Set State       | Normal        |

When does "Incomplete" Raid Set State Happens?

If the RAID subsystem is powered off and one disk drive is removed or has failed in power off state, and when the RAID subsystem is powered on, the Raid Set State will change to "Incomplete".

| Raid Set Information |               |
|----------------------|---------------|
| Raid Set Name        | Raid Set # 00 |
| Member Disks         | 3             |
| Total Raw Capacity   | 240.0GB       |
| Free Raw Capacity    | 240.0GB       |
| Min Member Disk Size | 80.0GB        |
| Raid Set Power State | Operating     |
| Raid Set State       | Incomplete    |

The Volume Set will not be visible and the failed or removed disk will be shown as "Missing".

| Raid Set Hierarchy            |                      |                      |              |          |
|-------------------------------|----------------------|----------------------|--------------|----------|
| Raid Set                      | IDE Channels         | Volume Set(Port/Lun) | Volume State | Capacity |
| <a href="#">Raid Set # 00</a> | <a href="#">Ch01</a> |                      |              |          |
|                               | <a href="#">Ch02</a> |                      |              |          |
|                               | Missing              |                      |              |          |

| IDE Channels         |               |          |                |
|----------------------|---------------|----------|----------------|
| Channel              | Usage         | Capacity | Model          |
| <a href="#">Ch01</a> | Raid Set # 00 | 203.9GB  | Maxtor 6Y200M0 |
| <a href="#">Ch02</a> | Raid Set # 00 | 122.9GB  | Maxtor 6Y120M0 |
| Ch03                 | N.A.          | N.A.     | N.A.           |

When is the “Activate Raid Set” function can be used?

In order to access the Volume Set and corresponding data, use the Activate Raid Set function to active the Raid Set. After selecting this function, the Raid State will change to “Degraded” state.

To activate the incomplete the Raid Set, click on the Activate Raid Set link. A “Select The Raid Set To Activate” screen is displayed showing all existing Raid Sets in the subsystem. Select the Raid Set with “Incomplete” state which you want to activate in the Select column.

**RAID Manager XXXXXXXX**

Select The Raid Set To Activate

| Select                           | Raid Set Name | Member Disks | Raid State | Capacity |
|----------------------------------|---------------|--------------|------------|----------|
| <input checked="" type="radio"/> | Raid Set # 00 | 2/3          | Incomplete | 240.0GB  |

Submit Reboot

Click on the Submit button to activate the Raid Set. The Volume Set(s) associated with the Raid Set will become accessible in “Degraded” mode.

**RAID Manager XXXXXXXX**

Raid Set Hierarchy

| Raid Set      | IDR Channels | Volume Set(Ch/Drv#)   | Volume State | Capacity |
|---------------|--------------|-----------------------|--------------|----------|
| Raid Set # 00 | Ch01         | Volume---VOL#00 (1/0) | Degraded     | 50.0GB   |
|               | Ch02         | Volume---VOL#01 (1/1) | Degraded     | 40.0GB   |
|               | Failed       | Volume---VOL#02 (0/0) | Degraded     | 40.0GB   |
|               |              | Volume---VOL#03 (0/1) | Degraded     | 34.7GB   |

IDR Channels

| Channel | Usage         | Capacity | Model           |
|---------|---------------|----------|-----------------|
| Ch01    | Raid Set # 00 | 50.0GB   | HD5720CR0PLA380 |
| Ch02    | Raid Set # 00 | 50.0GB   | HD5720CR0PLA380 |
| Ch03    | N.A.          | N.A.     | N.A.            |
| Ch04    | N.A.          | N.A.     | N.A.            |

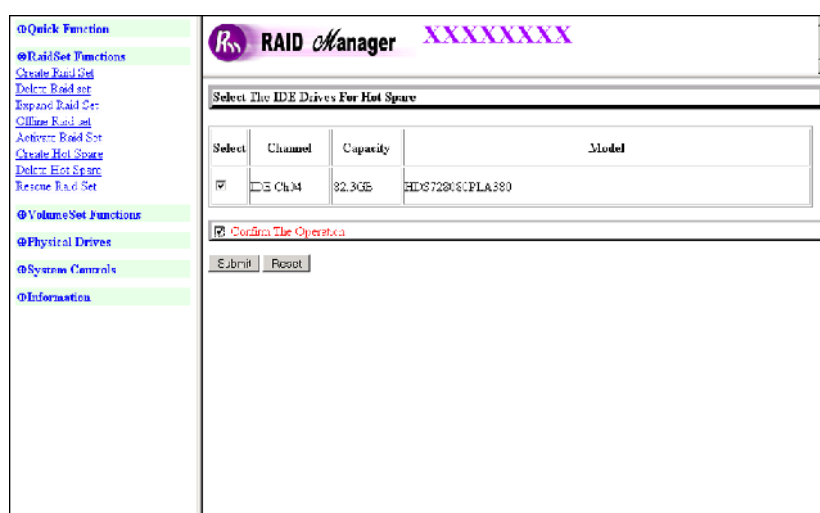


**NOTE:** The “Activate Raid Set” function is only used when Raid Set State is “Incomplete”. It cannot be used when Raid Set configuration is lost. Use the Rescue Raid Set function instead.

### 3.6.6 Create Hot Spare

The Create Hot Spare option gives you the ability to define a global hot spare.

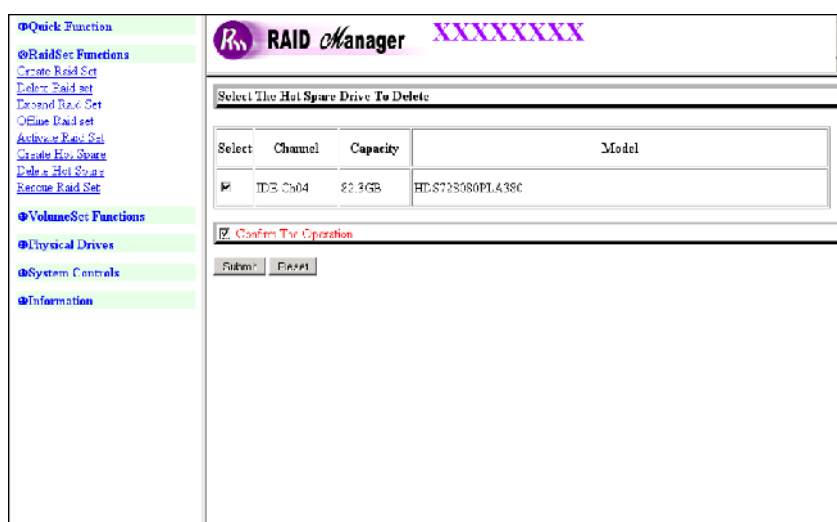
When you choose the Create Hot Spare option in the Raid Set Function, all unused (non Raid Set member) disk drives in the subsystem appear. Select the target disk drive by clicking on the appropriate check box. Tick on the Confirm The Operation and click on the Submit button to create hot spare drive(s).



### 3.6.7 Delete Hot Spare

Use this option to remove the Hot Spare function from a disk drive.

Click the Delete Hot Spare function then select the Hot Spare Disk. Tick on the Confirm The Operation, and click on the Submit button in the screen to delete the hot spare disk.



### 3.6.8 Rescue Raid Set

If you need to rescue a missing Raid Set, please contact our support engineer for assistance.

The screenshot displays the RAID Manager software interface. On the left is a navigation menu with the following sections:

- Quick Function**
  - Create Raid Set
  - Delete Raid set
  - Expand Raid Set
  - Online RAID
  - Assign Raid Set
  - Change Hot Spare
  - Delete Hot Spare
  - Rescue Raid Set
- VolumeSet Functions**
- Physical Drives**
- System Controls**
- Information**

The main window title is "RAID Manager" with a purple "XXXXXXX" display. The central area contains the following text:

**Try To Rescue Missing RAIDSET**  
Enter 'RESOLVE' To Try To Recover Missing RaidSet  
Enter 'SIGNAT' To Regenerate RaidSet Signature If RaidSet Is Recovered

Below this text is a text input field with the placeholder "Enter The Keyword".

At the bottom of the main window, there is a checkbox labeled "Continue The Operation" and two buttons: "Submit" and "Cancel".



## 3.7 Volume Set Function

A Volume Set is seen by the host system as a single logical device. It is organized in a RAID level with one or more physical disks. RAID level refers to the level of data performance and protection of a Volume Set. A Volume Set capacity can consume all or a portion of the raw capacity available in a Raid Set.

Multiple Volume Sets can exist on a group of disks in a Raid Set. Additional Volume Sets created in a specified Raid Set will reside on all the physical disks in the Raid Set. Thus each Volume Set on the Raid Set will have its data spread evenly across all the disks in the Raid Set.

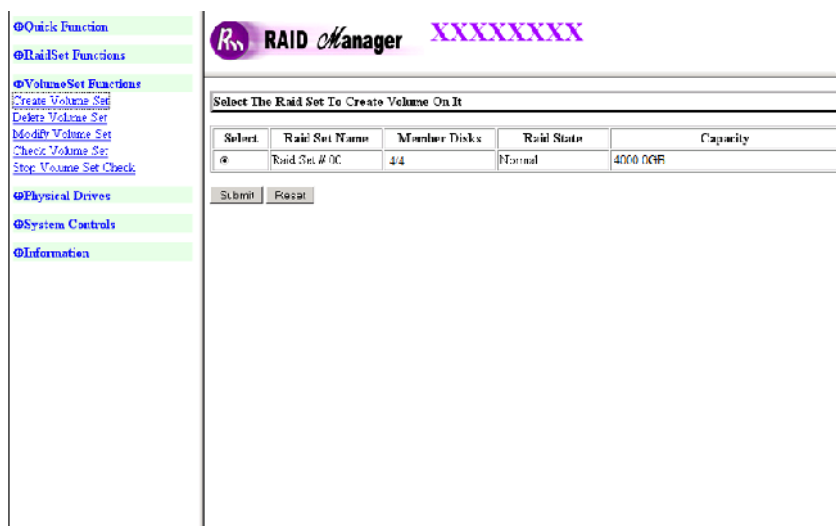
### 3.7.1 Create Volume Set

The following are the Volume Set features:

1. Volume sets of different RAID levels may coexist on the same Raid Set.
2. Up to 16 Volume Sets in a Raid Set can be created by the RAID subsystem controller. But only 4 Volume Sets can be mapped in each host channel (total 8 Volume Sets can be mapped).

To create Volume Set from a Raid Set, expand the Volume Set Functions in the main menu and click on the Create Volume Set link. The Select The Raid Set To Create Volume On It screen will show all existing Raid Sets. Tick on the Raid Set where you want to create the Volume Set and then click on the Submit button.

Configure the Volume Set name, Capacity, RAID level, Stripe Size, Cache Mode, Initialization Mode (if needed), SATA Data Xfer Mode, and Channel/Drive#.



The screenshot shows the RAID Manager interface with the following configuration for RAID Set #00:

| Enter Volume Attribute On Raid Set #00 |                           |
|--|---------------------------|
| Volume Name                            | Volume---VOL#00           |
| Member Drive                           | 6                         |
| Volume Raid Level                      | RAID 5                    |
| Max Capacity Allowed                   | 2500.5 GB                 |
| Select Volume Capacity                 | 2500.5 GB                 |
| Greater Two TB Volume Support          | No                        |
| Volume Initialization Mode             | Foreground Initialization |
| Volume Stripe Size                     | 64 KBytes                 |
| Volume Cache Mode                      | Write Back                |
| SATA Data Xfer Mode                    | SATA300+HDD               |
| Channel/Device#                        | SATA : 13                 |

Below the configuration table, there are red warnings:

```

Dev#0-3:
eSATA Port Multiple: Emulation DEV#0-3, #4-->#15 Reserved
USE LUN#0-3, #4-->#15 Reserved

```

At the bottom, there is a checkbox labeled "Confirm The Operation" which is checked, and "Submit" and "Reset" buttons.

#### Volume Name:

The default Volume Set name will always appear as Volume---VOL#00. You can rename the Volume Set name provided it does not exceed the 16 characters limit.

#### Raid Level:

Set the RAID level for the Volume Set. Click the down-arrow in the drop-down list. The available RAID levels for the current Volume Set are displayed. Select the preferred RAID level.

#### Capacity:

The maximum Volume Set size is displayed by default. If necessary, change the Volume Set size appropriate for your application.

#### Greater Two TB Volume Support:

If the Volume Set size is over 2TB, an option "Greater Two TB Volume Support" will be automatically provided in the screen as shown in the above example. There are two options to select: "No" and "Yes".

No: Volume Set capacity is set to maximum 2TB.

Yes: Volume Set capacity can be set over 2TB.

#### Initialization Mode:

Set the Initialization Mode for the Volume Set. Foreground mode is completed faster but Volume Set but be completed before it becomes accessible. Background mode makes the Volume Set available instantly but the initialization process takes longer.

#### Stripe Size:

This parameter sets the size of the stripe written to each disk in a RAID 0, 1, 1+0, 3, and 5 Volume Set. You can set the Stripe Size to 4 KB, 8 KB, 16 KB, 32 KB, 64 KB, or 128 KB.

A larger Stripe Size produces better read performance, especially if the host server does mostly sequential reads. However, if you are sure that the host server does random reads more often, select a small Stripe Size.



**NOTE:** Stripe Size in RAID level 3 can't be modified.

Cache Mode:

The RAID subsystem supports Write-Through Cache and Write-Back Cache.

SATA Data Xfer Mode

The RAID subsystem supports SATA150, SATA150+NCQ, SATA300, and SATA300+NCQ data transfer mode.

Channel

Select the Host Channel for mapping the Volume Set. Options are: SATA, USB, and SATA&USB.

Drive #

Drive # options are: 0, 1, 2, and 3.

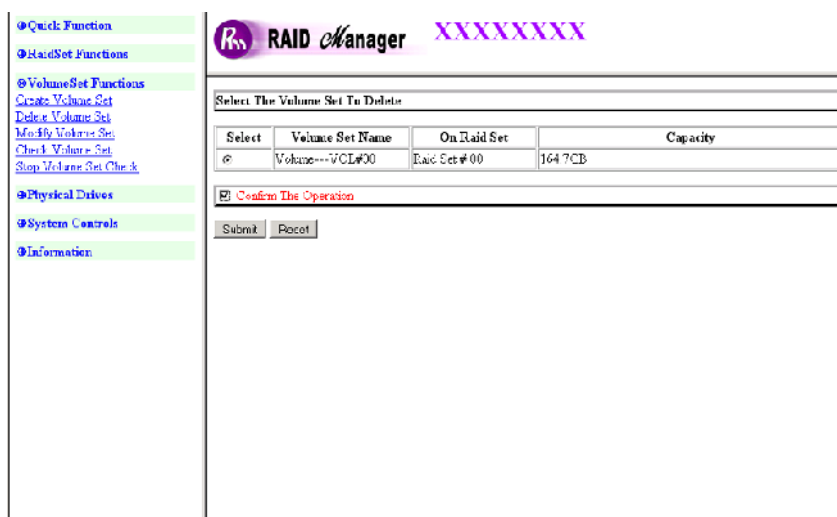
Each Host Channel can support maximum 4 Volume Sets.

eSATA: Port Multiplier Emulation: DEV# 0 ~ 3 (#4 ~ #15: Reserved)

USB: LUN# 0 ~ 3 (#4 ~ #15: Reserved)

### 3.7.2 Delete Volume Set

To delete a Volume Set, select the Volume Set Functions in the main menu and click on the Delete Volume Set link. The Select The Volume Set To Delete screen will show all available Raid Sets. Tick on a Raid Set and check the Confirm The Operation option and then click on the Submit button to show all Volume Sets in the selected Raid Set. Tick on a Volume Set and check the Confirm The Operation option. Click on the Submit button to delete the Volume Set.



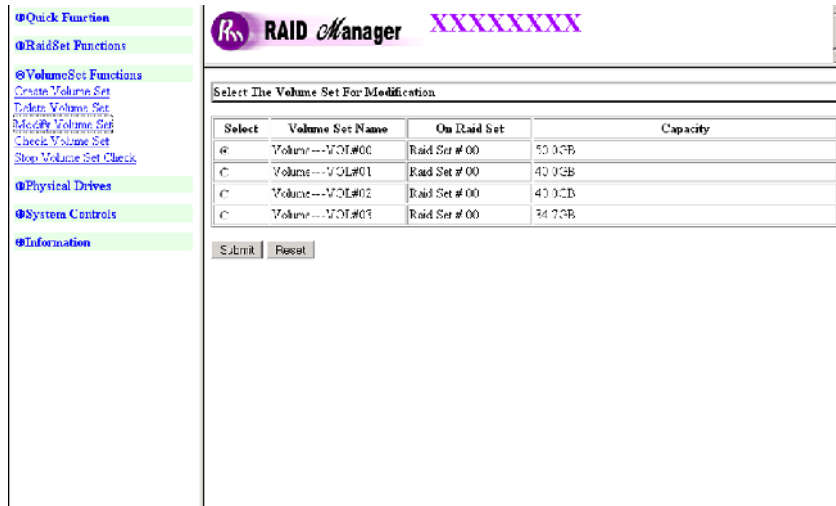
### 3.7.3 Modify Volume Set

Use this function to modify Volume Set configuration.

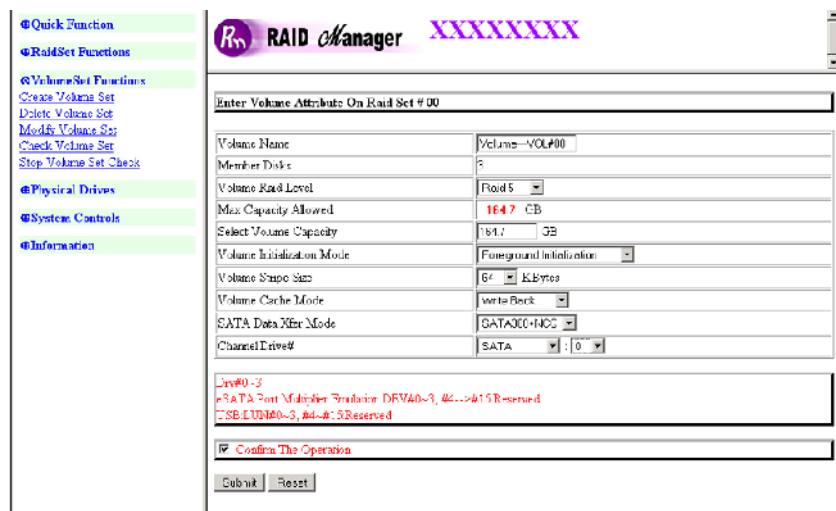
To modify the attributes of a Volume Set:

1. Click on the Modify Volume Set link.
2. Tick from the list the Volume Set you want to modify. Click on the Submit button.

The following screen appears.



To modify Volume Set attribute values, select an attribute item and click on the attribute value. After completing the modification, tick on the Confirm The Operation option and click on the Submit button to save the changes.



### 3.7.3.1 Volume Expansion

Volume Capacity (Logical Volume Concatenation Plus Re-stripe)

Use the Expand Raid Set function to expand a Raid Set when a disk is added to your subsystem. (Refer to Section 3.6.3)

The expanded capacity can be used to enlarge the Volume Set size or create another Volume Set. Use the Modify Volume Set function to expand the Volume Set capacity. Select the Volume Set and move the cursor to the Volume Set Capacity item and enter the capacity size.



**NOTE:** Only the last created Volume Set can be expanded.

Tick on the Confirm The Operation and click on the Submit button to complete the action. The Volume Set starts to expand.

### 3.7.4 Volume Set Migration

Migration occurs when a Volume Set migrates from one RAID level to another, a Volume Set stripe size changes, or when a disk is added to a Raid Set. Migrating status is displayed in the Volume Set status area of the RaidSet Hierarchy screen during migration.

The screenshot shows the RAID Manager interface with a sidebar on the left containing navigation options like @Quick Function, @RaidSet Functions, @VolumeSet Functions, @Physical Drives, @System Controls, and @Information. The main window displays the RAID Set Hierarchy table and the IDE Channels table.

| Raid Set      | IDE Channels | Volume Set(Ch/Drv#)    | Volume State  | Capacity |
|---------------|--------------|------------------------|---------------|----------|
| Raid Set # 00 | Ch01         | Volume ---VOL#01 (0.0) | Migrating, 4% | 50.0GB   |
|               | Ch02         | Volume ---VOL#01 (0.0) | Need Migrate  | 40.0GB   |
|               | Ch03         | Volume ---VOL#02 (1.0) | Need Migrate  | 40.0GB   |
|               | Ch04         | Volume ---VOL#03 (1.0) | Need Migrate  | 34.7GB   |

| Channel | Usage         | Capacity | Model          |
|---------|---------------|----------|----------------|
| Ch01    | Raid Set # 00 | 82.3GB   | HD672803DLA380 |
| Ch02    | Raid Set # 00 | 82.3GB   | HD672803DLA380 |
| Ch03    | Raid Set # 00 | 82.3GB   | HD672803DLA380 |
| Ch04    | Raid Set # 00 | 82.3GB   | HD672803DLA380 |

### 3.7.5 Check Volume Set

Use this function to perform Volume Set consistency check, which verifies the correctness of redundant data (data blocks and parity blocks) in a Volume Set. This basically means computing the parity from the data blocks and comparing the results to the contents of the parity blocks, or computing the data from the parity blocks and comparing the results to the contents of the data blocks.

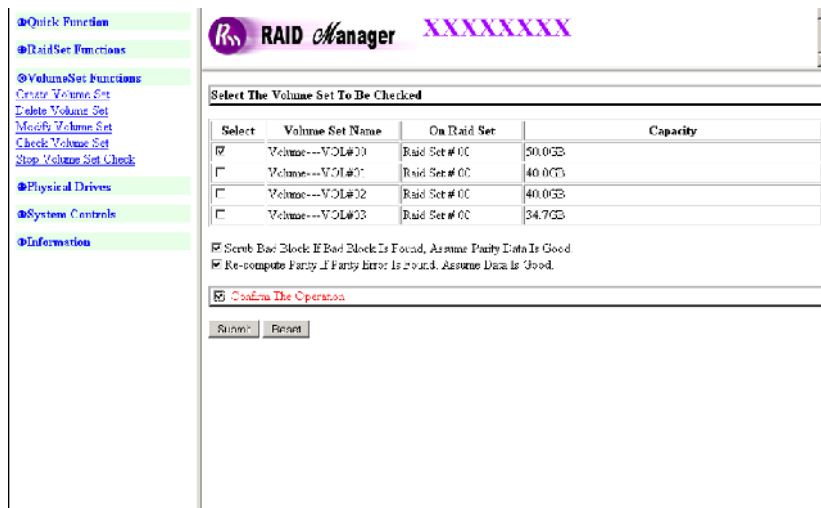
To perform Check Volume Set function:

1. Click on the Check Volume Set link.
2. Tick from the list the Volume Set you want to check. Tick on Confirm The Operation and click on the Submit button. The Checking process will be started.

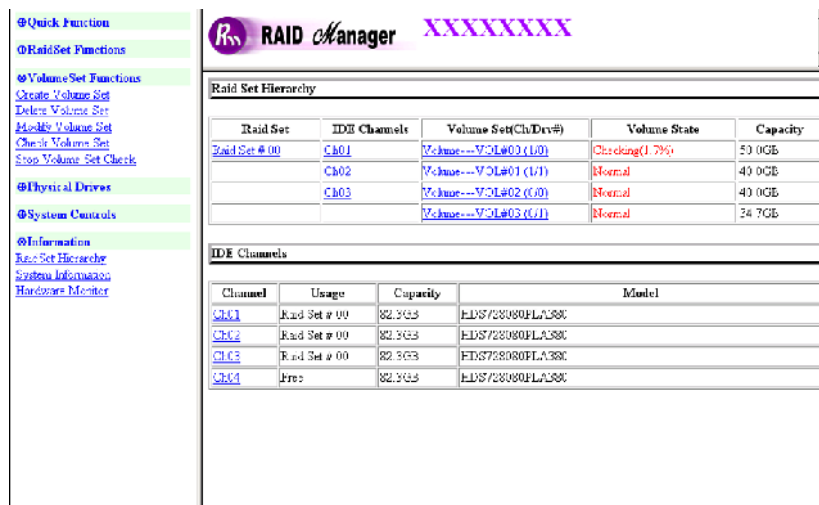
Check Volume Set Options:

- Scrub Bad Block If Bad Block Is Found, Assume Parity Data is Good
- Re-compute Parity if Parity Error, Assume Data is Good

Note: If none of the 2 options is selected, this function will only check for error. If an error is found, it will not be corrected.



The checking percentage can also be viewed by clicking on RaidSet Hierarchy in the main menu.



### 3.7.6 Stop Volume Set Check

Use this option to stop the current running Check Volume Set process.

## 3.8 Physical Drive

Choose this option from the Main Menu to select a disk drive and to perform the operations listed below.

### 3.8.1 Create Pass-Through Disk

A Pass-Through Disk is a disk drive not controlled by the internal RAID subsystem firmware and thus cannot be a part of a Volume Set. A Pass-Through disk is a separate and individual Raid Set. The disk is available to the host as an individual disk. It is typically used on a system where the operating system is on a disk not controlled by the RAID firmware.

To create pass-through disk, click on the Create Pass-Through link under the Physical Drives main menu. The setting function screen appears.

Select the disk drive to be made as Pass-Through Disk and configure the Pass-Through Disk attributes, such as the Cache Mode, Tagged Command Queuing, IDE Data Xfer Mode and IDE Channel/IDE Drive# for this volume.

**RAID Manager** XXXXXXXX

Select the IDE drive For Pass Through

| Select                              | Channel   | Capacity | Model          |
|-------------------------------------|-----------|----------|----------------|
| <input checked="" type="checkbox"/> | IDE Ch:04 | 52 GB    | HC572080FLA360 |

Enter Pass Through Disk Attribute

Volume Cache Mode: Write Once

SATA Data Xfer Mode: SATA300+NCQ

Channel/Drive#: SATA 2

Dev#0-3:  
eSATA Port Multiplier Emulation DEV#0-3, #<-->#10 Reserved  
USE\_LUN#0-3, #4-#10 Reserved

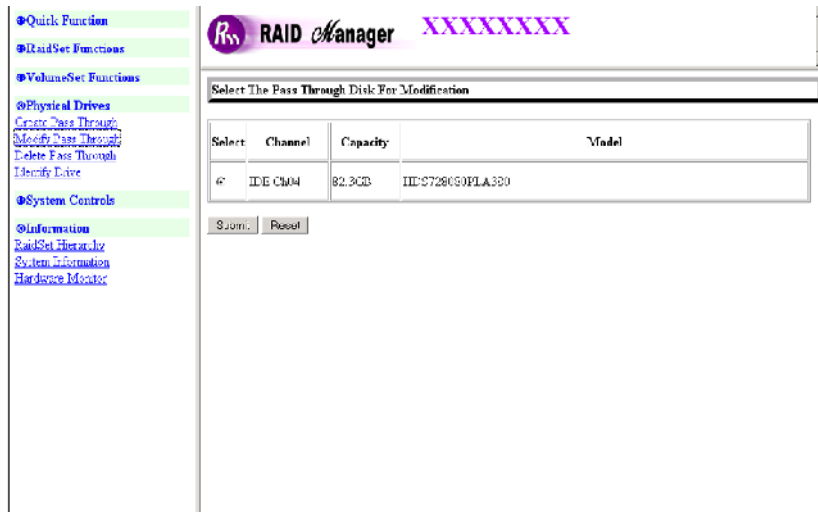
Confirm The Operation

Submit Reset

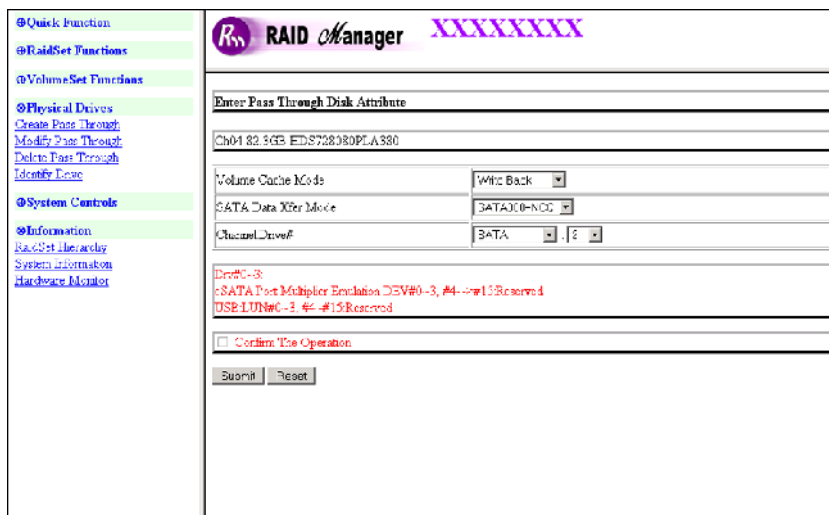
### 3.8.2 Modify Pass-Through Disk

Use this option to modify the Pass-Through Disk attributes. User can modify the Cache Mode, Tagged Command Queuing, IDE Data Xfer Mode and IDE Channel/IDE Drive#.

To modify the Pass-Through drive attribute from the Pass-Through drive pool, click on the Modify Pass-Through link. The “Select The Pass-Through Disk For Modification” screen appears. Tick on the Pass-Through Disk from the Pass-Through drive pool and click on the Submit button to select the drive.



The Enter Pass-Through Disk Attribute screen appears. Modify the drive attribute values as you want.

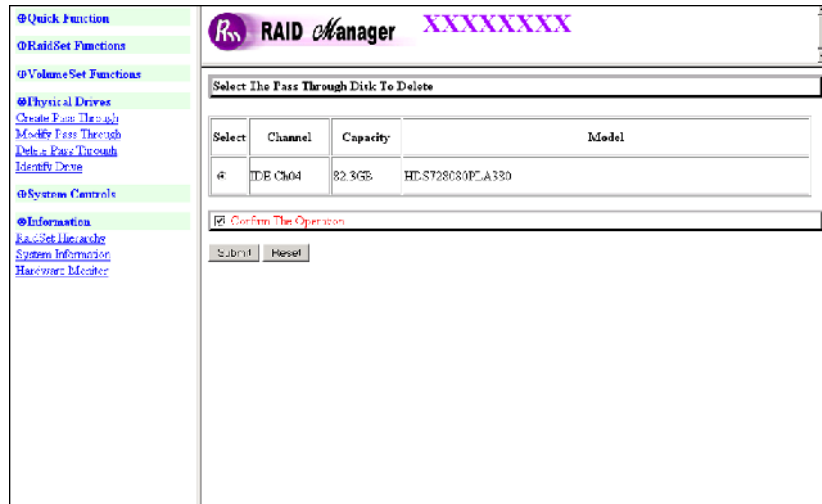


To save changes, tick on Confirm The Operation and click on the Submit button.



### 3.8.3 Delete Pass-Through Disk

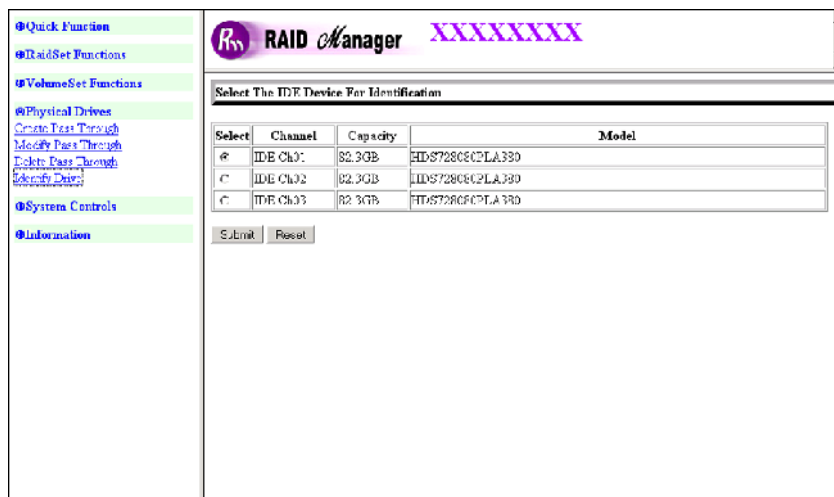
To delete Pass-Through Disk from the Pass-Through drive pool, click on Delete Pass-Through link. Select a Pass-Through Disk, tick on the Confirm The Operation and click the Submit button to complete the delete action.



### 3.8.4 Identify Selected Drive

Use this option to physically locate a selected drive to prevent removing the wrong drive. When a disk drive is selected using the Identify Drive function, the LED of the selected disk drive will light.

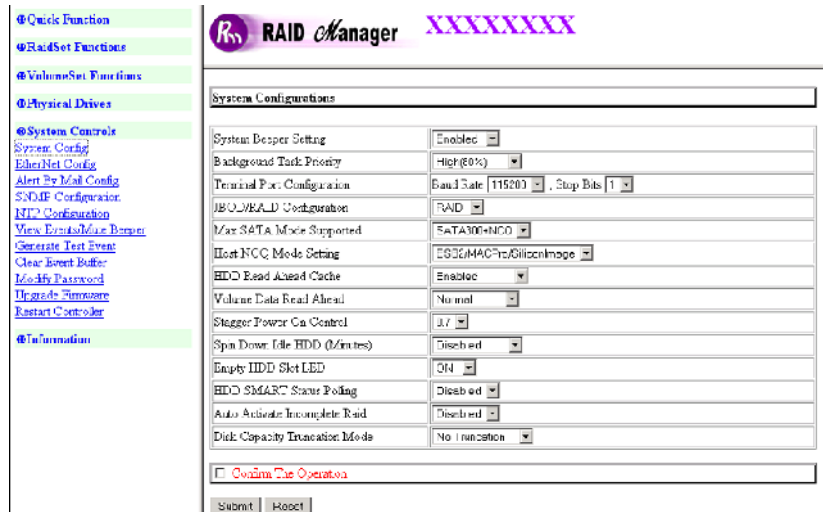
To identify a selected drive from the drives pool, click on the Identify Drive link. The “Select The IDE Device For identification” screen appears. Tick on the disk drive from the drives list. After completing the selection, click on the Submit button to identify selected drive.



## 3.9 System Controls

### 3.9.1 System Configuration

To set the RAID subsystem system configuration options, click the System Config link under the System Controls menu. The System Configuration screen will be shown. Set the system configuration option as needed.



#### System Beeper Setting:

This option is used to Disabled or Enable the subsystem's RAID controller alarm beeper.

#### Background Task Priority:

The Background Task Priority indicates how much time and system resource the RAID controller devotes to a background task, such as a rebuild operation. The RAID subsystem allows user to choose the background task priority (High 80%, Medium 50%, Low 25%, and Ultra Low 5%) to balance between background task process and Volume Set access. For high RAID subsystem performance, specify a low value.

#### Terminal Port Configuration:

Baud Rate setting values are 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200. Use 115200 for the RAID subsystem terminal port speed setting.

Stop Bits values are 1 bit and 2 bits. Use 1 bit for the RAID subsystem stop bit setting.

Note: Parity value is fixed at "None". Data Bits value is fixed at 8 bits.

#### JBOD/RAID Configuration

The RAID subsystem supports JBOD and RAID configuration.

**Maximum SATA Mode Supported:**

The 4 SATA drive channel can support up to SATA II, which runs up to 300MB/s. NCQ is a command protocol in Serial ATA that can only be implemented on native Serial ATA hard drives. It allows multiple commands to be outstanding within a drive at the same time. Drives that support NCQ have an internal queue where outstanding commands can be dynamically rescheduled or re-ordered, along with the necessary tracking mechanisms for outstanding and completed portions of the workload. RAID subsystem allows user to choose the SATA Mode: SATA150, SAT150+NCQ, SAT300, SATA300+NCQ.

**Host NCQ Mode Setting:**

This option allows the users to select the supported Host NCQ Mode or to disable it. Options are: ESB2/MACPro/SiliconImage, Marvell 6145, ICH, nVidia, and Disabled.

**HDD Read Ahead Cache:**

This option allows the users to disable the cache of the disk drives in the RAID subsystem. In some HDD models, disabling the cache in the HDD is necessary to prove the RAID subsystem functions correctly.

**Volume Data Read Ahead:**

This option allows the users to set the Volume Data Read Ahead function. Options are: Normal, Aggressive, Conservative, and Disabled.

**Stagger Power On Control:**

This option allows the RAID subsystem's power supply to power up in succession each HDD in the RAID subsystem. In the past, all the HDDs on the RAID subsystem are powered up altogether at the same time. This function allows the power transfer time (lag time) from the last HDD to the next one be set within the range of 0.4 to 6.0 seconds.

**Spin Down Idle HDD (Minutes): MAID Function**

This option enables the hard drives to spin down after they become idle after a preset period of time. Options are: Disabled, 1 (For Test), 3, 5, 10, 15, 20, 30, 40, and 60.

**Empty HDD Slot LED:**

Use this option to turn ON or OFF the LED of a slot with no HDD.

**HDD SMART Status Polling:**

The RAID subsystem can read HDD SMART information through this function. This function is enabled by default.

**Auto Activate Incomplete Raid:**

Use this option to automatically activate an Incomplete Raid Set. Note that the Raid Set status becomes Incomplete when one disk is removed or failed in power off state. After activated, the Volume Set(s) in the Raid Set will be in Degraded mode.

### Disk Capacity Truncation Mode:

This RAID subsystem use drive truncation so that drives from different vendors are more likely to be able to be used as spares for each other. Drive truncation slightly decreases the usable capacity of a drive that is used in redundant units. Options are:

**Multiples Of 10G:** If you have several 120GB drives from different vendors, chances are that the capacity varies slightly. For example, one drive might be 121.1 GB, and the other 120.4 GB. This drive truncation mode makes the 121.1 GB and 120.4 GB drives same capacity as 120 GB so that one could replace the other.

**Multiples Of 1G:** If you have 120 GB drives from different vendors, chances are that the capacity varies slightly. For example, one drive might be 121.1 GB, and the other 121.4 GB. This drive truncation mode makes the 121.1 GB and 121.4 GB drives same capacity 121 GB so that one could replace the other.

**No Truncation:** The capacity of the disk drive is not truncated.

### 3.9.2 EtherNet Config

To set the Ethernet configuration, click the EtherNet Config link under the System Controls menu. The RAID subsystem EtherNet Configuration screen will be shown. Set the desired configuration. Once done, tick on the Confirm The Operation and click the Submit button to save the settings.

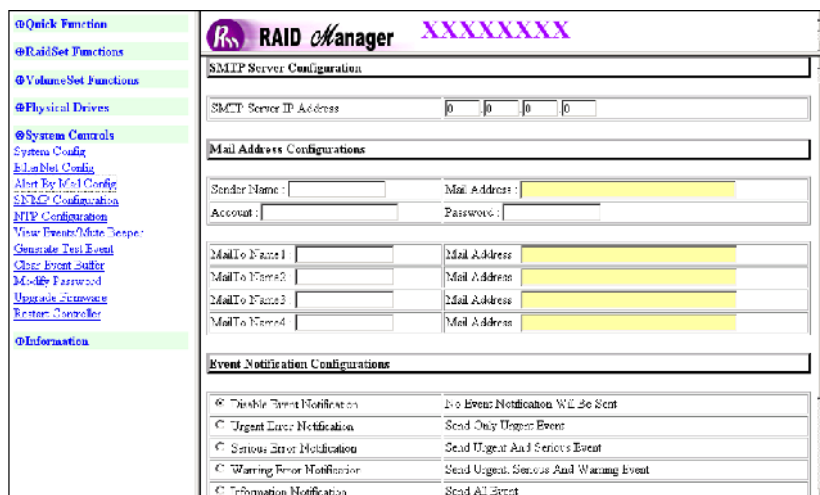
The screenshot shows the RAID Manager interface with the following configuration details:

| Ether Net Configurations                   |                   |
|--|-------------------|
| DHCP Function                              | Disable           |
| Local IP Address (Used If DHCP Disabled)   | 192.168.15.101    |
| Gateway IP Address (Used If DHCP Disabled) | 192.168.1.1       |
| Subnet Mask (Used If DHCP Disabled)        | 255.255.255.0     |
| TFTP Port Number (168.8191 is Reserved)    | 60                |
| SMB Port Number (168.8191 is Reserved)     | 63                |
| SNMP Port Number (168.8191 is Reserved)    | 65                |
| Current IP Address                         | 192.168.15.101    |
| Current Gateway IP Address                 | 192.168.1.1       |
| Current Subnet Mask                        | 255.255.255.0     |
| Ether Net MAC Address                      | 00:1B:4E:00:33:CA |

At the bottom of the configuration area, there is a checkbox labeled "Confirm The Operation" which is currently unchecked. Below the checkbox are two buttons: "Submit" and "Reset".

### 3.9.3 Alert By Mail Config

To set the Event Notification function, click on the Alert By Mail Config link under the System Controls main menu. The RAID subsystem Event Notification configuration screen will be shown. Set up the desired function and option. When an abnormal condition occurs, an error message will be emailed to the email recipient(s) that a problem has occurred. Events are classified into 4 levels (Urgent, Serious, Warning, and Information).



### 3.9.4 SNMP Configuration

The SNMP gives users independence from the proprietary network management schemes of some manufacturers and SNMP is supported by many WAN and LAN manufacturers enabling true LAN/ WAN management integration.

To set the SNMP function, move the cursor to the main menu and click on the SNMP Configuration link. The RAID subsystem's SNMP Configurations screen will be shown. Select the desired function and set the preferred option.

| SNMP Trap Configurations |   |   |   |   |       |     |
|--------------------------|---|---|---|---|-------|-----|
| SNMP Trap IP Address #1  | 0 | 0 | 0 | 0 | Port# | 162 |
| SNMP Trap IP Address #2  | 0 | 0 | 0 | 0 | Port# | 162 |
| SNMP Trap IP Address #3  | 0 | 0 | 0 | 0 | Port# | 162 |

| SNMP System Configurations |  |
|----------------------------|--|
| Community                  |  |
| sysContact.0               |  |
| sysName.0                  |  |
| sysLocation.0              |  |

| SNMP Trap Notification Configurations                 |  |
|---|--|
| <input checked="" type="checkbox"/> Disable SNMP Trap | No SNMP Trap Will Be Sent              |
| <input type="checkbox"/> Urgent Error Notification    | Send Only Urgent Event                 |
| <input type="checkbox"/> Serious Error Notification   | Send Urgent And Serious Event          |
| <input type="checkbox"/> Warning Error Notification   | Send Urgent, Serious And Warning Event |
| <input type="checkbox"/> Information Notification     | Send All Event                         |

SNMP Trap Configurations: Type the SNMP Trap IP Address. The SNMP Port is set to 162 by default.

SNMP System Configuration:

Community: The default is Public.

(1)sysContact.0; (2)sysLocation.0; (3)sysName.0: SNMP parameter (31 bytes max). If these 3 categories are configured and when an error occurs, SNMP will send out a message that includes the 3 categories within the message. This allows user to easily define which RAID unit is having problem.

SNMP Trap Notification Configurations: Select the desired option.

After completing the settings, tick on the Confirm The Operation and click on the Submit button to save the configuration.

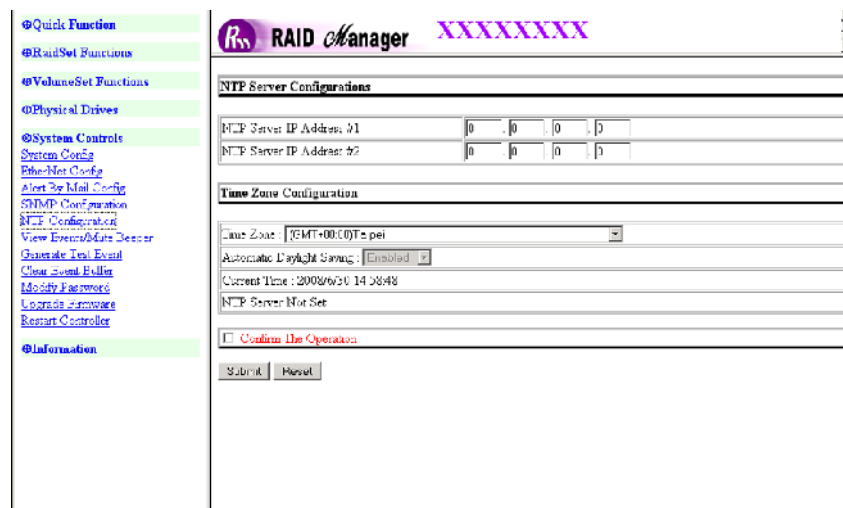
SNMP also works in the same as Alert By Mail when sending event notifications.

### 3.9.5 NTP Configuration

NTP stands for Network Time Protocol. It is an Internet protocol used to synchronize the clocks of computers to some time reference. Type the NTP Server IP Address to enable the RAID subsystem to synchronize with it.

To set the NTP function, move the cursor to the main menu and click on the NTP Configuration. The RAID subsystem's NTP Configuration screen will be displayed. Select the desired function and configure the necessary option.

After completing the settings, tick on the Confirm The Operation and click on the Submit button to save the configuration.



### 3.9.6 View Events/Mute Beeper

To view the RAID subsystem's event log information, move the mouse cursor to the System Controls menu and click on the System Information link. The Raid Subsystem's System Events Information screen appears.

The System Events Information screen will show: Time, Device, Event type, Elapse Time and Errors. The RAID system does not have built-in real time clock. When the RAID manager GUI is opened from a host system via R-Link connection, the RAID system's time will be referenced to the time of the host system. When not connected to the RAID Manager GUI via R-Link connection, the time information is the relative to the time when the RAID subsystem was powered on.

This function can also be used to silence the alarm beeper.

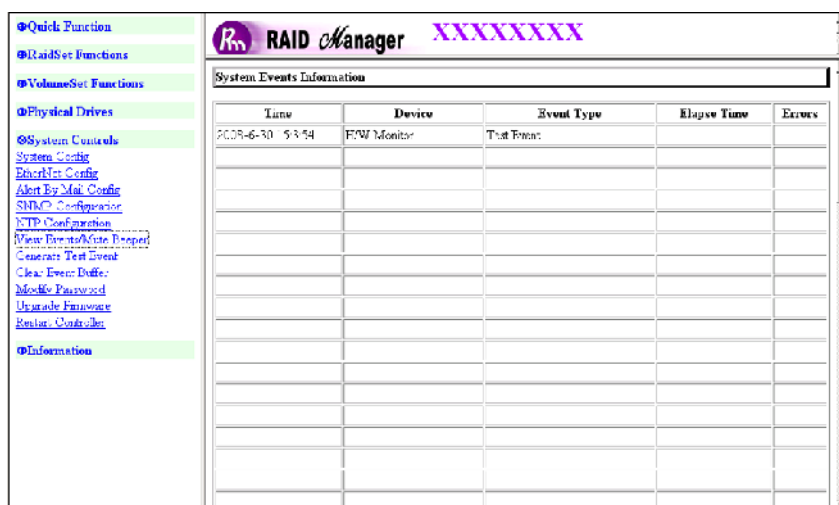
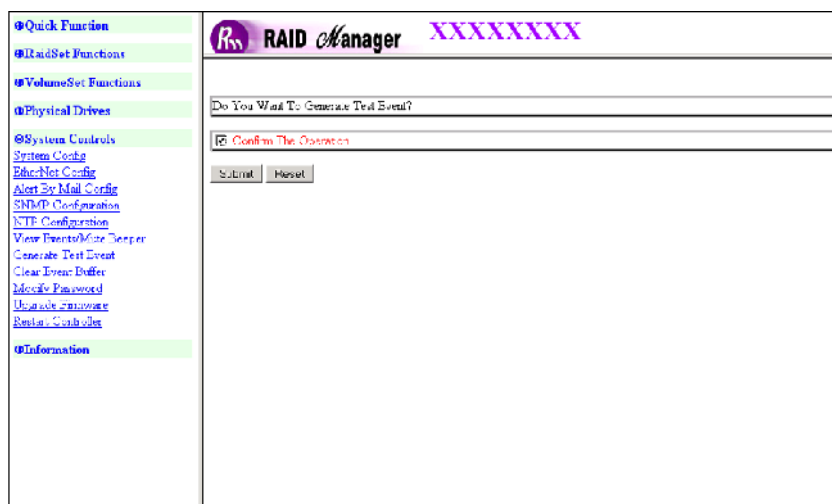
The screenshot shows the RAID Manager GUI with a sidebar menu on the left and a main table of system events. The sidebar menu includes sections like 'Quick Function', 'RaidSet Functions', 'Volume Set Functions', 'Physical Drives', 'System Controls', and 'Information'. The main table displays a list of events with columns for Time, Device, Event type, and Elapse Time.

| Time               | Device          | Event type           | Elapse Time | Errors |
|--------------------|-----------------|----------------------|-------------|--------|
| 2008-6-27 19:25:00 | Volume---VOL#00 | Start Initalize      |             |        |
| 2008-6-27 19:25:00 | Volume---VOL#00 | Create Volume        |             |        |
| 2008-6-27 19:03:29 | Raid Set: # 00  | Create RaidSet       |             |        |
| 2008-6-27 18:59:50 | Raid Set: # 00  | Delete RaidSet       |             |        |
| 2008-6-27 18:59:55 | Volume---VOL#00 | About Initialization | 0000036     |        |
| 2008-6-27 18:59:15 | Volume---VOL#00 | Start Initalize      |             |        |
| 2008-6-27 18:59:18 | Volume---VOL#00 | Create Volume        |             |        |
| 2008-6-27 18:59:18 | Raid Set: # 00  | Create RaidSet       |             |        |
| 2008-6-27 18:48:32 | IDE Channel 3   | Device Inserted      |             |        |
| 2008-6-27 18:47:32 | IDE Channel 2   | Device Inserted      |             |        |
| 2008-6-27 18:46:4  | IDE Channel 1   | Device Inserted      |             |        |
| 2008-6-27 18:45:8  | 192 168 015 016 | HTTP Log In          |             |        |
| 2008-6-27 18:44:20 | HW M:suboe      | Raid Powered On      |             |        |
| 2008-6-27 18:43:5  | ES232 Terminal  | VT100 Log In         |             |        |
| 2008-6-27 18:41:20 | 192 168 015 016 | HTTP Log In          |             |        |
| 2008-6-27 18:37:28 | HW M:suboe      | Raid Powered On      |             |        |
| 2008-6-27 18:36:58 | IDE Channel 1   | Device Inserted      |             |        |
| 2008-6-27 18:13:7  | IDE Channel 1   | Device Removed       |             |        |
| 2008-6-27 18:11:45 | IDE Channel 1   | Device Inserted      |             |        |
| 2008-6-27 18:11:27 | IDE Channel 1   | Device Removed       |             |        |
| 2008-6-27 18:10:42 | IDE Channel 1   | Device Inserted      |             |        |



### 3.9.7 Generate Test Event

If you want to generate test events, move the mouse cursor to the main menu and click on the Generate Test Events Link. Tick on the Confirm The Operation and click on the Submit button. Then click on the View Events/Mute Beeper to view the test event.



### 3.9.8 Clear Event Buffer

Use this feature to clear the RAID subsystem's System Events Information buffer.

### 3.9.9 Modify Password

To change or disable the RAID subsystem's admin password, click on the Change Password link under the System Controls menu. The Modify System Password screen appears.

The factory-default admin password is set to 00000000. Once the password has been set, the user or administrator can only monitor and configure the RAID subsystem by providing the correct password.

The password is used to protect the RAID subsystem's configuration from unauthorized access. The RAID controller will check the password only when entering the Main Menu from the initial screen. The RAID subsystem will automatically go back to the initial screen when it does not receive any command after sometime.

To disable the password, enter only the original password in the Enter Original Password box, leave both the Enter New Password and Re-Enter New Password boxes blank. After selecting the Confirm The Operation option and clicking the Submit button, the system password checking will be disabled. No password checking will occur when entering the main menu from the starting screen.

### 3.9.10 Upgrade Firmware

Please refer to Section 3.12 for more information.

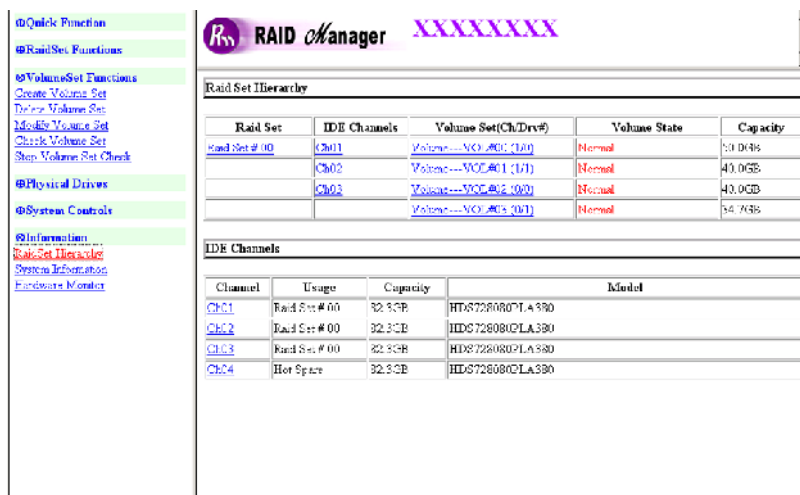
### 3.9.11 Restart Controller

Use this function to restart the RAID controller.

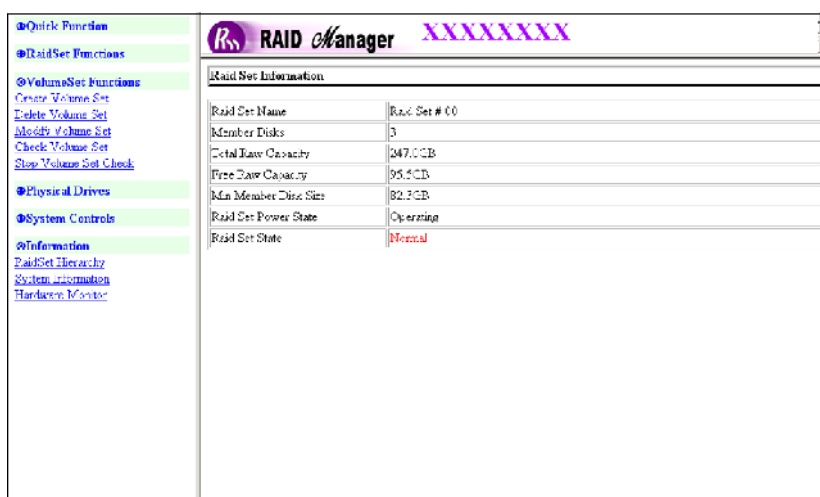
### 3.10 Information Menu

#### 3.10.1 RaidSet Hierarchy

Use this feature to view the RAID subsystem's existing Raid Set(s), Volume Set(s) and physical disk(s) configuration and information. Select the RaidSet Hierarchy link from the Information menu to display the Raid Set Hierarchy screen..

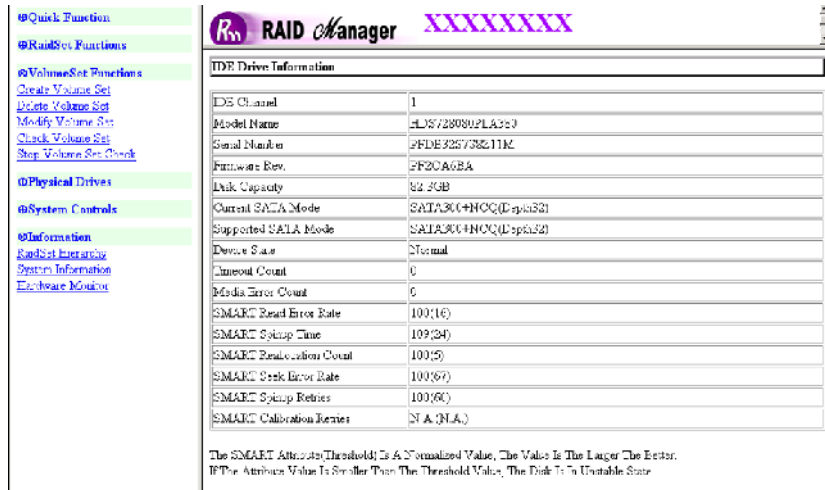


To view the Raid Set information, click the Raid Set # link from the Raid Set Hierarchy screen. The Raid Set Information screen appears.

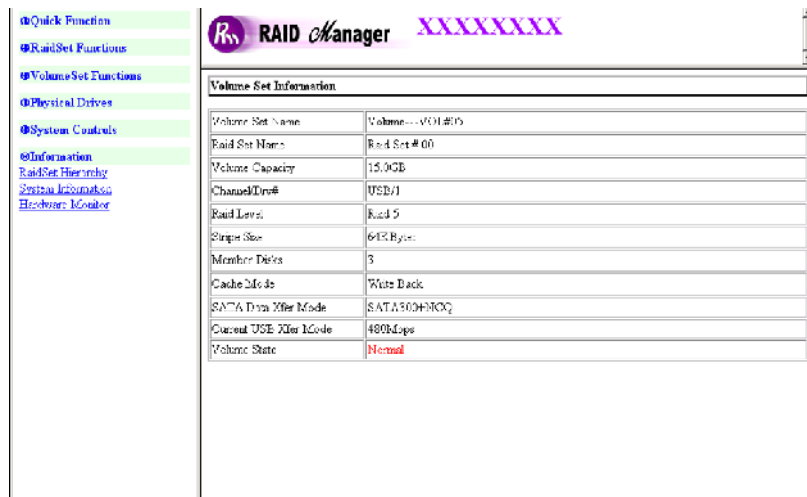


To view the disk drive information, click the CHO# link from the Raid Set Hierarchy screen. The Disk Information screen appears. This screen shows various information such as timeout count, media error count, and SMART information.

The SMART information shows two numbers, one on the left (attribute value) and one on the right enclosed in parentheses (threshold). The higher the attribute value is compared to the threshold value, the better. If the attribute value becomes smaller than the threshold value, the disk is in unstable state.

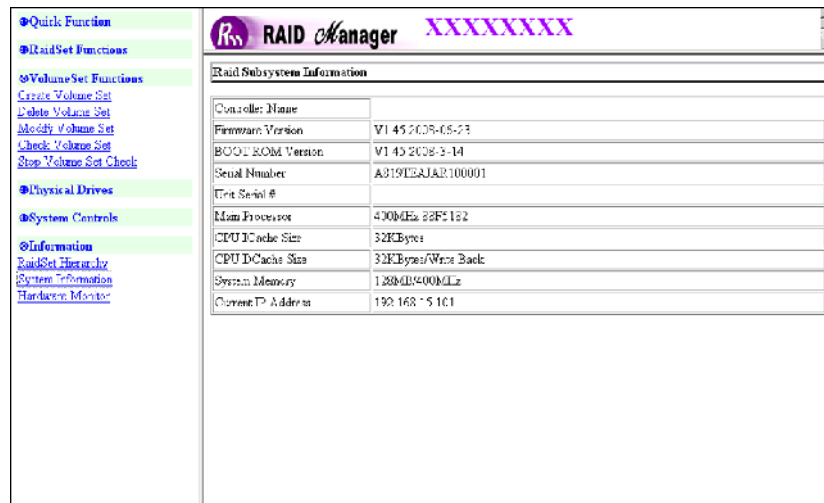


To view the Volume Set information, click the Volume Set # link from the Raid Set Hierarchy screen. The Volume Set Information screen appears.



### 3.10.2 System Information

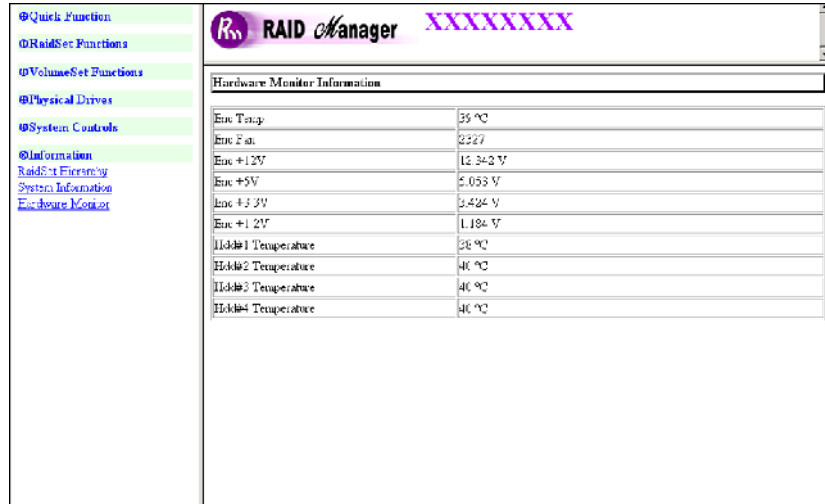
To view the RAID subsystem's controller information, click the System Information link from the Information menu. The Raid Subsystem Information screen appears.



The controller name, firmware version, serial number, main processor, CPU data/instruction cache size and system memory size/speed appear in this screen.

### 3.10.3 Hardware Monitor

To view the RAID subsystem's controller hardware information, click the Hardware Monitor link from the Information menu. The Hardware Monitor Information screen appears.



**NOTE:** When no disk drive is installed in the disk slot, the disk temperature will show "--". The disk temperature will also show "--" when "HDD SMART Status Polling" is disabled in System Configuration.

The Hardware Monitor Information provides the temperature and voltage levels of the RAID subsystem. All items are also unchangeable. When the threshold values are exceeded, warning messages will be indicated through the LCD, LED and alarm buzzer.

| Item                         | Warning Condition    |
|------------------------------|----------------------|
| Controller Board Temperature | > 60 Celsius         |
| HDD Temperature              | > 60 Celsius         |
| Power Supply +12V            | < 10.5V or > 13.5V   |
| Power Supply +5V             | < 4.7V or > 5.4V     |
| Power Supply +3.3V           | < 3.0V or > 3.6V     |
| DDR Supply Voltage +2.5V     | < 2.25V or > 2.75V   |
| CPU Core Voltage +1.3V       | < 1.17V or > 1.43V   |
| DDR Termination Power +1.25V | < 1.125V or > 1.375V |

### 3.11 Creating New Raid Set or Reconfiguring an Existing Raid Set

You can configure Raid Sets and Volume Sets using Quick Create or Raid Set Functions/Volume Set Functions configuration method. Each configuration method requires a different level of user input. The general flow of operations for Raid Set and Volume Set configuration is:

| Step | Action  |
|------|---|
| 1    | Designate hot spare disk/pass-through disk (optional).              |
| 2    | Choose a configuration method.                                      |
| 3    | Create Raid Set using the available physical drives.                |
| 4    | Define Volume Set using the available raw capacity in the Raid Set. |
| 5    | Initialize the Volume Set. Then use Volume Set in the Host OS.      |

## 3.12 Upgrading the Firmware

### Upgrading Firmware Using Flash Programming Utility

Since the RAID subsystem's controller features flash firmware, it is not necessary to change the hardware flash chip in order to upgrade the controller firmware. User can simply re-program the old firmware through the RS-232 port. New releases of the firmware are available in the form of binary file at vendor's FTP. The file available at the FTP site is usually a self-extracting file that contains the following:

XXXXVVV.BIN Firmware Binary (where "XXXX" refers to the model name and "VVV" refers to the firmware version)

README.TXT It contains the history information of the firmware change. Read this file first before upgrading the firmware.

These files must be extracted from the compressed file and copied to one directory in the host computer.

### Establishing the Connection for the RS-232

The firmware can be downloaded to the RAID subsystem's controller using an ANSI/VT-100 compatible terminal emulation program or web browser-based RAID Manager remote management page.

With terminal emulation program, you must complete the appropriate installation and configuration procedure before proceeding with the firmware upgrade. Whichever terminal emulation program is used must support the ZMODEM file transfer protocol.

Web browser-based RAID Manager can be used to update the firmware. A web browser must have been installed and setup before proceeding with the firmware upgrade.



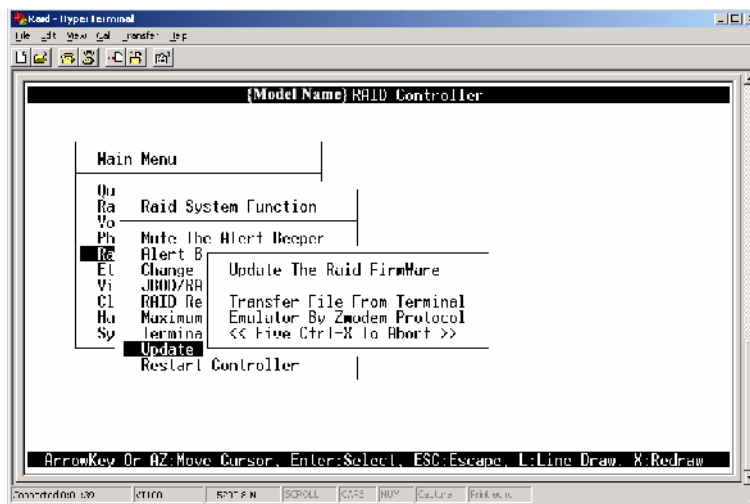
## Upgrading Firmware Through ANSI/VT-100 Terminal Emulation

Get the new firmware version for your RAID subsystem controller. For Example, download the bin file from your vendor’s web site into the local directory.

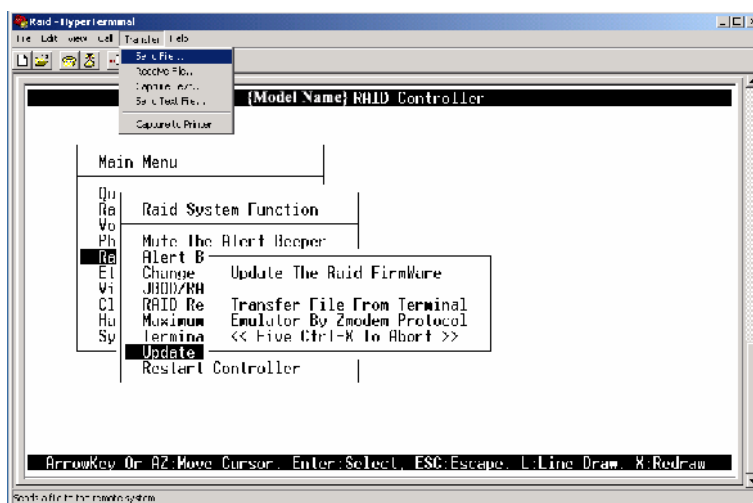


**NOTE:** When there is new boot ROM firmware that needs to be upgraded, upgrade first the boot ROM firmware. Then repeat the process (steps 1 to 9) to upgrade the firmware code after which a RAID controller restart will be necessary.

1. From the Main Menu, scroll down to “Raid System Function”
2. Choose the “Update Firmware”. The Update The Raid Firmware dialog box appears.

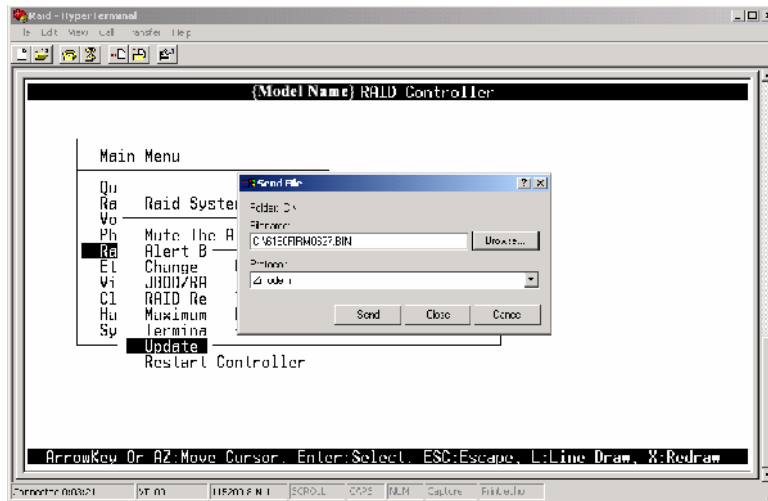


3. Go to the menu bar and click Transfer. Select Send File.

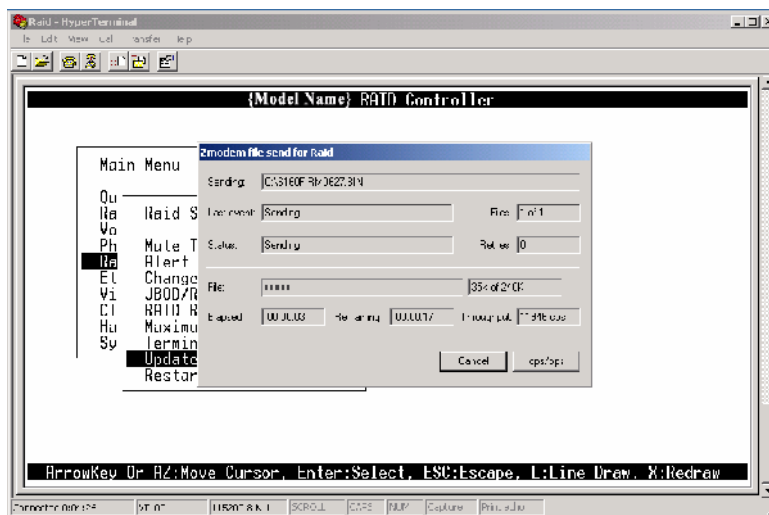


4. Select “ZMODEM modem” under Protocol to set ZMODEM as the file transfer protocol of your terminal emulation software.

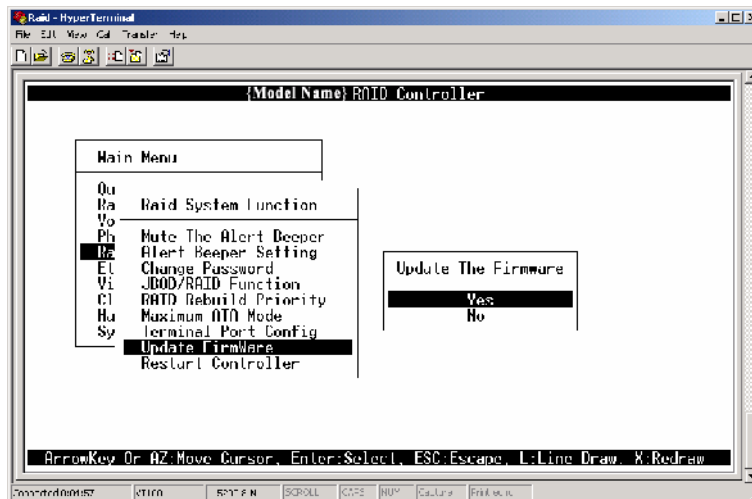
- Click Browse. Look in the location where the firmware file was saved. Select the firmware file name "xxxxxxx.BIN" and click Open.



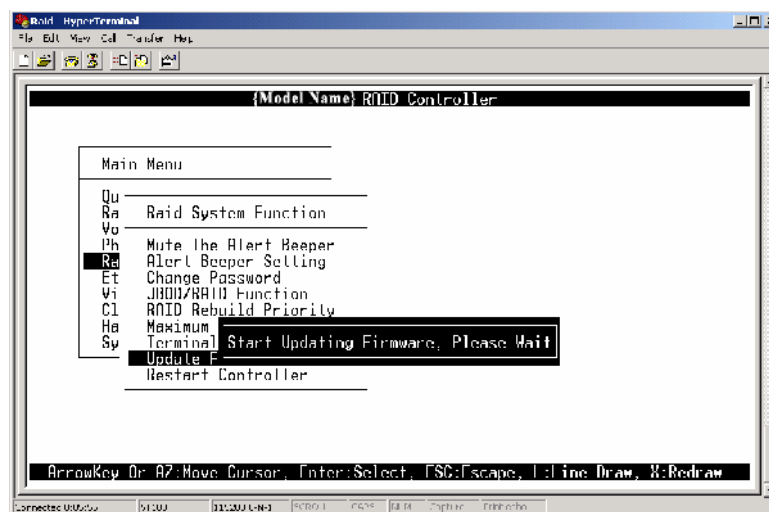
- Click Send to send the firmware binary file to the RAID controller.



- When the firmware downloading is completed, the confirmation screen appears. Select Yes to start programming the flash ROM.

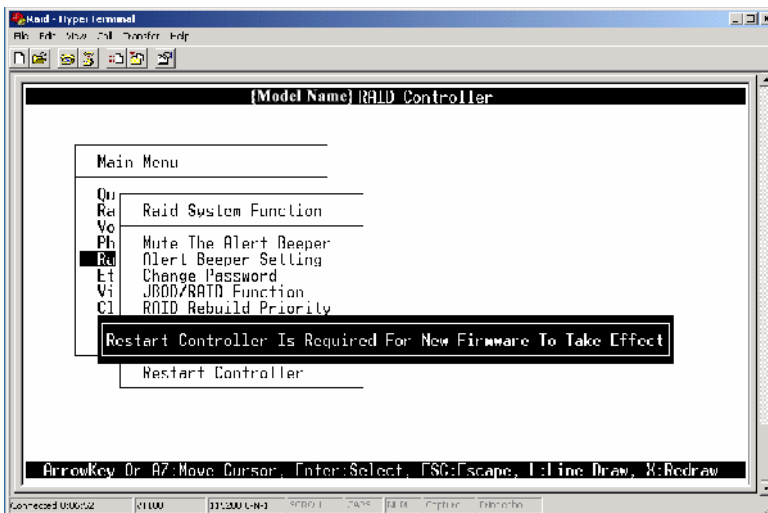
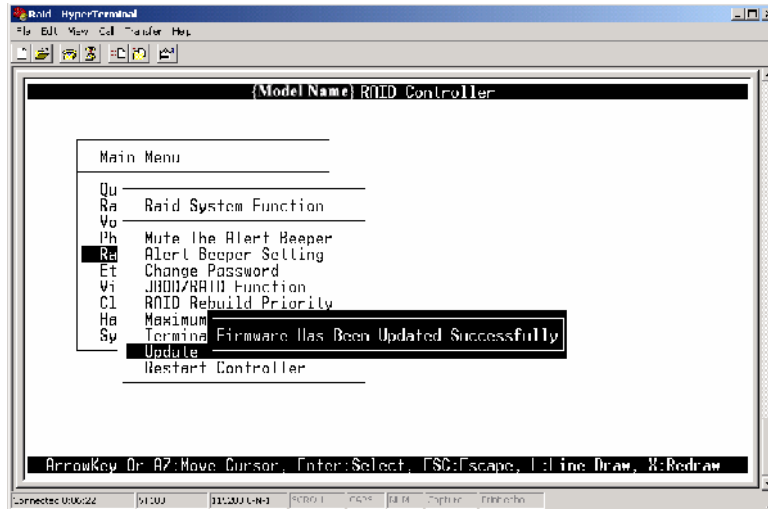


8. When the Flash programming starts, a message will show " Start Updating Firmware. Please Wait".



9. The firmware upgrade will take approximately thirty seconds to complete.

10. After the firmware upgrade is complete, a message will show "Firmware Has Been Updated Successfully". Restarting the RAID controller is required for the new firmware to take effect.



## Upgrading Firmware Through Web Browser

Get the new version of firmware for your RAID subsystem controller.



**NOTE:** When there is new boot ROM firmware that needs to be upgraded, upgrade first the boot ROM firmware. Then repeat the process (steps 1 to 3) to upgrade the firmware code after which a RAID controller restart will be necessary.

1. To upgrade the RAID subsystem firmware, click the Upgrade Firmware link under System Controls menu. The Upgrade The Raid System Firmware Or Boot Rom screen appears.
2. Click Browse. Look in the location where the firmware file was saved. Select the firmware file name "xxxxxxx.BIN" and click Open.



3. Select the Confirm The Operation option. Click the Submit button.
4. The Web Browser begins to download the firmware binary to the controller and start to update the flash ROM.
5. After the firmware upgrade is complete, a message will show "Firmware Has Been Updated Successfully". Restarting the RAID controller is required for the new firmware to take effect.

