XtendLan

XL-RAID SCSI TO S-ATA

Installation Reference Guide

Revision 1.0

FCC Compliance Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in residential installations. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is not guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television equipment reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient or relocate the receiving antenna
2. Move the equipment away from the receiver
3. Plug the equipment into an outlet on a circuit different from that to which the receiver is powered.
4. Consult the dealer or an experienced radio/television technician for help

All external connections should be made using shielded cables.

About This Manual

Welcome to your **R**edundant **A**rray of **I**ndependent **D**isks System User's Guide. This manual covers everything you need to know in learning how to install or configure your RAID system. This manual also assumes that you know the basic concepts of RAID technology. It includes the following information :

Chapter 1 **Introduction**

Introduces you to Disk Array's features and general technology concepts.

Chapter 2 **Getting Started**

Helps user to identify parts of the Disk Array and prepare the hardware for configuration.

Chapter 3 **Configuring**

Quick Setup
Provides a simple way to setup your Disk Array.
Customizing Setup
Provides step-by-step instructions to help you to do setup or re-configure your Disk Array.

Chapter 4 **Array Maintenance**

Updating Firmware
Provides step-by-step instructions to help you to update the firmware to the latest version.

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Chapter 1

Introduction

The RAID subsystem is a Ultra 320 LVD SCSI-to-Serial II ATA RAID (Redundant Arrays of Independent Disks) disk array subsystem. It consists of a RAID disk array controller and four (4) disk trays.

The subsystem is a “Host Independent” RAID subsystem supporting RAID levels 0, 1, 3, 5, 6, 0+1 and JBOD. Regardless of the RAID level the subsystem is configured for, each RAID array consists of a set of disks which to the user appears to be a single large disk capacity.

One unique feature of these RAID levels is that data is spread across separate disks as a result of the redundant manner in which data is stored in a RAID array. If a disk in the RAID array fails, the subsystem continues to function without any risk of data loss. This is because redundant information is stored separately from the data. This redundant information will then be used to reconstruct any data that was stored on a failed disk. In other words, the subsystem can tolerate the failure of a drive without losing data while operating independently of each other.

The subsystem is also equipped with an environment controller which is capable of accurately monitoring the internal environment of the subsystem such as its power supplies, fans, temperatures and voltages. The disk trays allow you to install any type of 3.5-inch hard drive. Its modular design allows hot-swapping of hard drives without interrupting the subsystem’s operation.

1.1 Key Features

Subsystem Features:

- Features an Intel 80219 64 bit RISC I/O processor
- Build-in 128MB~256MB cache memory
- Ultra 320 LVD host port
- Smart-function LCD panel
- Supports up to four (4) 1" hot-swappable Serial ATA II hard drives
- 250W power supply with PFC
- High quality advanced cooling fan
- Local audible event notification alarm
- Supports password protection and UPS connection
- Built-in R-Link LAN port interface for remote management & event notification
- Real time drive activity and status indicators

RAID Function Features:

- Supports RAID levels 0, 1, 0+1, 3, 5, 6 and JBOD
- Supports hot spare and automatic hot rebuild
- Allows online capacity expansion within the enclosure
- Tagged command queuing for 256 commands, allows for overlapping data streams
- Transparent data protection for all popular operating systems
- Bad block auto-remapping
- Supports multiple array enclosures per host connection
- Multiple RAID selection
- Array roaming
- Online RAID level migration

1.2 RAID Concepts

RAID Fundamentals

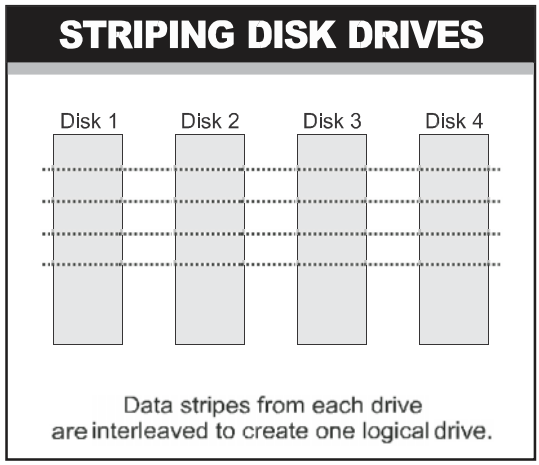
The basic idea of RAID (Redundant Array of Independent Disks) is to combine multiple inexpensive disk drives into an array of disk drives to obtain performance, capacity and reliability that exceeds that of a single large drive. The array of drives appears to the host computer as a single logical drive.

Six types of array architectures, RAID 1 through RAID 6, 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 array.

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.

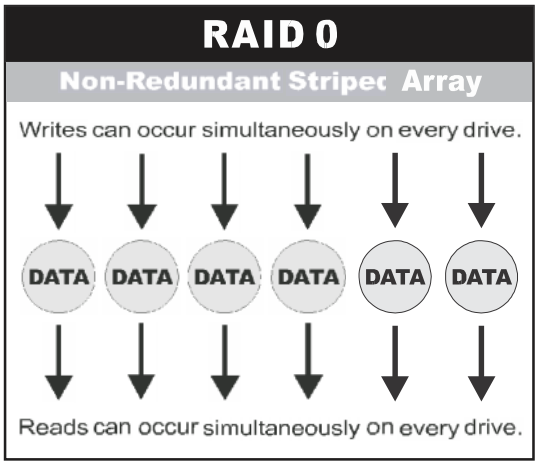
Most operating systems today support concurrent disk I/O operations across multiple drives. However, in order to maximize throughput for the disk subsystem, the I/O load must be balanced across all the drives so that each drive can be kept busy as much as possible. In a multiple drive system without 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.



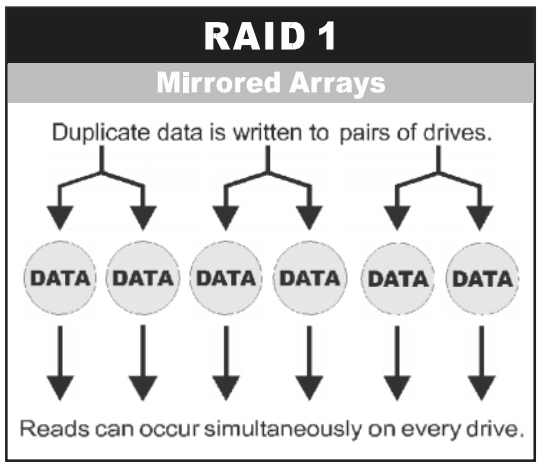
By striping the drives in the array with stripes large enough so that each record falls entirely within one stripe, most records can be evenly distributed across all drives. This keeps all drives in the array busy during heavy load situations. This situation allows all drives to work concurrently on 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

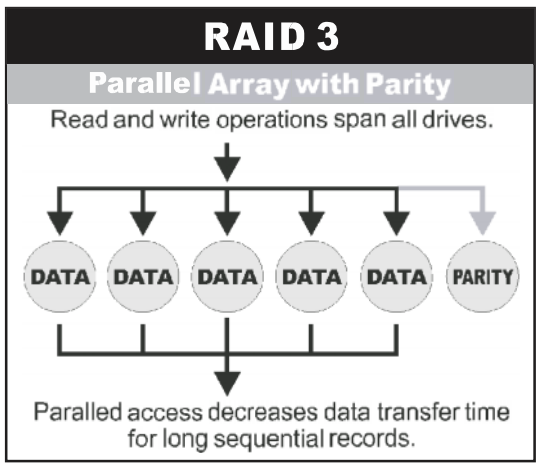
RAID 0 is typically defined as a group of striped disk drives without parity or data redundancy. RAID 0 arrays can be configured with large stripes for multi-user environments or small stripes for single-user systems that access long sequential records. RAID 0 arrays deliver the best data storage efficiency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



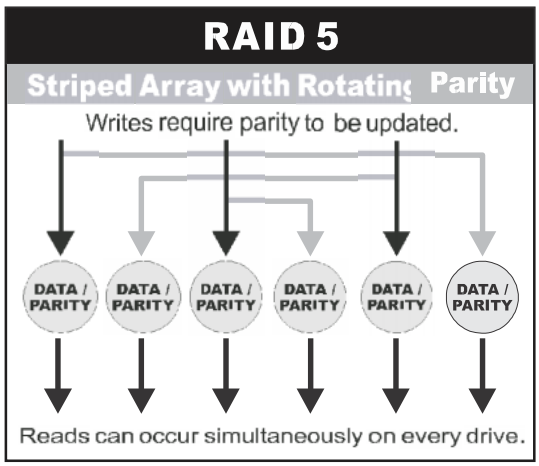
RAID 1, also known as disk mirroring, is simply a pair of disk drives that store duplicate data but appear to the computer as a single drive. Although striping is not used within a single mirrored drive pair, multiple RAID 1 arrays can be striped together to create a single large array consisting of 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.



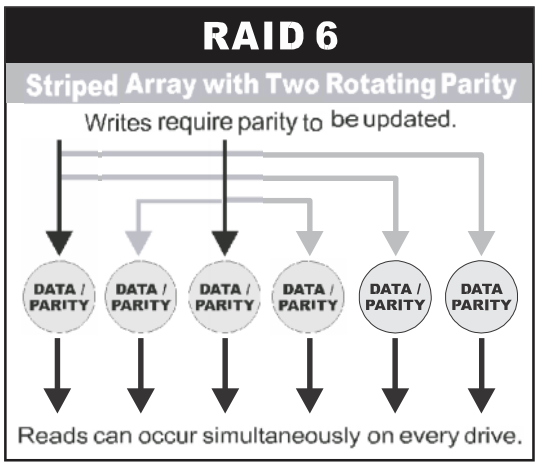
RAID 3 sector-stripes data across groups of drives, but one drive in the group is dedicated to storing parity information. RAID 3 relies on the embedded ECC in each sector for error detection. In the case of drive failure, data recovery is accomplished by calculating the exclusive OR (XOR) of the information 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.



RAID 6 is similar to RAID 5 in that data protection is achieved by writing parity information to the physical drives in the array. With RAID 6, however, ***two*** sets of parity data are used. These two sets are different, and each set occupies a capacity equivalent to that of one of the constituent drives. The main advantages of RAID 6 is High data availability – any two drives can fail without loss of critical data.



Dual-level RAID achieves a balance between the increased data availability inherent in RAID 1 and RAID 5 and the increased read performance inherent in disk striping (RAID 0). These arrays are sometimes referred to as **RAID 0+1** or RAID 10 and RAID 0+5 or RAID 50.

In summary:

- RAID 0 is the fastest and most efficient array type but offers no fault-tolerance. RAID 0 requires a minimum of two drives.
- 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.
- 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.
- 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 6 is essentially an extension of RAID level 5 which allows for additional fault tolerance by using a second independent distributed parity scheme (two-dimensional parity). Data is striped on a block level across a set of drives, just like in RAID 5, and a second set of parity is calculated and written across all the drives; RAID 6 provides for an extremely high data fault tolerance and can sustain multiple simultaneous drive failures. Perfect solution for mission critical applications.

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
6	Data is striped across several physical drives. Parity protection is used for data redundancy. Requires N+2 drives to implement because of two-dimensional parity scheme	4
0 + 1	Combination of RAID levels 0 and 1. This level provides striping and redundancy through mirroring.	4

1.3 SCSI Concepts

Before configuring the subsystem, you must first understand some basic SCSI concepts so that the subsystem and SCSI devices will function properly.

1.3.1 Multiple SCSI Format Support

The subsystem support the SCSI interface standards listed below. Note that the data bit and cable length restrictions must be followed.

SCSI Type	Data Bit	Data Rate	Cable Length
SCSI-1	8 Bits	5 MB/Sec	6 m
Fast SCSI	8 Bits	10 MB/Sec	3 m
Fast Wide SCSI	16 Bits	20 MB/Sec	3 m
Ultra SCSI	8 Bits	20 MB/Sec	1.5 m
Ultra Wide SCSI	16 Bits	40 MB/Sec	1.5 m
Ultra 2 SCSI	8 Bits	40 MB/Sec	12 m
Ultra 2 Wide SCSI	16 Bits	80 MB/Sec	12 m
Ultra 160 Wide LVD	16 Bits	160MB/Sec	12 m
Ultra 320 LVD	16 Bits	320MB/Sec	12 m

1.3.2 Host SCSI ID Selection

A SCSI ID is an identifier assigned to SCSI devices which enables them to communicate with a computer when they are attached to a host adapter via the SCSI bus. Each SCSI device, and the host adapter itself, must have a SCSI ID number (Ultra 320 Wide SCSI = 0 to 15). The ID defines each SCSI device on the SCSI bus. If there are more than one SCSI adapter in the Host subsystem, each adapter forms a separate SCSI bus. SCSI IDs can be re-used as long as the ID is assigned to a device on a separate SCSI bus. Refer to the documentation that came with your peripheral device to determine the ID and how to change it. The subsystem must be assigned a unique SCSI ID ranging from 0 to 15 for the Ultra 320 LVD SCSI host system. The default value is ID 0.

1.3.3 Terminators

Based on SCSI specifications, the SCSI bus must be terminated at both ends, meaning the devices that are connected to the ends of the SCSI bus must have their bus terminators enabled. Devices connected in the middle of the SCSI bus must have their terminators disabled. Proper termination allows data and SCSI commands to be transmitted reliably on the SCSI bus. The host adapter and the SCSI devices attached to it must be properly terminated, or they will not work reliably.

Termination means that terminators are installed in the devices at each end of the bus. Some SCSI devices require you to manually insert or remove the terminators. Other devices have built-in terminators that are enabled or disabled via switches or software commands. Refer to the device's documentation on how to enable or disable termination.

1.4 Array Definition

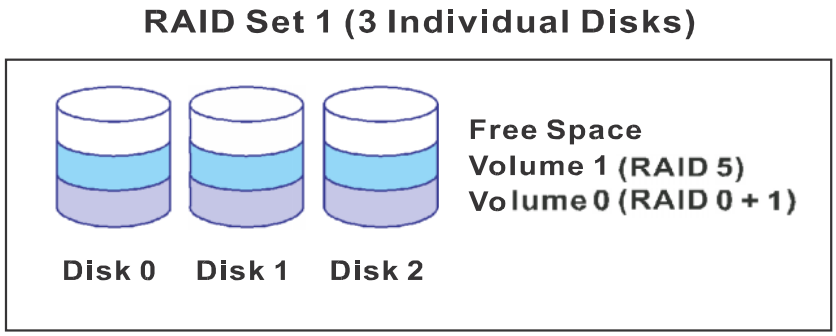
1.4.1 RAID Set

A RAID Set is a group of disks containing one or more volume sets. It is impossible to have multiple RAID Sets on the same disks.
A Volume Set must be created either on an existing RAID set or on a group of available individual disks (disks that are not yet a part of an raid set). If there are pre-existing raid sets with available capacity and enough disks for specified RAID level desired, then the volume set will be created in the existing raid set of the user's choice. If physical disks 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.

1.4.2 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 disk 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 of operation while Volume 0 might be assigned a RAID 0+1 level of operation.



1.4.3 Easy of Use features

1.4.3.1 Instant Availability/Background Initialization

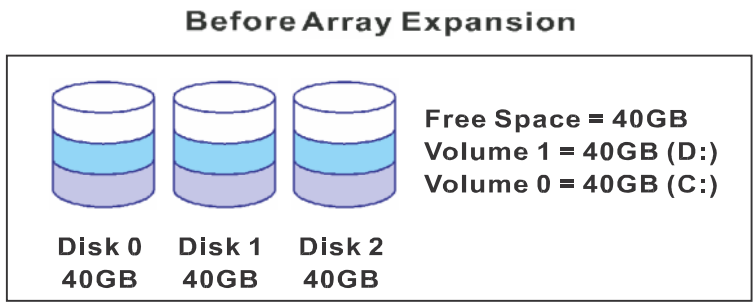
RAID 0 and RAID 1 volume set can be used immediately after the creation. But the RAID 3, 5 and 6 volume sets must be initialized to generate the parity. In the Normal Initialization, the initialization proceeds as a background task, the volume set is fully accessible for system reads and writes. The operating system can instantly access to the newly created arrays without requiring a reboot and waiting the initialization complete. Furthermore, the RAID volume set is also protected against a single disk failure while initialing. In Fast Initialization, the initialization proceeds must be completed before the volume set ready for system accesses.

1.4.3.2 Array Roaming

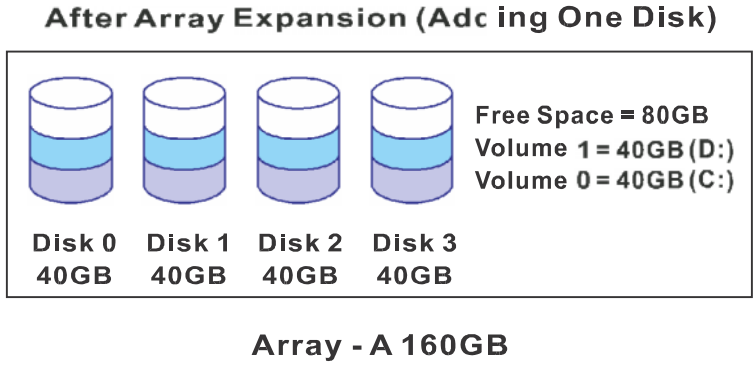
The RAID subsystem stores configuration information both in NVRAM and on the disk drives It can protect the configuration settings in the case of a disk drive or controller failure. Array roaming allows the administrators the ability to move a completely raid set to another system without losing RAID configuration and data on that raid set. If a server fails to work, the raid set disk drives can be moved to another server and inserted in any order.

1.4.3.3 Online Capacity Expansion

Online Capacity Expansion makes it possible to add one or more physical drive to a volume set, while the server is in operation, eliminating the need to store and restore after reconfiguring the raid set. When disks are added to a raid set, unused capacity is added to 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 create additional volume set. The expansion process is illustrated as following figure.



The RAID subsystem controller redistributes the original volume set over the original and newly added disks, using the same fault-tolerance configuration. The unused capacity on the expand raid set can then be used to create an additional volume sets, with a different fault tolerance setting if user need to change.



1.4.3.4 Online RAID Level and Stripe Size Migration

User can migrate 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.

1.4.4 High availability

1.4.4.1 Creating Hot Spares

A hot spare drive is an unused online available drive, which is ready for re-placing the failure 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 define as a hot spare drive. Hot spares permit you to replace failed drives without powering down the system. When RAID subsystem detects a UDMA drive failure, the system will automatic and transparent rebuilds using 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.

1.4.4.2 Hot-Swap Disk Drive Support

The RAID subsystem has built the protection circuit to support the replacement of UDMA hard disk drives without having to shut down or reboot the system. The removable hard drive tray can deliver “hot swappable,” fault-tolerant RAID solutions at prices much less than the cost of conventional SCSI hard disk RAID subsystems. We provide this feature for subsystems to provide the advanced fault tolerant RAID protection and “online” drive replacement.

1.4.4.3 Hot-Swap Disk Rebuild

A Hot-Swap function can be used to rebuild disk drives in arrays 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 restart the system and the rebuild if the system is shut down or powered off abnormally during a reconstruction procedure condition. When a disk is Hot Swap, although the system is functionally operational, the system may no longer be fault tolerant. Fault tolerance will be lost until the removed drive is replaced and the rebuild operation is completed.

Chapter 2

Getting Started

Getting started with the subsystem consists of the following steps:

- ***Unpack the storage subsystem.***
- ***Identifying Parts of the subsystem.***
- ***Connect the SCSI Cables.***
- ***SCSI Termination.***
- ***Power on the subsystem.***
- ***Install Hard Drives.***

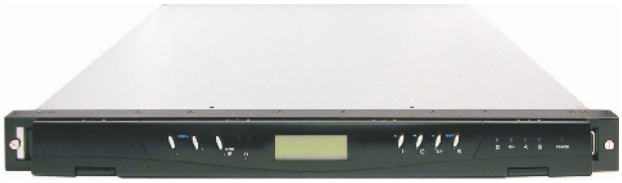
2.1 Unpacking the Subsystem

Before continuing, first unpack the subsystem and verify that the contents of the shipping carton are all there and in good condition. Before removing the subsystem from the shipping carton, visually inspect the physical condition of the shipping carton. 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 the subsystem was purchased for further instructions.

The package contains the following items:

- RAID subsystem unit
- One power cord
- One external SCSI cable
- One external null modem cable
- One external UPS cable
- One RJ-45 ethernet cable
- One Active LVD/SE terminator
- Installation Reference Guide
- Spare screws, etc.

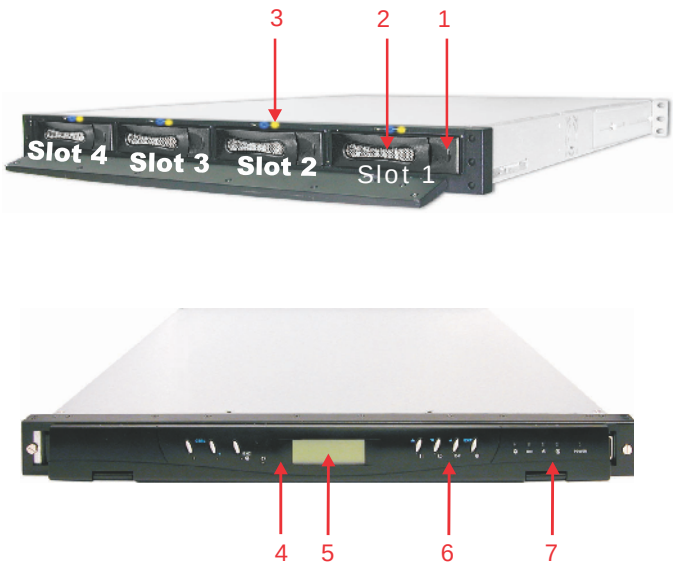
If any of these items are missing or damaged, please contact your dealer or sales representative for assistance.



2.2 Identifying Parts of the subsystem

The illustrations below identify the various features of the subsystem. Get yourself familiar with these terms as it will help you when you read further in the following sections.

2.2.1 Front View



1. Tray Latch

2. Tray Lever

3. HDD status Indicator

Parts	Function
HDD fault LEDs	Red LED indicates the hard drive is failure.
HDD activity LEDs	These LED will blink blue when the hard drive is being accessed.
HDD power LEDs	Green LED indicates power is on.

4. Smart Function Panel - Function Keys

Parts	Function
Activity LED	Blue blinking LED indicates controller is activity.

5. LCD display panel

6. Smart Function Panel - Function Keys for RAID configuration

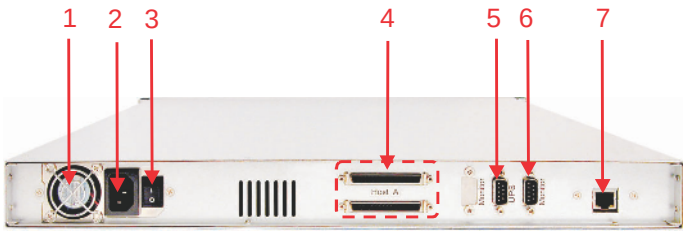
The smart LCD panel is where you will configure the RAID subsystem. If you are configuring the subsystem using the LCD panel, please press the controller button to configure your RAID subsystem.

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 EXIT	Press this button to return to the previous menu.

7. Environment status

Parts	Function
Voltage warning LED	An alarm will sound warning of a voltage abnormality and this LED will turn red.
Over temp LED	If temperature irregularity in these systems occurs (HDD slot temperature over 60°C), this LED will turn red and an alarm will sound.
Fan fail LED	When a fan's rotation speed is lower than 2000rpm, this LED will turn red and an alarm will sound.
Power LED	Green LED indicates power is on.

2.2.2 Rear View



1. Power Supply Unit

2. AC power input socket

3. Power on / off switch

4. Host Channel A

The subsystem is equipped with one host channel. The host channel with two 68-pin SCSI connectors at the rear of the subsystem for SCSI in and out.

5. Uninterrupted Power Supply (UPS) Port

The subsystem may come with an optional UPS port allowing you to connect a UPS device. Connect the cable from the UPS device to the UPS port located at the rear of the subsystem. This will automatically allow the subsystem to use the functions and features of the UPS.

6. Monitor Port

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

7. 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 web-based browser to management RAID subsystem through Ethernet for remote configuration and monitoring.

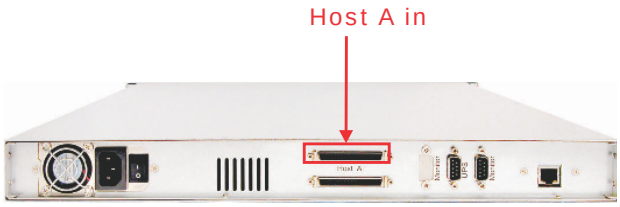
Link LED: Green LED indicates ethernet is linking.

Link speed LED: Orange LED indicates the link speed is 100Mbps. The LED will not blink when the link speed is 10Mbps.

2.3 Connecting to Host

The subsystem supports the Ultra 320 SCSI LVD interface which provides fast 320MB/S data transfer rates using a 16-bit SCSI bus. Installation of the disk array is very similar to the installation of a standard SCSI drive. The SCSI connector accepts the standard 68-pin LVD SCSI connector used on most LVD SCSI devices. Refer to your system and/or SCSI host adapter manual for additional installation procedures that may apply to your system or host adapter.

1. The package comes with one external SCSI cable. For host channel SCSI connector at the rear of the subsystem, attach one end of the external SCSI cable to one of the SCSI connectors and the other end to the host adapter's external SCSI connector. (The host adapter is installed in your Host subsystem.)



Note:

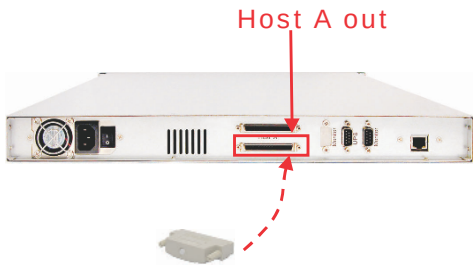
1. When one or more SCSI devices are connected, the total length of all cables (internal or external) must not exceed 3 meters (9.8 ft.) to ensure reliable operation.

2. For safety reasons, make sure the Disk Array and Host Computer are turned off when you plug-in the SCSI cable.

2.4 SCSI Termination

One 68-pin wide SCSI connector is provided on the back of the enclosure for connecting the array to the system. These connectors are used in one of two ways:

- If the disk array is the only external SCSI device, or is the last external device in a daisy-chained configuration, connect the incoming cable (the one which is attached to the SCSI adapter) to the Host A in connector and install the external SCSI Terminator on the Host A out connector.



- If the array is to be placed in the middle of a daisy-chained configuration, connect the incoming cable (the one which is attached to the SCSI adapter) to the Host A in connector and connect the outgoing cable (the one which continues on to other devices) to the Host A out connector. In this case, no terminator is required at the disk array but the last device in the daisy chain must have a terminator.

Correct SCSI termination procedures require that the last devices on the SCSI bus be terminated. If the last device is not terminated, or if devices other than the last are terminated, erratic SCSI bus performance may occur. Typically, the system or host adapter (SCSI card inside the PC) is the first device and is already terminated. When installing the disk array on a SCSI bus with other devices, be sure to observe the above rules with all devices on the SCSI bus. Consult your system and/or host adapter manual for additional information on correct termination procedure.

2.5 Powering-on the Subsystem

When you connect the Disk Array to the Host computer, you should press the ON/OFF Power Supply Switch. It will turn the Disk Array on and the Self-Test will be started automatically.

1. Plug in the power cord or power connector located at the rear of the subsystem.

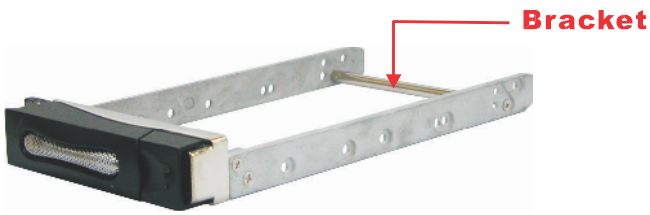
Note:
The subsystem is equipped with redundant PFC (power factor correction), Full Range power supplies. The subsystem will automatically selector voltage.

2. Turn on the power.
3. The “Power” LED on the front panel will turn green. After a few moments the LCD should display the following message:

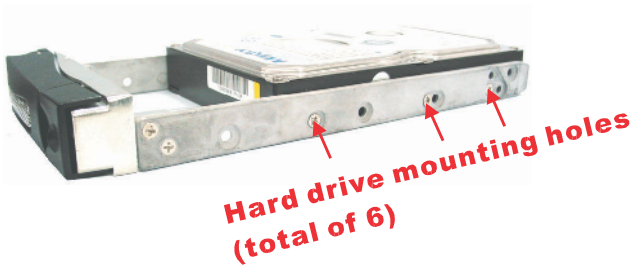
2.6 Install Hard Drives

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.

1. Pull out an empty disk tray. (You can install in any available slot.)
2. Take off the bracket before installing hard drive.



3. Place the hard drive in the disk tray.
4. Install the mounting screws on each side to secure the drive in the mobile rack.

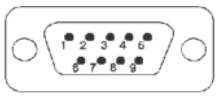


Note:
Insert screws through the front sides of the mounting holes.

5. Slide the tray into a slot until it clicks into place. The HDD status LED will turn green on front panel.
6. Press the lever in until you hear the latch click into place.
7. If the HDD power LED did not turn green, check the hard drive is in good condition.
8. If the hard drive is not being accessed, the HDD access LED will not illuminate. The LED blinks only when being accessed.

2.7 Connecting an Uninterrupted Power Supply (UPS)

The subsystem is equipped with a UPS port located at the rear of the system unit. It allows you to connect a UPS fail signal.

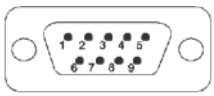


Pin	Description
1	Not used
2	UPS Line Fail
3	Not used
4	UPS Common
5	Not used
6	Not used
7	Not used
8	Not used
9	Not used

Note:
UPS connection compliant with NetWare UPS management, smart mode UPS not support.

2.8 Connecting to a PC or Terminal

The subsystem is equipped with a serial monitor port located at the rear of the system unit. This serves as an alternative display when accessing the setup utility.



Pin	Description
1	Data Carrier Detect (DCD)
2	Receive Data (RD)
3	Transmit Data (TD)
4	Data Teminal Ready (DTR)
5	Signal Ground (SG)
6	Data Set Ready (DSR)
7	Ready To Send (RTS)
8	Clear To Send (CTS)
9	Ring Indicator (RI)

Note:

Refer to Chapter 3 for instructions on accessing the setup utility through a PC or terminal, as well as instructions on setting the baud rate, stop bit, data bit and parity of your monitor or terminal. The default setting of the monitor port is 115200 baud rate, non-parity, 8 data bit and no flow control.

Chapter 3

Configuring

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 both methods at the same time.

3.1 Configuring through a Terminal

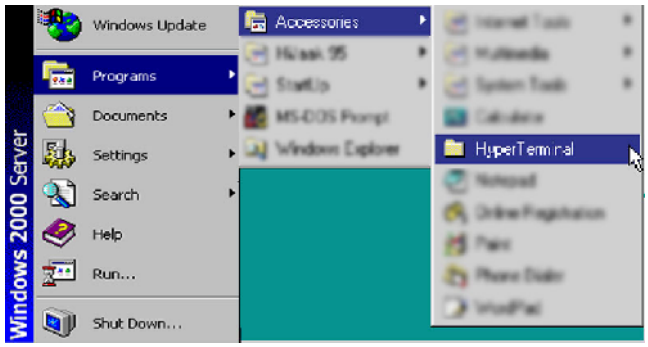
Configuring through a terminal will allow you to use the same configuration options and functions that are available from the LCD panel. To start-up:

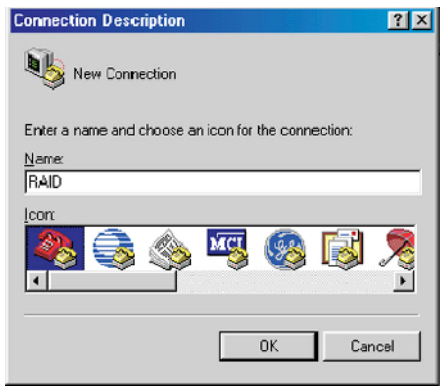
1. Connect a VT100 compatible terminal or a PC operating in an equivalent terminal emulation mode to the monitor port located at the rear of the subsystem.

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

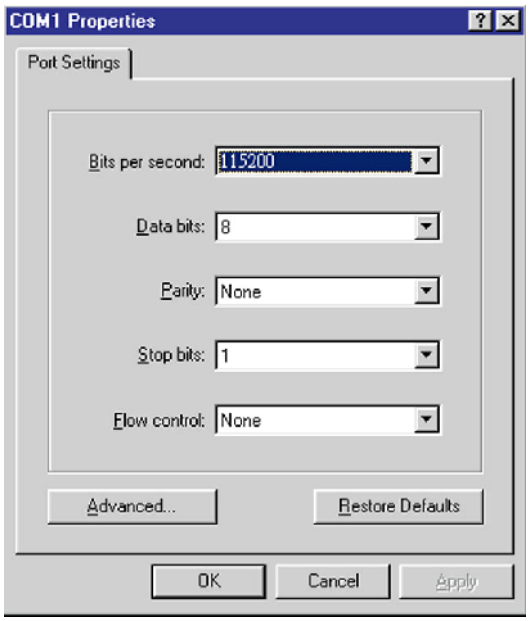
2. Power-on the terminal.

3. Run the VT100 program or an equivalent terminal program.

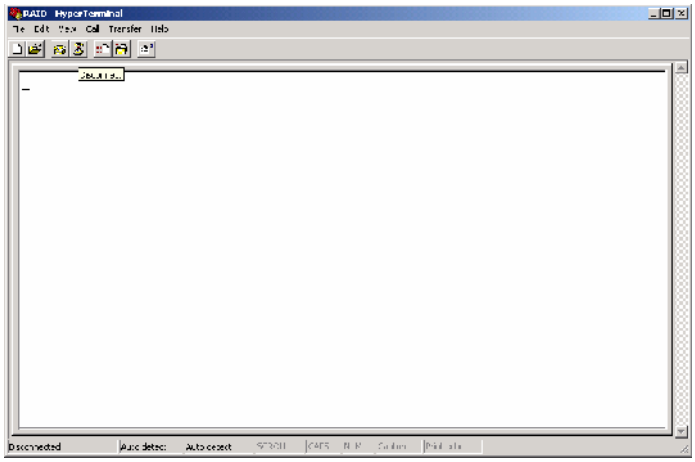




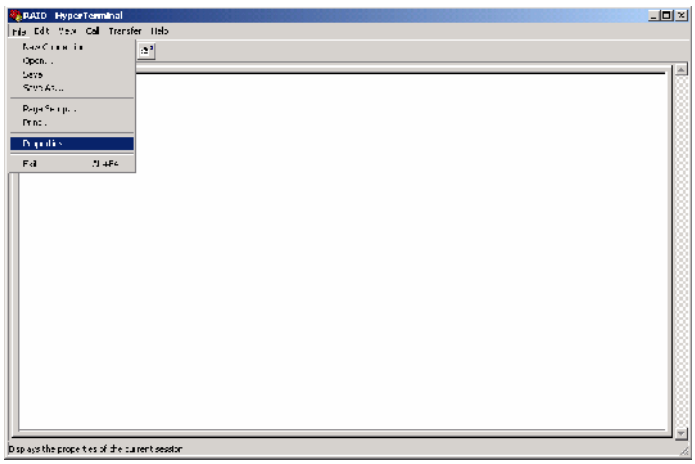
4. The default setting of the monitor port is 115200 baud rate, 8 data bit, non-parity, 1 stop bit and no flow control.



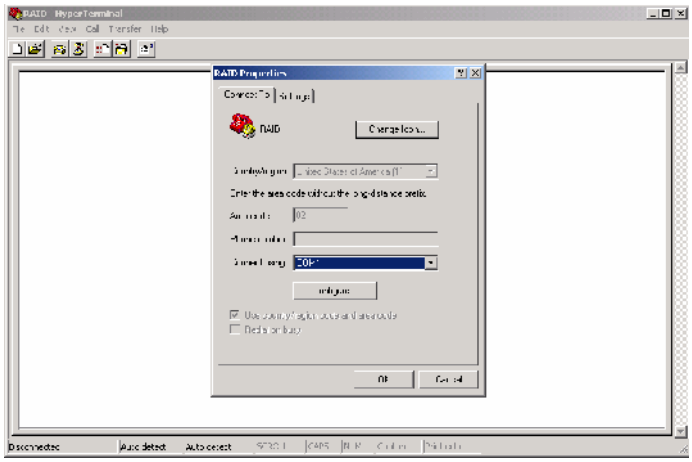
5. Click  disconnect button.



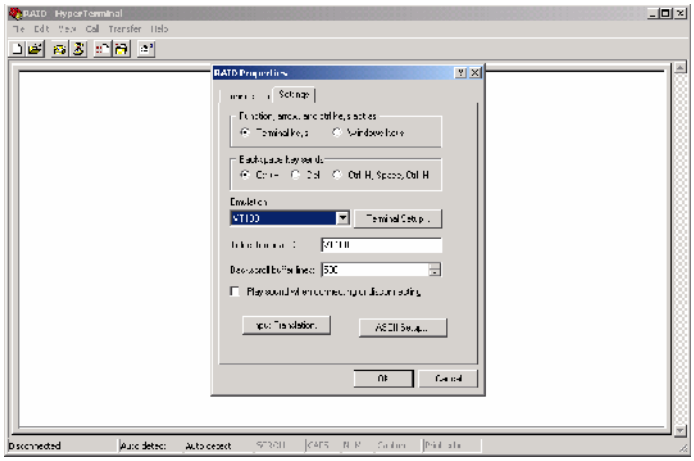
6. Open the File menu, and then open Properties.



7. Open the Settings Tab.

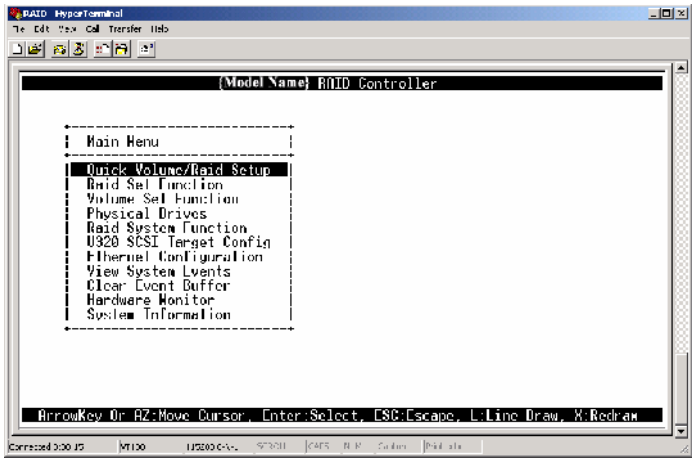


8. Open the Settings Tab. Function, arrow and ctrl keys act as: Terminal Keys, Backspace key sends: Crtl+H, Emulation: VT100, Telnet terminal: VT100, Back scroll buffer lines: 500. Click OK.



9. Now, the VT100 is ready to use. After you have finished the VT100 Terminal setup, you may press " 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

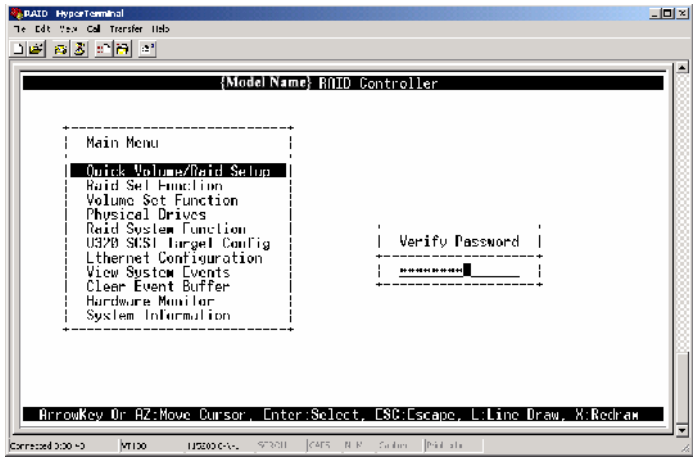
" ESC " key - Return to previous screen

" 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 internal RAID subsystem from unauthorized entry. 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 password is default setting at **00000000** by the manufacture.

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 explained on the section 3.3. The configuration utility main menu options are:

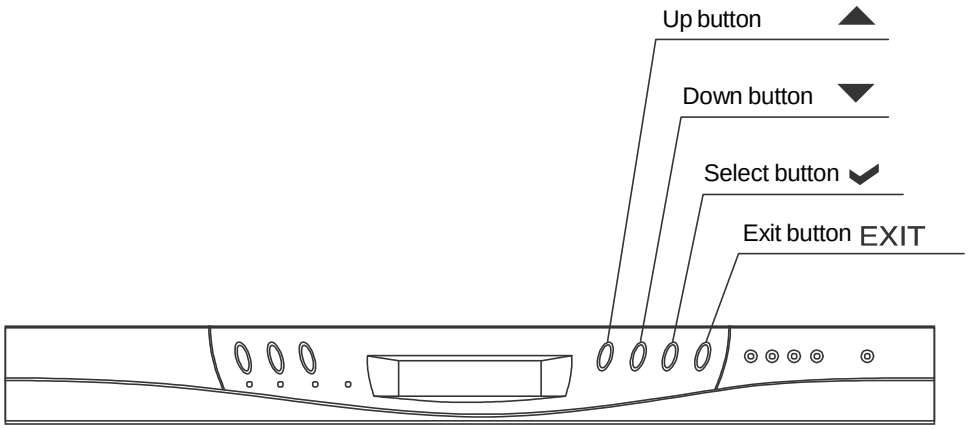
Option	Description
Quick Volume And Raid Set Setup	Create a RAID configurations which is consist of the number of physical disk installed
Raid Set Functions	Create a customized raid set
Volume Set Functions	Create a customized volume set
Physical Drive Functions	View individual disk information
Raid System Functions	Setting the raid system configurations
U320 SCSI Target Config	Setting the U320 SCSI 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 the Subsystem 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 configuration 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 password is default setting at **00000000** by the manufacture.

Function Key Definitions

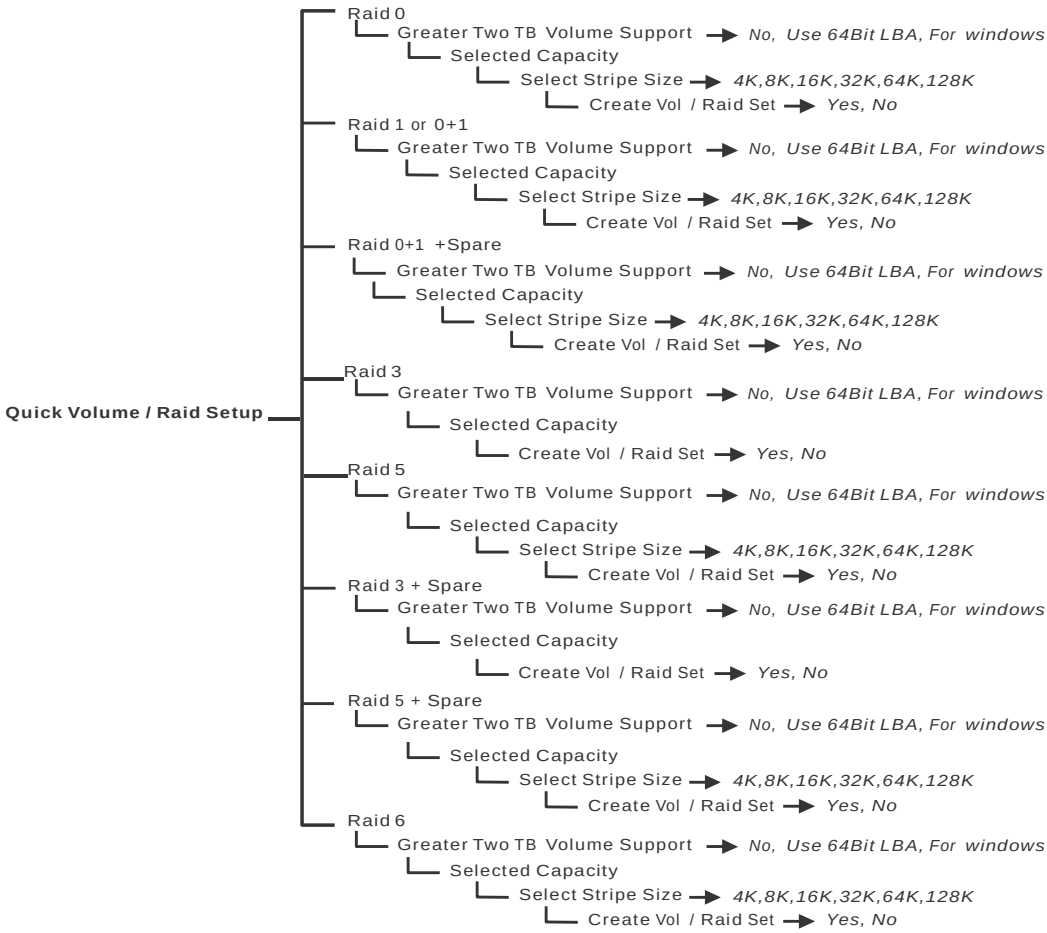
The four function keys at the top of the front panel perform the following functions :

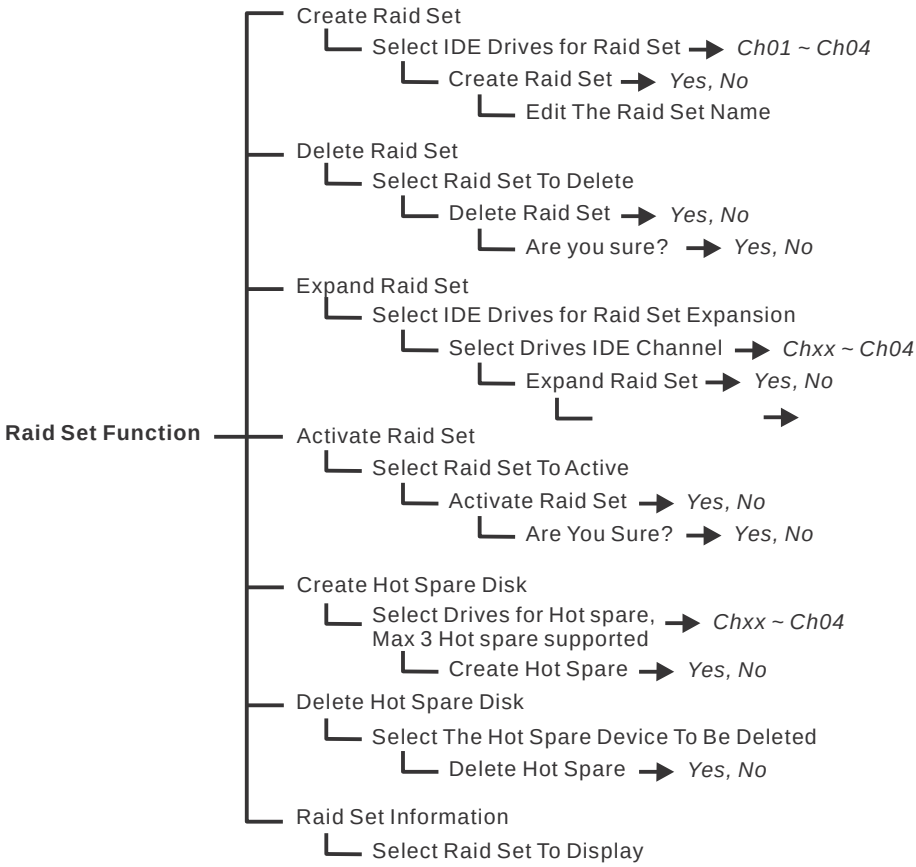


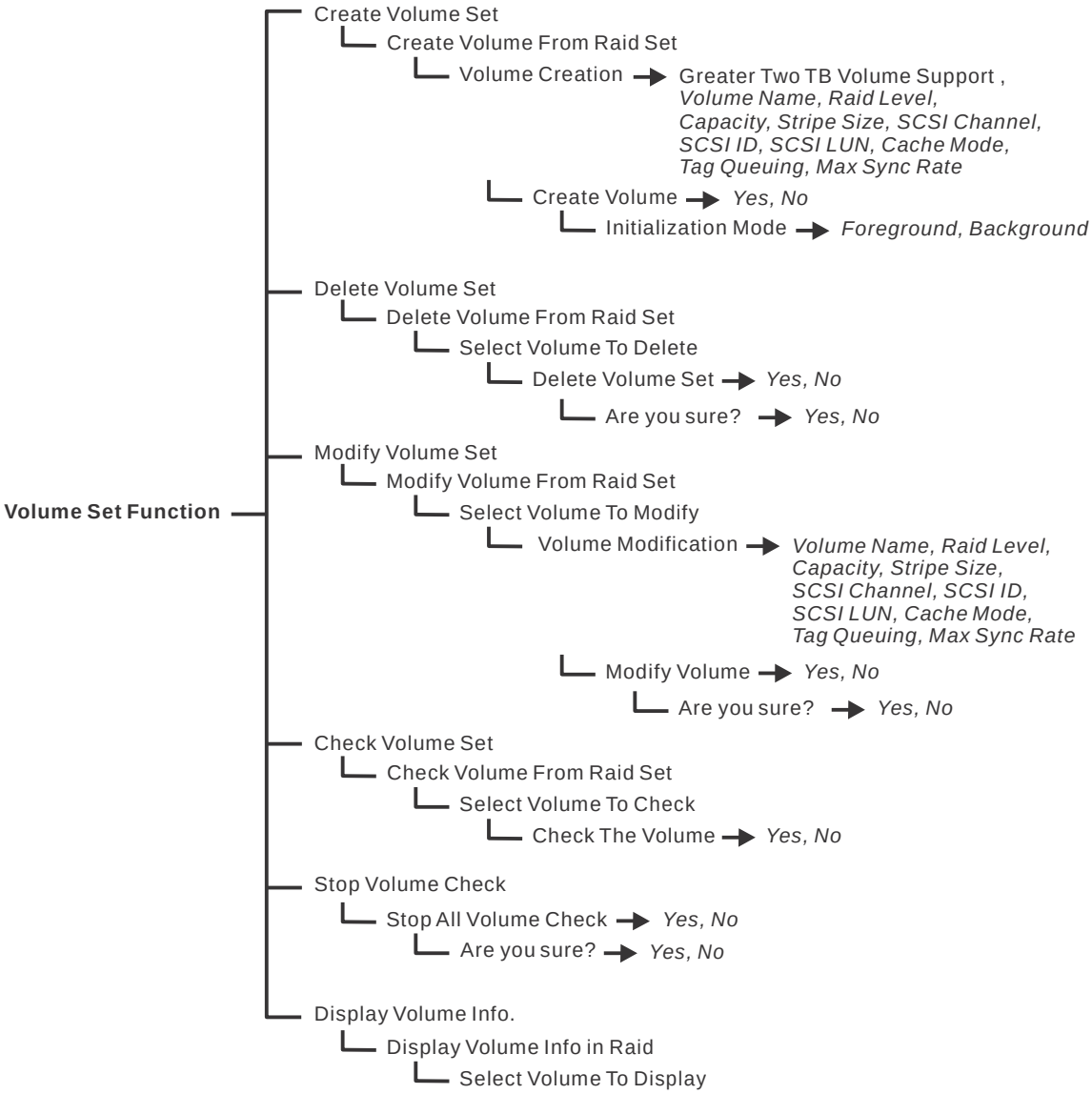
Parts	Function
Up or Down arrow buttons ▲ ▼	Use the Up or Down arrow keys to go through the information on the LCD screen. This is also used to move between each menu when you configure the subsystem.
Select button ✔	This is used to enter the option you have selected.
Exit button EXIT	Press this button to return to the previous menu.

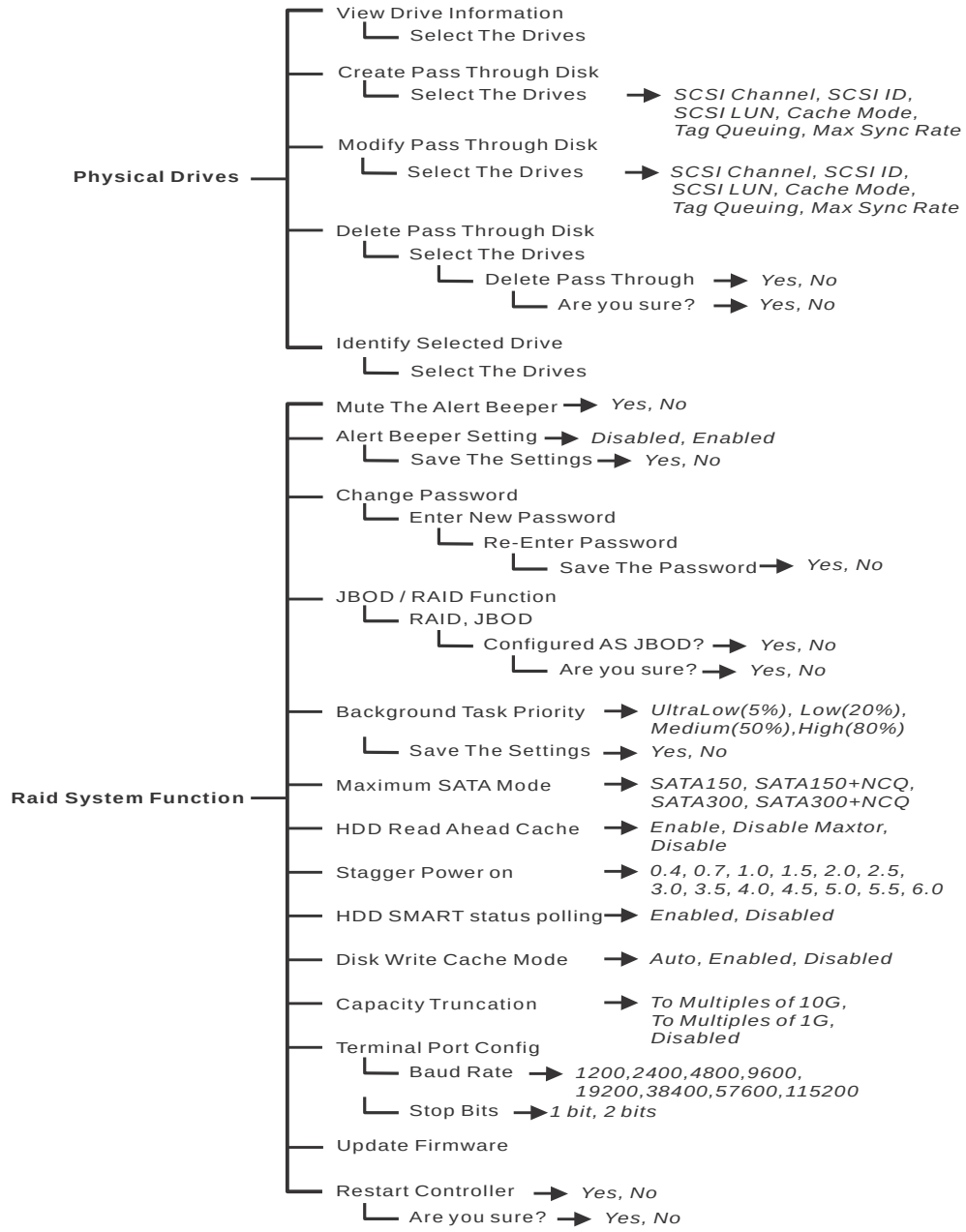
3.3 Menu Diagram

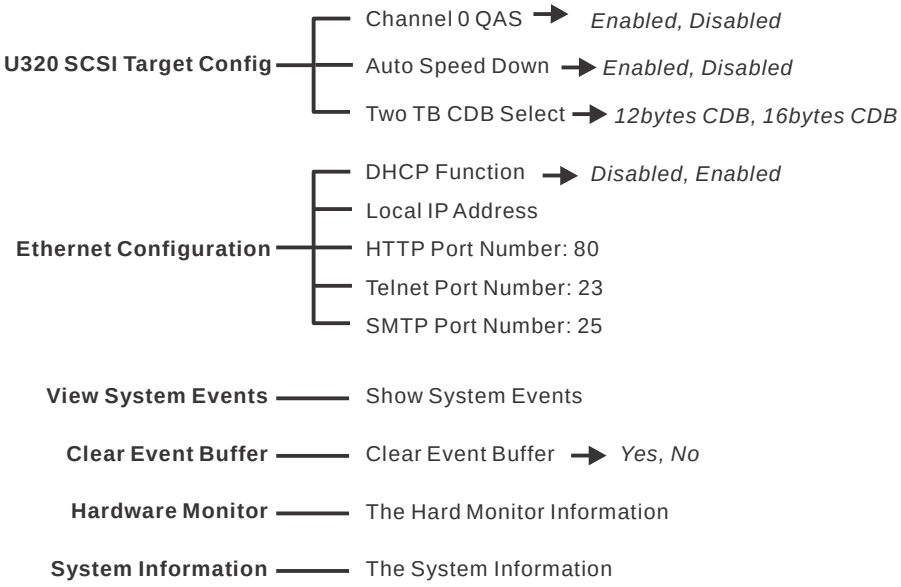
The following tree diagram is a summary of the various configuration and setting functions that can be accessed through the LCD panel menus or the terminal monitor.




Raid Set Function
Create Raid Set
Select IDE Drives for Raid Set → Ch01 ~ Ch04
Create Raid Set → Yes, No
Edit The Raid Set Name
Delete Raid Set
Select Raid Set To Delete
Delete Raid Set → Yes, No
Are you sure? → Yes, No
Expand Raid Set
Select IDE Drives for Raid Set Expansion
Select Drives IDE Channel → Chxx ~ Ch04
Expand Raid Set → Yes, No
Activate Raid Set
Select Raid Set To Active
Activate Raid Set → Yes, No
Are You Sure? → Yes, No
Create Hot Spare Disk
Select Drives for Hot spare, Max 3 Hot spare supported → Chxx ~ Ch04
Create Hot Spare → Yes, No
Delete Hot Spare Disk
Select The Hot Spare Device To Be Deleted
Delete Hot Spare → Yes, No
Raid Set Information
Select Raid Set To Display


Volume Set Function
Create Volume Set
Create Volume From Raid Set
Volume Creation
Greater Two TB Volume Support ,
Volume Name, Raid Level,
Capacity, Stripe Size, SCSI Channel,
SCSI ID, SCSI LUN, Cache Mode,
Tag Queuing, Max Sync Rate
Create Volume
Yes, No
Initialization Mode
Foreground, Background
Delete Volume Set
Delete Volume From Raid Set
Select Volume To Delete
Delete Volume Set
Yes, No
Are you sure?
Yes, No
Modify Volume Set
Modify Volume From Raid Set
Select Volume To Modify
Volume Modification
Volume Name, Raid Level,
Capacity, Stripe Size,
SCSI Channel, SCSI ID,
SCSI LUN, Cache Mode,
Tag Queuing, Max Sync Rate
Modify Volume
Yes, No
Are you sure?
Yes, No
Check Volume Set
Check Volume From Raid Set
Select Volume To Check
Check The Volume
Yes, No
Stop Volume Check
Stop All Volume Check
Yes, No
Are you sure?
Yes, No
Display Volume Info.
Display Volume Info in Raid
Select Volume To Display


Physical Drives
View Drive Information
Select The Drives
Create Pass Through Disk
Select The Drives
SCSI Channel, SCSI ID, SCSI LUN, Cache Mode, Tag Queuing, Max Sync Rate
Modify Pass Through Disk
Select The Drives
SCSI Channel, SCSI ID, SCSI LUN, Cache Mode, Tag Queuing, Max Sync Rate
Delete Pass Through Disk
Select The Drives
Delete Pass Through
Yes, No
Are you sure?
Yes, No
Identify Selected Drive
Select The Drives
Raid System Function
Mute The Alert Beeper
Yes, No
Alert Beeper Setting
Disabled, Enabled
Save The Settings
Yes, No
Change Password
Enter New Password
Re-Enter Password
Save The Password
Yes, No
JBOD / RAID Function
RAID, JBOD
Configured AS JBOD?
Yes, No
Are you sure?
Yes, No
Background Task Priority
UltraLow(5%), Low(20%), Medium(50%),High(80%)
Save The Settings
Yes, No
Maximum SATA Mode
SATA150, SATA150+NCQ, SATA300, SATA300+NCQ
HDD Read Ahead Cache
Enable, Disable Maxtor, Disable
Stagger Power on
0.4, 0.7, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0
HDD SMART status polling
Enabled, Disabled
Disk Write Cache Mode
Auto, Enabled, Disabled
Capacity Truncation
To Multiples of 10G, To Multiples of 1G, Disabled
Terminal Port Config
Baud Rate
1200,2400,4800,9600, 19200,38400,57600,115200
Stop Bits
1 bit, 2 bits
Update Firmware
Restart Controller
Yes, No
Are you sure?
Yes, No


U320 SCSI Target Config
Channel 0 QAS
Enabled, Disabled
Auto Speed Down
Enabled, Disabled
Two TB CDB Select
12bytes CDB, 16bytes CDB
Ethernet Configuration
DHCP Function
Disabled, Enabled
Local IP Address
HTTP Port Number: 80
Telnet Port Number: 23
SMTP Port Number: 25
View System Events
Show System Events
Clear Event Buffer
Clear Event Buffer
Yes, No
Hardware Monitor
The Hard Monitor Information
System Information
The System Information

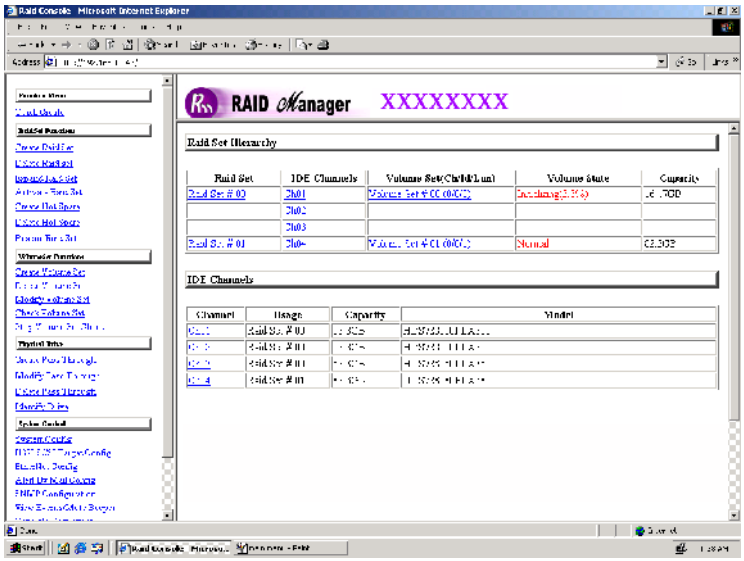
3.4 Web browser-based Remote RAID management via R-Link ethernet port

Configuration of the internal RAID subsystem with remote RAID management is a web browser-based application, which utilizes the browser installed on your operating system. Web browser-based remote RAID management can be used to manage all the raid function.

To configure internal 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 “enable”. You can configure 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”.



Main Menu

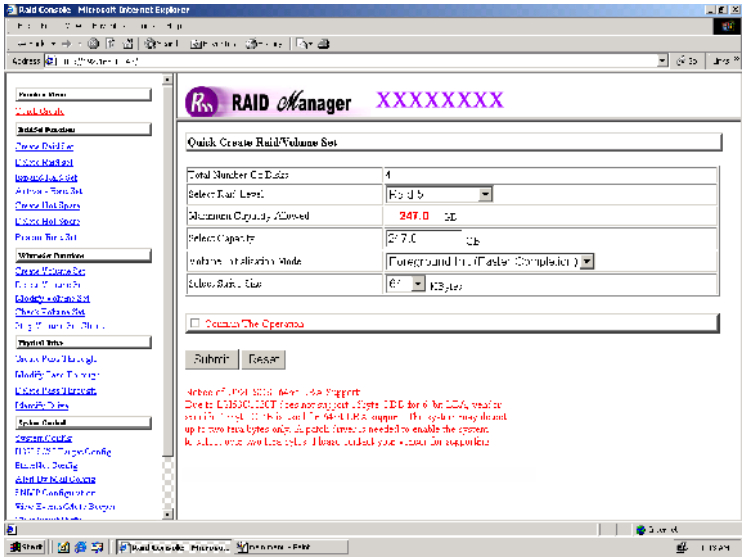
The main menu shows all function that enables the customer to execute actions by clicking on the appropriate link.

Individual Category	Description
Quick Create	Create a RAID configuration, which is consist of the number of physical disk installed; it can modify the volume set Capacity, Raid Level, and Stripe Size.
Raid Set Functions	Create a customized raid set.
Volume Set Functions	Create customized volume sets and modify the existed volume sets parameter.
Physical Drive	Create pass through disks and modify the existed pass through drives parameter. It also provides the function to identify the respect disk drive.
System Control	Setting the raid system configurations
Information	View the controller and hardware monitor information. The Raid Set Hierarchy can also view through the RaidSet 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 with 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.

If volume size over 2TB, it will be provided one option “Creater TwoTB Volume Support” Automatically as above menu. There are three model for option “No” , “64bit LBA” , “For Windows”.

Greater Two TB Volume Support:

No: still keep the volume size with max. 2TB limitation.

64bit LBA: the max. size 512TB.

For Windows: the max. size 16TB , just use with " basic disk manager " under OS Window 2000, 2003 or XP. Noted that can't be used by with dynamic disk manager.

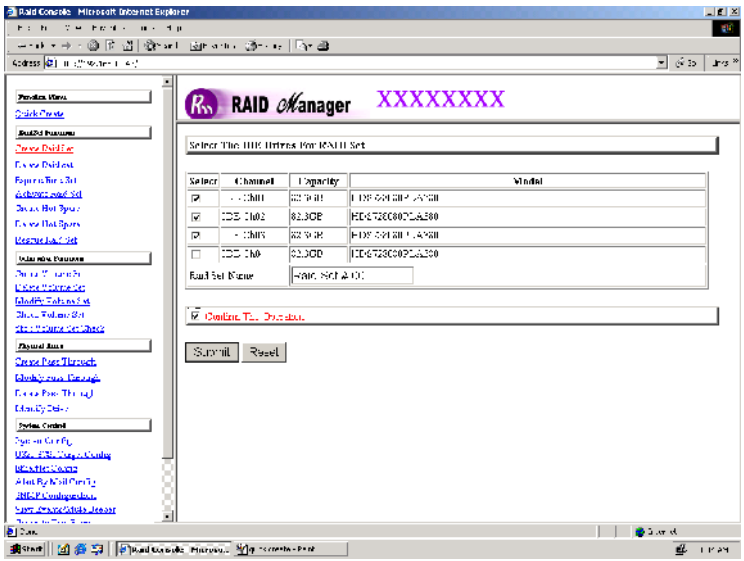
Tick on the **Confirm The Operation** and click on the **Submit** button in the Quick Create screen, the raid set and volume set will start to initialize.

Note: In Quick Create your volume 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 system.

3.6 Raid Set Functions

Use the Raid Set Function and Volume Set Function if you prefer to customize your system. User manual configuration can full control of the raid set setting, but it will take longer to complete than the Quick Volume/Raid Setup configuration. Select the Raid Set Function to manually configure the raid set for the first time or deletes existing raid set and reconfigures the raid set. A raid set is a group of disks containing one or more volume sets. 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



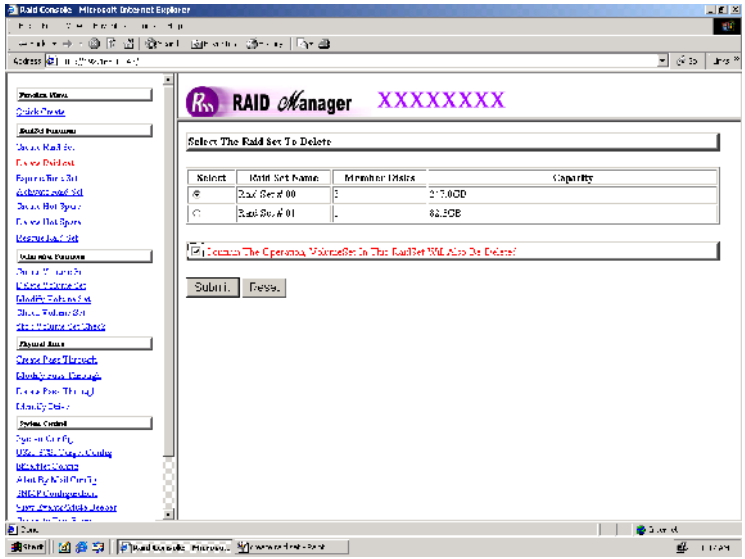
To create a raid set, click on the **Create Raid Set** link. A "*Select The IDE Drive For RAID Set"* screen is displayed showing the IDE drive connected to the current controller. Click on the selected physical drives with the current raid set. Enter 1 to 15 alphanumeric characters to define a unique identifier for a raid set. The default raid set name will always appear as Raid Set. #.

Tick on the **Confirm The Operation** and click on the **Submit** button in the screen, the raid set will start to initialize.

3.6.2 Delete Raid Set

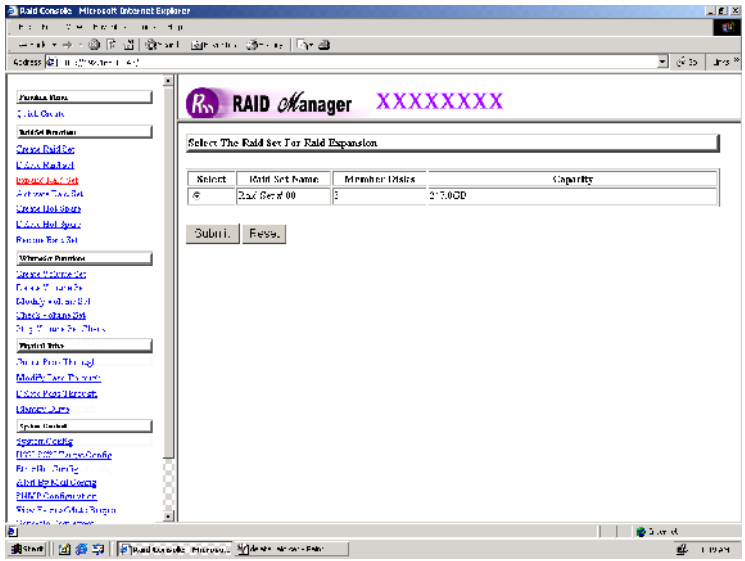
To delete a raid set, click on the **Delete Raid Set** link**.** A "*Select The RAID SET To Delete" screen* is displayed showing all raid set existing in the current controller. Click the raid set number you which to delete in the select column to delete screen.

Tick on the **Confirm The Operation** and click on the **Submit** button in the screen to delete it.



3.6.3 Expand Raid Set

Use this option to expand a raid set, when a disk is added to your system. This function is active when at least one drive is available.



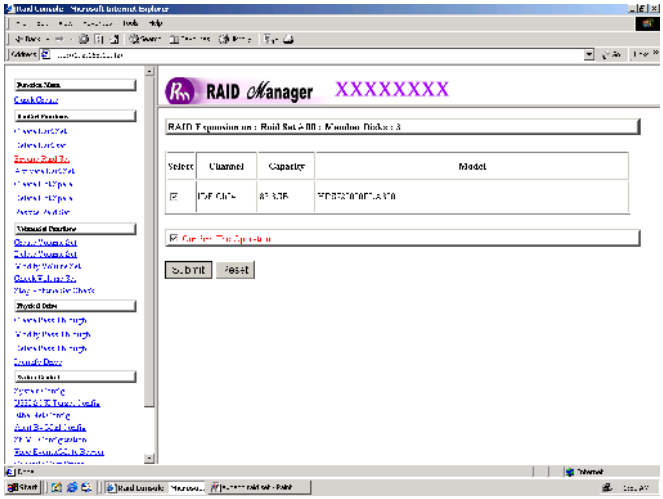
To expand a raid set, click on the **Expand Raid Set** link. Select the target raid set, which you want to expand it.

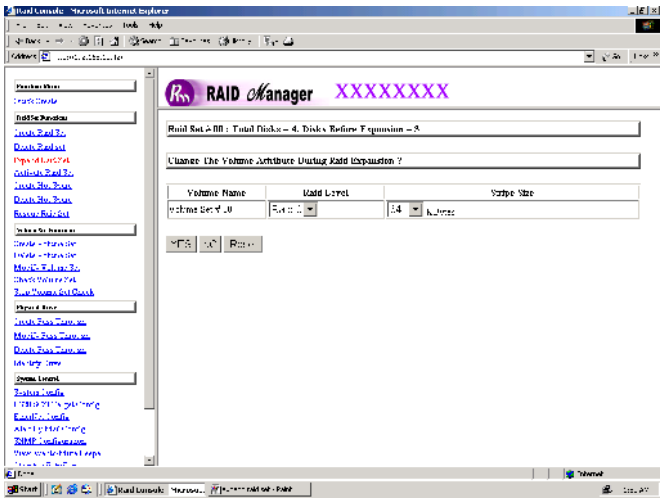
Tick on the available disk and **Confirm The Operation**, and then click on the **Submit** button in the screen to add disks to the raid set.

Note:

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

2. 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 completes.



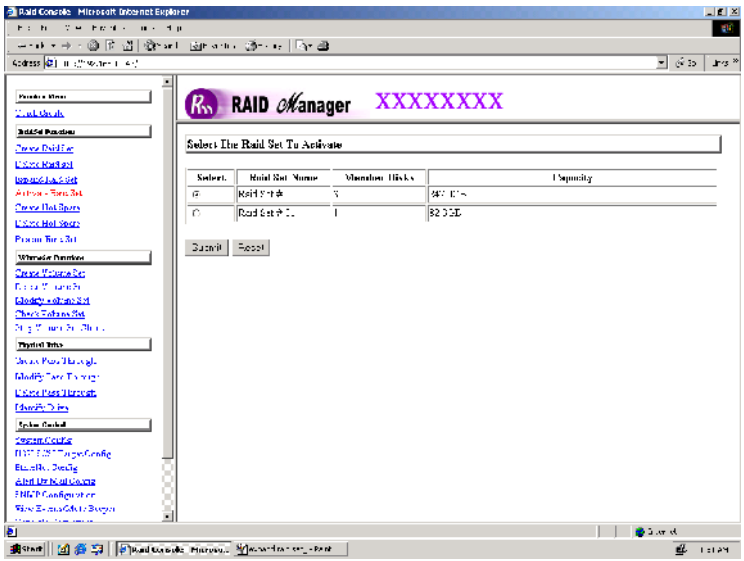


Migrating occurs when a disk is added to a raid set. Migration status is displayed in the raid status area of the Raid Set information when a disk is added to a raid set. Migrating status is also displayed in the associated volume status area of the volume set Information when a disk is added to a raid set.

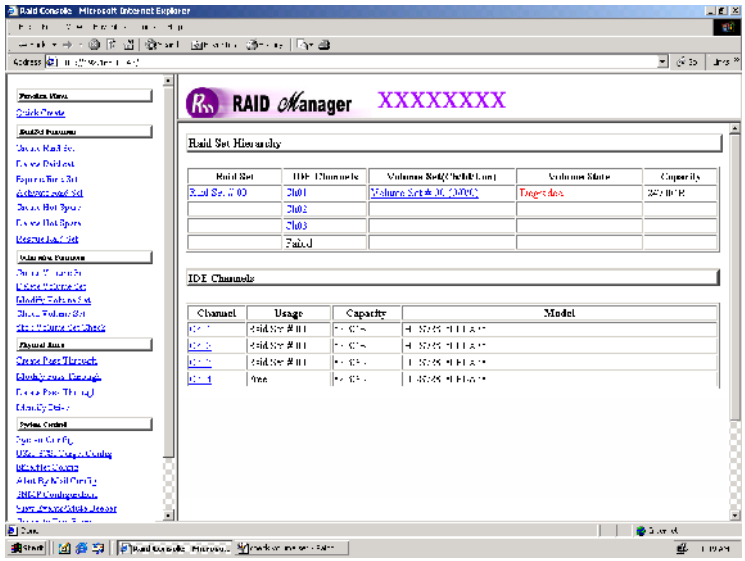
3.6.4 Activate Incomplete Raid Set

When one of the disk drive is removed in power off state, the raid set state will change to Incomplete State. If user wants to continue to work, when the RAID subsystem is power on. User can use the Activate Raid Set option to active the raid set. After user complete the function, the Raid State will change to Degraded Mode.

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 raid set existing in the current controller. Click the raid set number you which to activate in the select column.



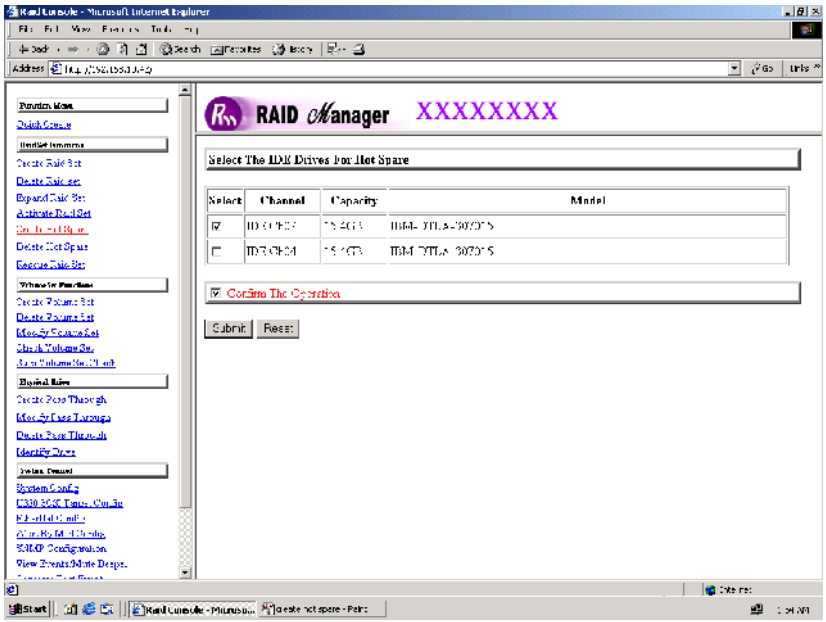
Click on the **Submit** button in the screen to activate the raid set that has removed one of disk drive in the power off state. The RAID subsystem will continue to work in degraded mode.



3.6.5 Create Hot Spare

When you choose the **Create Hot Spare** option in the Raid Set Function, all unused physical devices connected to the current controller appear: Select the target disk by clicking on the appropriate check box. Tick on the **Confirm The Operation**, and click on the **Submit** button in the screen to create the hot spares.

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



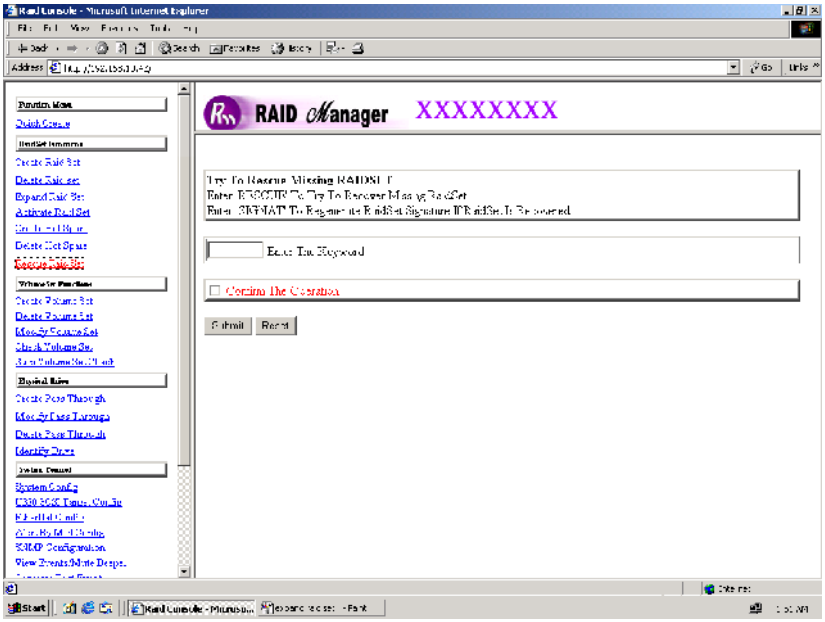
3.6.6 Delete Hot Spare

Select the target Hot Spare disk to delete by clicking on the appropriate check box.

Tick on the **Confirm The Operation**, and click on the **Submit** button in the screen to delete the hot spares.

3.6.7 Rescue Raid Set

If you try to Rescue Missing RAID Set, please contact our engineer for assistance.



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 disk 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

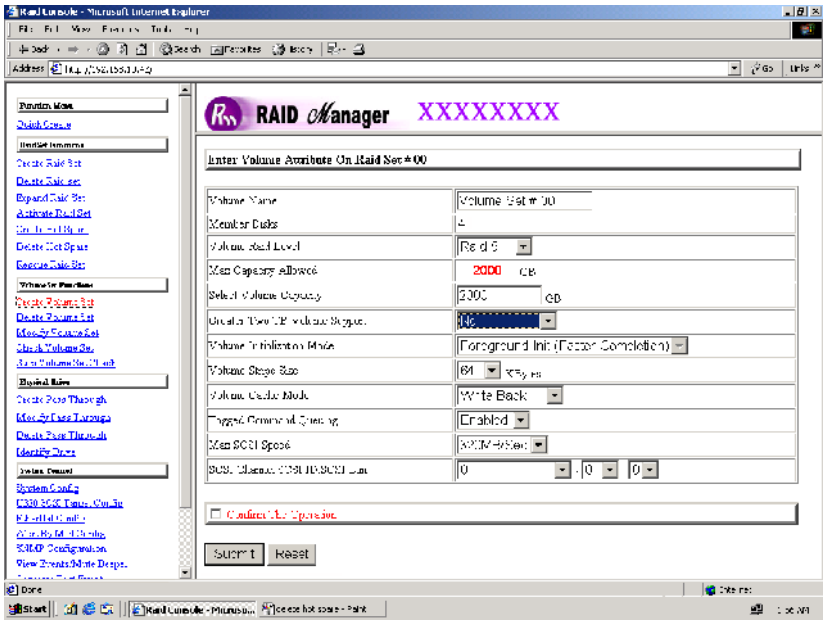
The following is the volume set features:

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.

To create volume set from raid set system, move the cursor bar to the main menu and click on the **Create Volume Set** link. The **Select The Raid Set To Create On It** screen will show all raid set number. **Tick** on a raid set number that you want to create and then **click** on the Submit button.

The new create volume set allows user to select the Volume name, capacity, RAID level, strip size, SCSI ID/LUN, Cache mode, tag queuing and Max Sync Rate.



Volume Name:

The default volume name will always appear as Volume Set. #. You can re-name the volume set name providing it does not exceed the 15 characters limit.

Raid Level:

Set the RAID level for the Volume Set. Highlight *Raid Level* and press **Enter**.

The available RAID levels for the current Volume Set are displayed. Select a RAID level and press **Enter** to confirm.

Capacity:

The maximum volume size is default in the first setting. Enter the appropriate volume size to fit your application.

Greater Two TB Volume Support: If volume size over 2TB, it will be provided one option “Creater TwoTB Volume Support” Automatically.

No: still keep the volume size with max. 2TB limitation.

64bit LBA: the max. size 512TB, for Unix or Linux.

Due to LSI53C1030T does not support 16byte CDB for 64bit LBA, vendor specific 12byte CDB is used for 64bit LBA support. The system may detect up to two tera bytes only. A patch driver is needed to enable the system to detect over two tera bytes. Please contact your vendor for supporting.

For Windows: the max. size 16TB , just use with " basic disk manager " under OS Window 2000, 2003 or XP. Noted that can't be used by with dynamic disk manager.

Initialization Mode:

Set the Initialization Mode for the Volume Set. Foreground mode is faster completion and background is instant available.

Strip Size:

This parameter sets the size of the stripe written to each disk in a RAID 0, 1, 0+1, 5, or 6 logical drive. 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 your computer does mostly sequential reads. However, if you are sure that your computer does random reads more often, select a small stripe size

Note: RAID level 3 can't modify strip size.

Cache Mode:

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

Tag Queuing:

The Enabled option is useful for enhancing overall system performance under multi-tasking operating systems. The Command Tag (Drive Channel) function controls the SCSI command tag queuing support for each drive channel. This function should normally remain enabled. Disable this function only when using older SCSI drives that do not support command tag queuing

Max SCSI Speed:

The RAID subsystem supports 320 MB/sec as the highest data transfer rate.

SCSI Channel/SCSI ID/SCSI Lun:

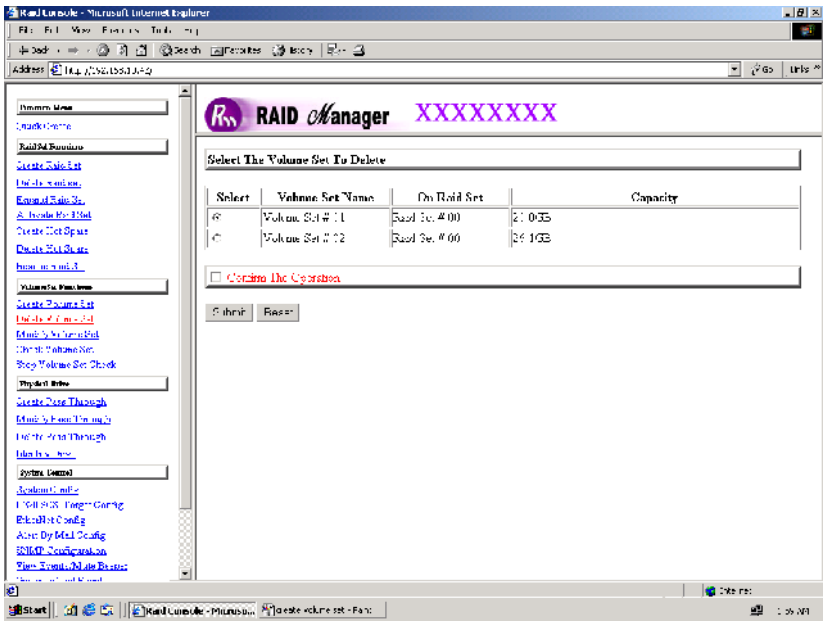
SCSI Channel: The RAID subsystem supports one SCSI Channel.

SCSI ID: Each SCSI device attached to the SCSI card, as well as the card itself, must be assigned a unique SCSI ID number. A Wide SCSI channel can connect up to 15 devices. The RAID subsystem is as a large SCSI device. We should assign an ID from a list of SCSI IDs.

SCSI LUN: Each SCSI ID can support up to 8 LUNs. Most SCSI host adapter treats each LUN like a SCSI disk.

3.7.2 Delete Volume Set

To delete Volume from raid set system function, move the cursor bar to the main menu and click on the **Delete Volume Set** link. The **Select The Volume Set To Delete** screen will show all raid set number. **Tick** on a raid set number and the Confirm The Operation and then **click** on the Submit button to show all volume set item in the selected raid set. **Tick** on a volume set number and the Confirm The Operation and then **click** on the **Submit** button to delete the volume set.



3.7.3 Modify Volume Set

To modify a volume set from a raid set:

(1). Click on the **Modify Volume Set** link.

(2). Tick on the volume set from the list that you wish to modify. Click on the **Submit** button.

The following screen appears.

Use this option to modify volume set configuration. To modify volume set attribute values from raid set system function, move the cursor bar to the volume set attribute menu and click on it. The modify value screen appears. Move the cursor bar to an attribute item, and then click on the attribute to modify the value. After you complete the modification, tick on the **Confirm The Operation** and click on the **Submit** button to complete the action. User can modify all values except the capacity.

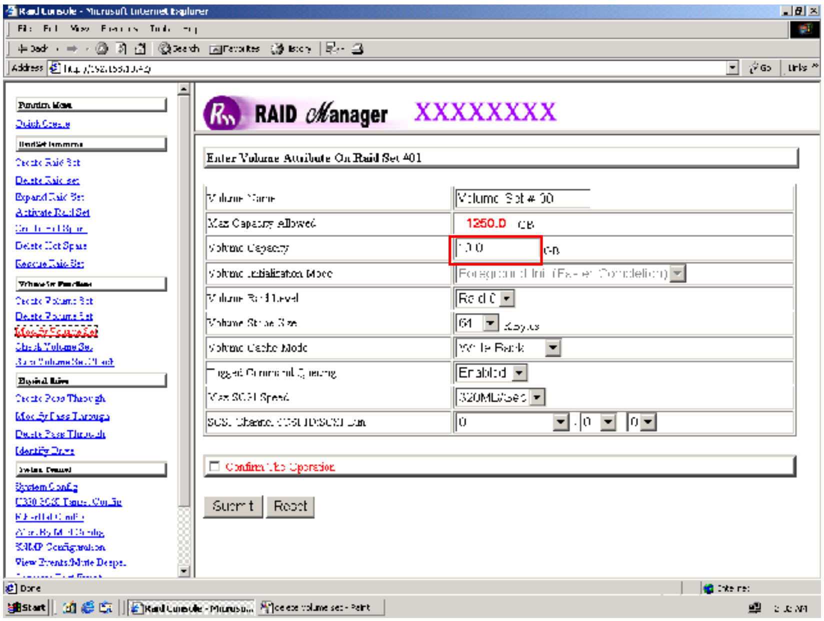
3.7.3.1 Volume Expansion

Volume Capacity (Logical Volume Concatenation Plus Re-stripe)

Use this raid set expands to expand a raid set, when a disk is added to your system. (refer to section 3.6.3)

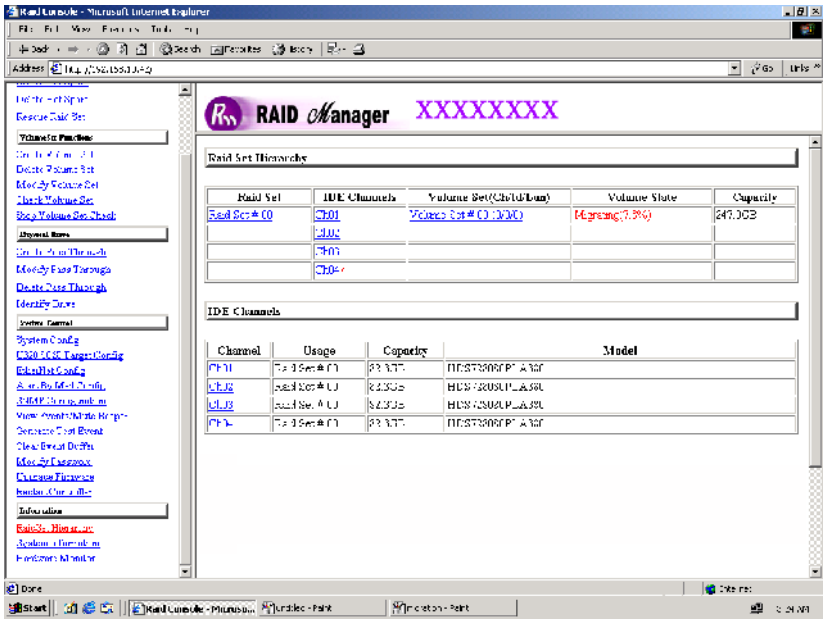
The expand capacity can use to enlarge the volume set size or create another volume set. The modify volume set function can support the volume set expansion function. To expand volume set capacity value from raid set system function, move the cursor bar to the volume set **Volume capacity** item and entry the capacity size.

Tick on the **Confirm The Operation** and click on the **Submit** button to complete the action. The volume set start to expand.


RAID Manager
XXXXXXXX
Enter Volume Attribute On Raid Set #01
Volume Name
Volume Set # 00
Max Capacity Allowed
1250.0
Volume Capacity
Volume Initialization Mode
Volume Raid Level
Volume Stripe Size
Volume Cache Mode
Tagged Command Queuing
Enabled
Max SCSI Speed
Confirm The Operation
Submit
Reset

3.7.4 Volume Set Migration

Migrating occurs when a volume set is migrating from one RAID level to another, a volume set strip size changes, or when a disk is added to a raid set. Migration status is displayed in the volume status area of the RaidSet Hierarchy screen when one RAID level to another, a Volume set strip size changes or when a disk is added to a raid set.



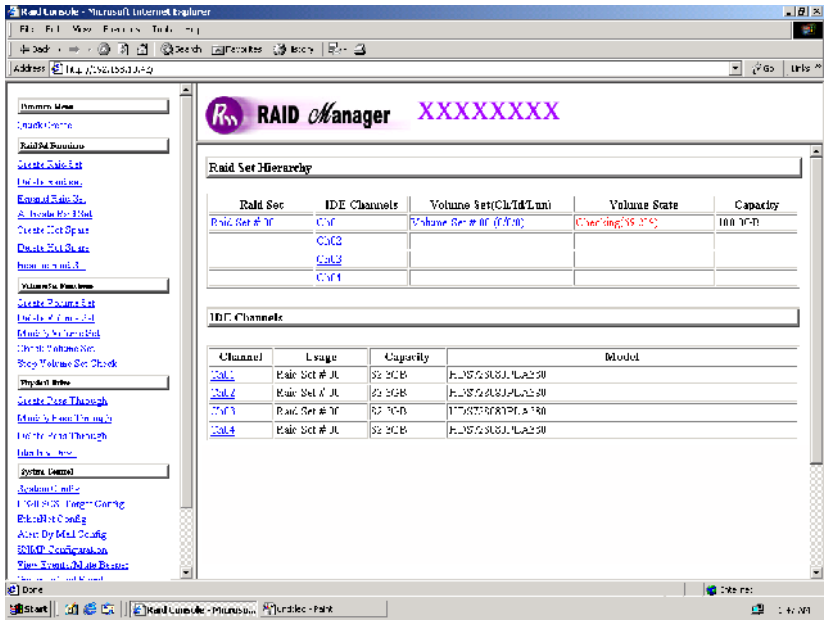
3.7.5 Check Volume Set

To check a volume set from a raid set:

(1). Click on the **Check Volume Set** link.

(2). **Tick** on the volume set from the list that you wish to check. Tick on Confirm The Operation and click on the **Submit** button.

Use this option to verify the correctness pf the redundant data in a volume set. For example, in a system with dedicated parity, volume set check means computing the parity of the data disk drives and comparing the results to the contents of the dedicated parity disk drive. The checking percentage can also be viewed by clicking on RaidSet Hierarchy in the main menu.



3.7.6 Stop VolumeSet Check

Use this option to stop the Check Volume Set function.

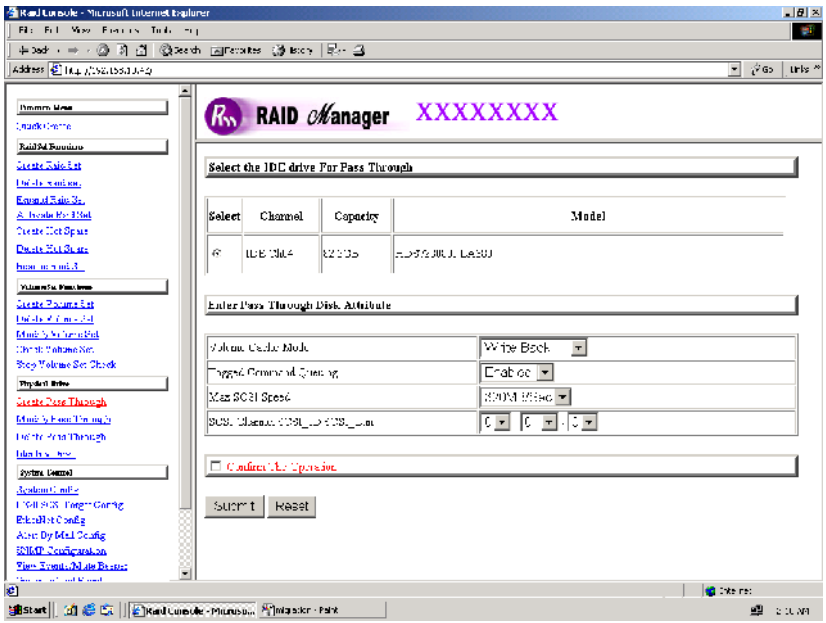
3.8 Physical Drive

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

3.8.1 Create Pass-Through Disk

To create pass-through disk, move the mouse cursor to the main menu and click on the **Create Pass-Through** link. The relative setting function screen appears.

Disk is no controlled by the internal RAID subsystem firmware and thus cannot be a part of a volume set. The disk is available to the operating system 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. User can also select the cache mode, Tagged Command Queuing, Max SCSI speed and SCSI channel/ SCSI_ID/SCSI_LUN for this volume.

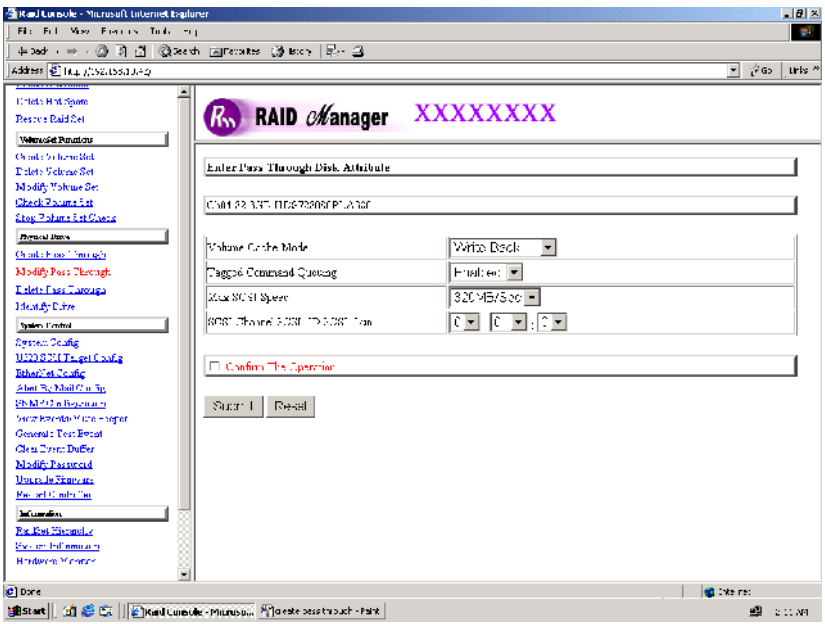


3.8.2 Modify Pass-Through Disk

Use this option to modify the Pass-Through Disk Attribute. User can modify the cache mode, Tagged Command Queuing, Max SCSI speed and SCSI channel/ ID/LUN on an existed pass through disk.

To modify the pass-through drive attribute from the pass-through drive pool, move the mouse cursor bar to click on **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 drive.

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



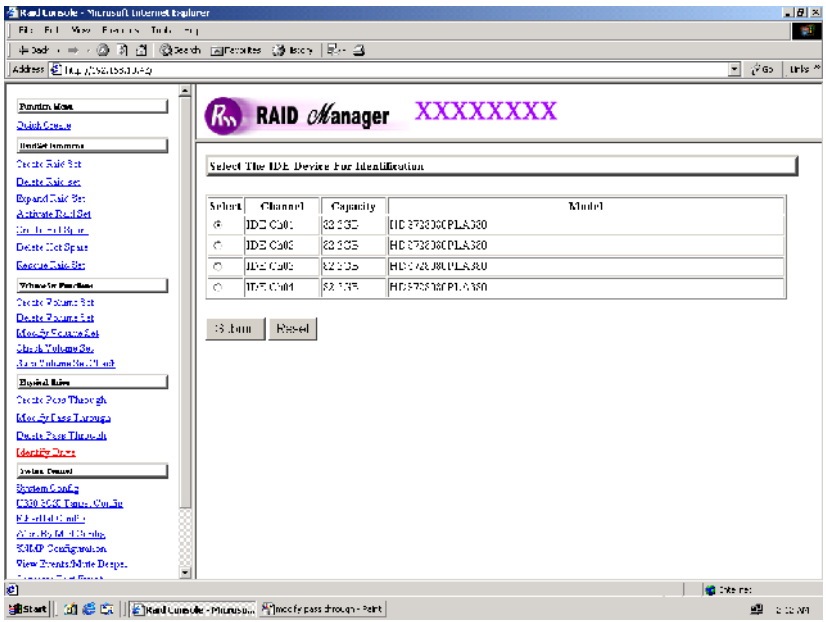
3.8.3 Delete Pass-Through Disk

To delete pass-through drive from the pass-through drive pool, move the mouse cursor bar to the main menus and click on **Delete Pass Through** link. After you complete the selection, tick on the **Confirm The Operation** and click on the **Submit** button to complete the delete action.

3.8.4 Identify Selected Drive

To prevent removing the wrong drive, the selected disk LED will light for physically locating the selected disk when the *Identify Selected Drive* is selected.

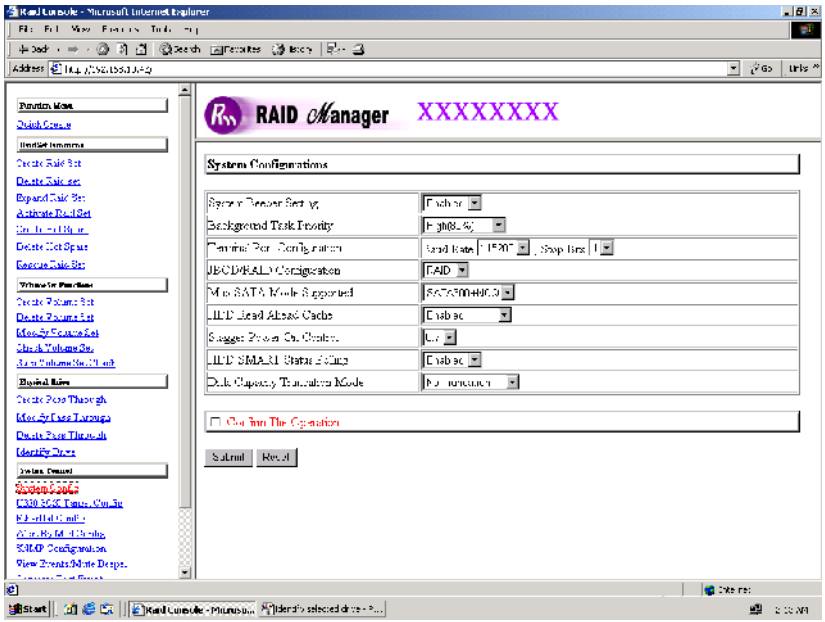
To identify the selected drive from the drives pool, move the mouse cursor bar to click on **Identify Selected Drive** link. The Select The IDE Device For identification screen appears tick on the IDE device from the drives pool and Flash method. After completing the selection, click on the **Submit** button to identify selected drive.



3.9 System Configuration

3.9.1 System Configuration

To set the raid system function, move the cursor bar to the main menu and click on he **Raid System Function** link. The Raid System Function menu will show all items. Select the desired function.



System Beeper Setting:

The Alert Beeper function item is used to Disabled or Enable the RAID sub-system controller alarm tone generator.

RAID Rebuild Priority:

The Raid Rebuild Priority is a relative indication of how much time the controller devotes to a rebuild operation. The RAID subsystem allows user to choose the rebuild priority (ultraLow, Low, Medium, High) to balance volume set access and rebuild tasks appropriately. For high array performance, specify a Low value.

Terminal Port Configuration:

Speed setting values are 1200, 2400, 4800, 9600, 19200,38400, 57600, and 115200.

Stop Bits values are 1 bit and 2 bits.

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 8 SATA drive channel can support up to SATA ll, 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.

HDD Read Ahead Cache:

This option allows the users to disable the cache of the HDDs on the RAID subsystem. To some HDD models, disabling the cache in the HDD is necessary to prove the RAID subsystem functions correctly.

Stagger Power On Control:

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

HDD SMART Status Polling:

The RAID subsystem can read HDD temperature information through the SMART function. This option allows the users to enable the repeat to scan the HDD temperature. This function is default enabled.

Disk Capacity Truncation Mode:

This RAID subsystem use drive truncation so that drives from differing 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.

Multiples Of 10G: If you have 120 GB drives from different vendors; chances are that the capacity varies slightly. For example, one drive might be 123.5 GB, and the other 120 GB. This drive Truncation mode **Multiples Of 10G** uses the same capacity for both of these drives so that one could replace the other.

Multiples Of 1G: If you have 123 GB drives from different vendors; chances are that the capacity varies slightly. For example, one drive might be 123.5 GB, and the other 123.4 GB. This drive Truncation mode **Multiples Of 1G** uses the same capacity for both of these drives so that one could replace the other.

No Truncation: It does not truncate the capacity.

3.9.2 U320 SCSI Target Config

To set the U320 SCSI Target function, move the cursor bar to the main menu and click on the **U320 SCSI Target Config**.

Channel 0 QAS:

The Enabled option supports Quick Arbitration and Selection (QAS). QAS reduces the overhead of control release on the SCSI bus from one device to another. This improvement reduces command overhead and maximizes bus utilization. Select the desired function.

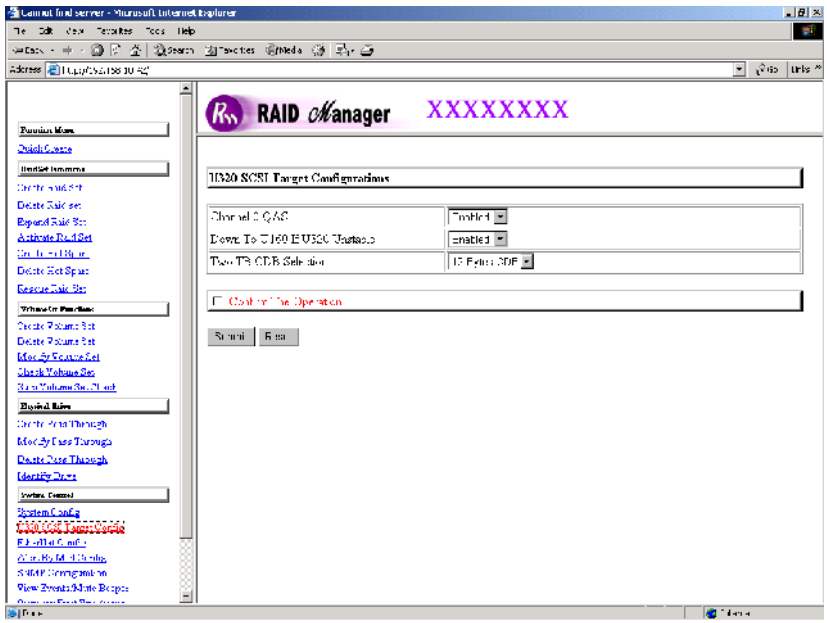
Down To U160 IF U320 Unstable:

When Ultra320 signal transfer quality becomes terrible or bad, the RAID subsystem will auto-speed down the transfer rate to Utra160 from Ultra320 in order to keep the data transfer from being broken due to bad or poor SCSI signal transfer quality.

Two TB CDB Selection:

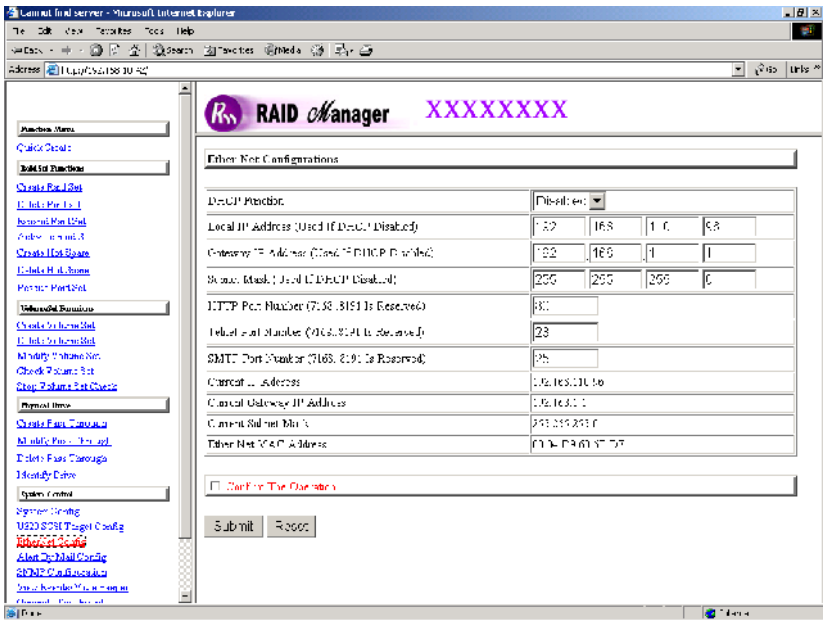
12 Bytes CDB allows the RAID subsystem to support Over-2TB under Windows Server 2003 (Must pre-install SP1 and driver) and Linux (Must pre-install Linux patch).

16Bytes CDB allows the RAID subsystem to fully support Over-2TB without any extra files or drivers pre-installed under Linux and Windows. (Must use U320 and could not down to U160 if U320 unstable)



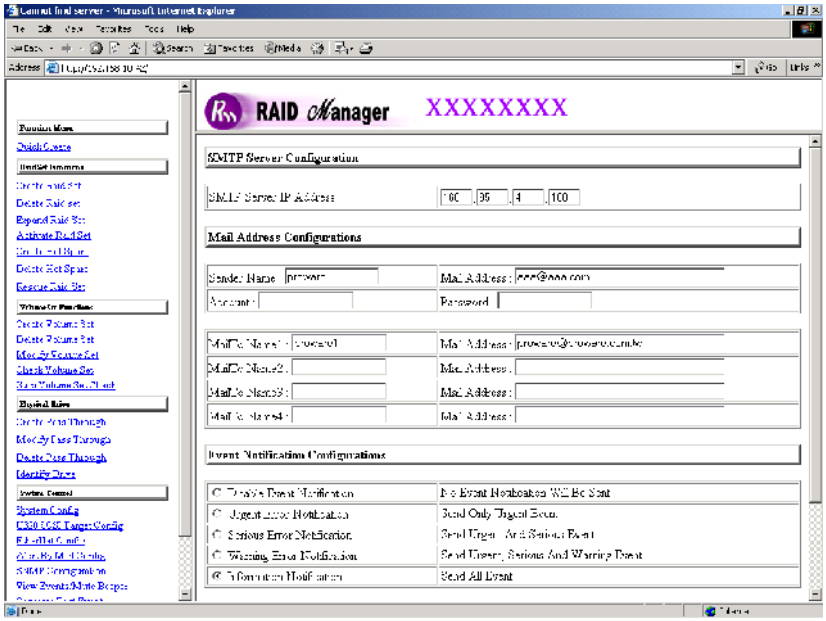
3.9.3 EtherNet Config

To set the EtherNet function, move the cursor bar to the main menu and click on he **EtherNet Config**. The Raid System EtherNet Function menu will show all items. Select the desired function.



3.9.4 Alert By Mail Config

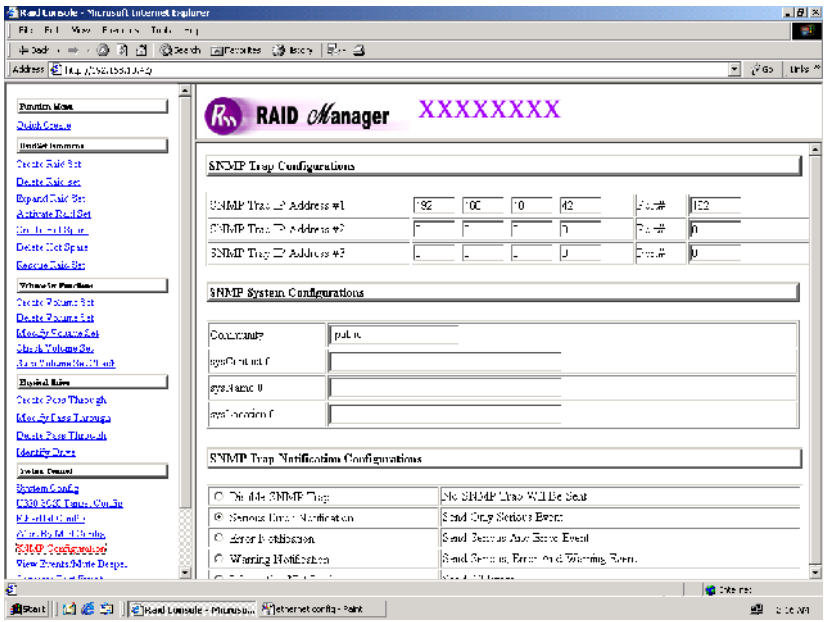
To set the Event Notification function, move the cursor bar to the main menu and click on the **Alert By Mail Config**. The Raid System Event Notification Function menu will show all items. Select the desired function. When an abnormal condition occurs, an error message will be email to administrator that a problem has occurred. Events are classified to 4 levels (urgent, serious, warning, message).



3.9.5 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 bar to the main menu and click on he **SNMP Configuration**. The Raid System SNMP Function menu will show all items. Select the desired function.



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

SNMP System Configuration:

Community: The default is Public.

(1)sysContact.0; (2)sysLocation.0; (3)sysName.0: SNMP parameter (31 bytes max). If this 3 categories are selected during initial setting then 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. Once this setting is done, alert by mail configuration will also work in the same way.

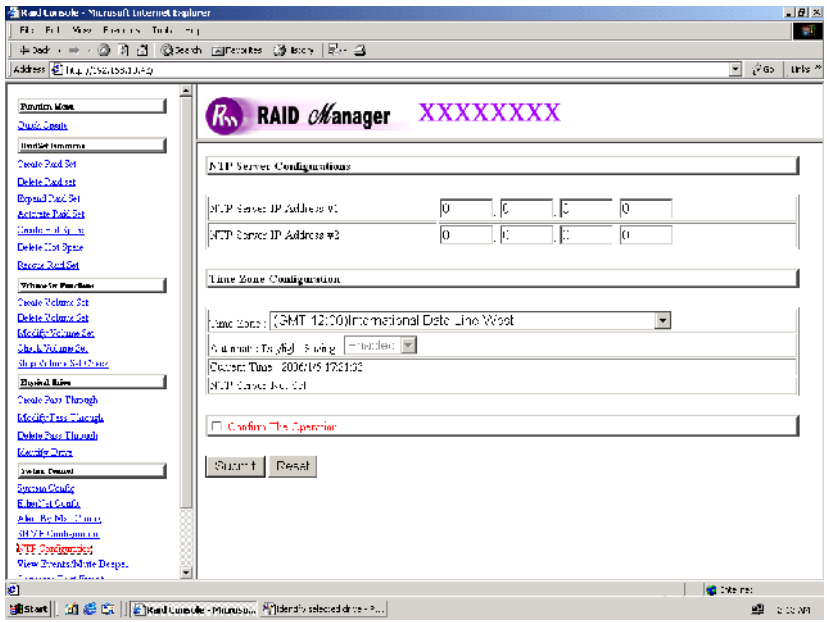
SNMP Trap Notification Configurations: Select the desired function.

After you complete the addition, tick on the **Confirm The Operation** and click on the **Submit** button to complete the action.

3.9.6 NTP Configuration

NTP stands for *Network Time Protocol*, and it is an *Internet* protocol used to synchronize the clocks of computers to some time reference. NTP is an *Internet* standard protocol. You can directly type your NTP Server IP Address to have the RAID subsystem can work with it.

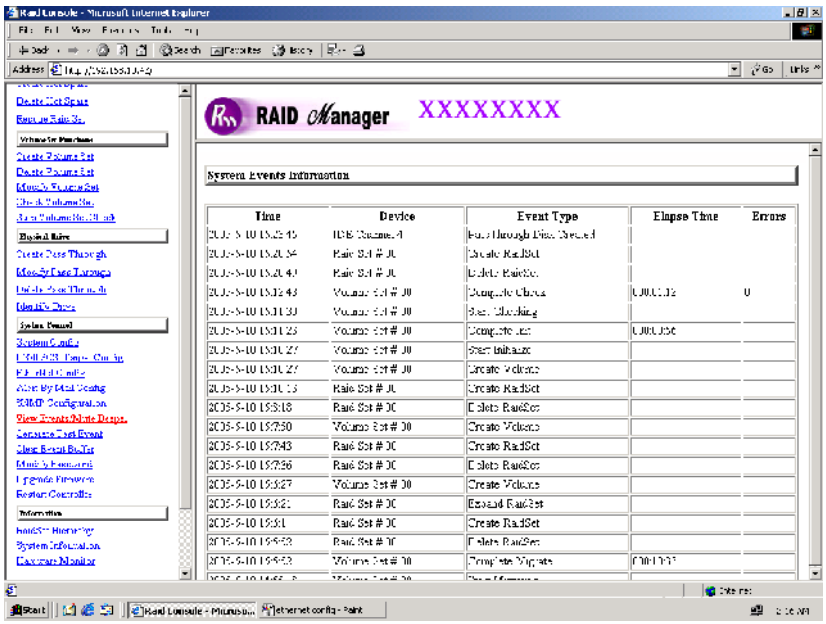
To set the NTP function, move the cursor bar to the main menu and click on he **NTP Configuration**. The Raid System NTP Function menu will show all items. Select the desired function.



3.9.7 View Events

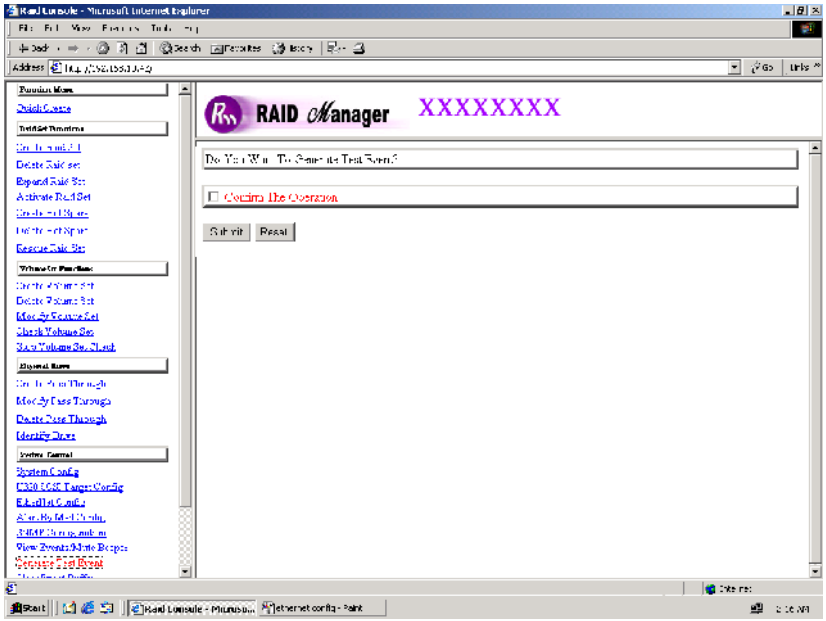
To view the RAID subsystem controller's information, move the mouse cursor to the main menu and click on the **System Information** link. The Raid Subsystem events Information screen appears.

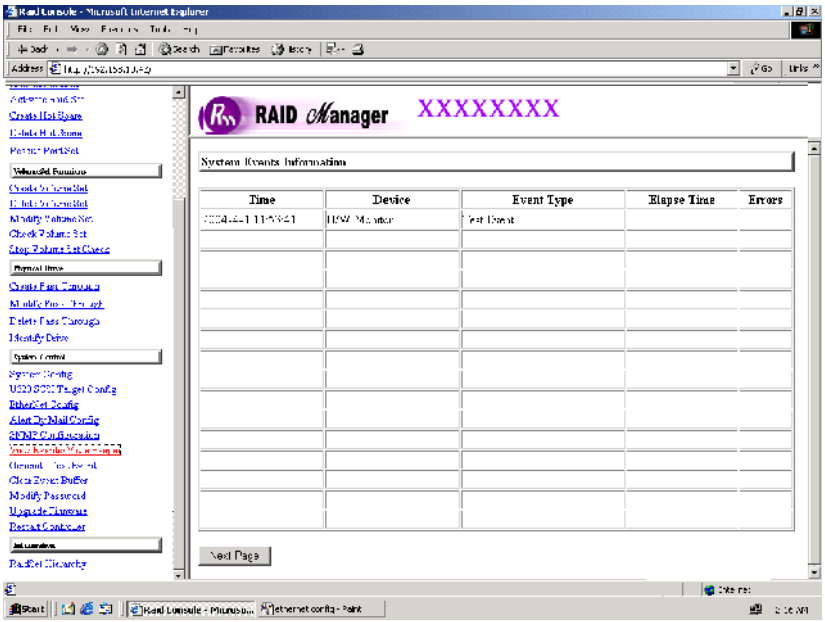
Choose this option to view the system events information: Time, Device, Event type, Elapse Time and Errors. The RAID system does not built the real time clock. The Time information is the relative time from the client machine power on.



3.9.8 Generate Test Events

If you want to generate test events, move the cursor bar to the main menu and click on he **Generate Test Events**. Tick on the **Confirm The Operation**, and click on the **Submit** button in the screen to create the hot spares. Then click on the **View Events/Mute Beeper** to view the test event.





3.9.9 Clear Events Buffer

Use this feature to clear the entire events buffer information.

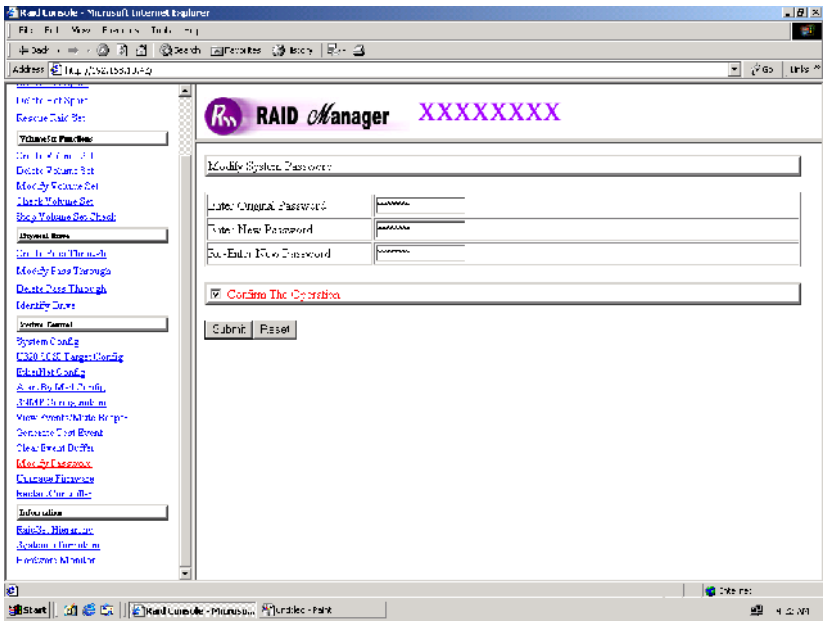
3.9.10 Modify Password

To set or change the RAID subsystem password, move the mouse cursor to **Raid System Function** screen, and click on the **Change Password** link. The Modify System Password screen appears.

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 internal RAID subsystem from unauthorized entry. 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 ten seconds.

To disable the password, press **Enter** key only in both the **Enter New Password** and **Re-Enter New Password** column. Once the user confirms the operation and clicks the **Submit** button. The existing password will be cleared. No password checking will occur when entering the main menu from the starting screen.



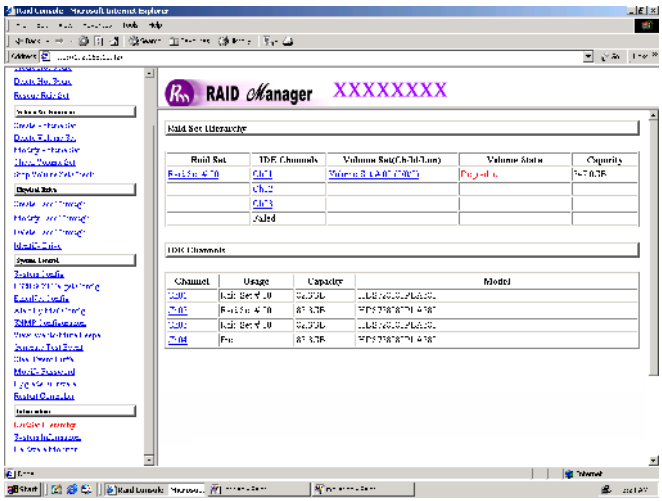
3.9.11 Upgrade Firmware

Please reference the section 4.2 for more information.

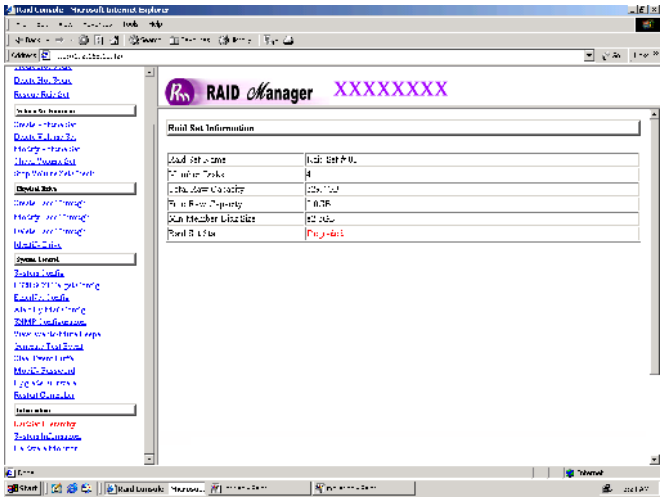
3.10 Information Menu

3.10.1 RaidSet Hierarchy

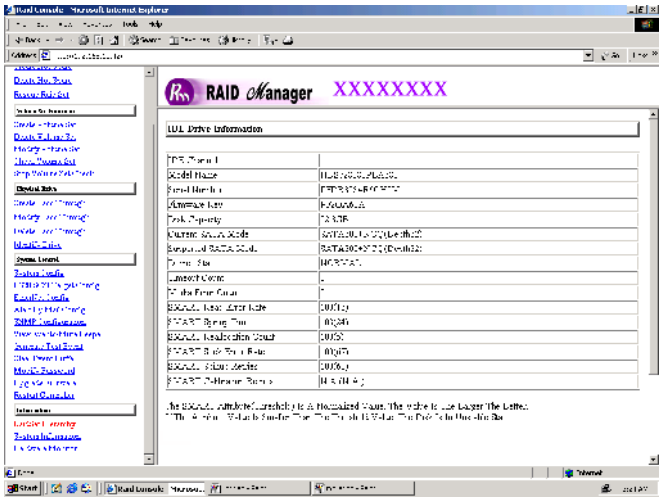
Use this feature to view the internal raid subsystem current raid set, current volume set and physical disk configuration.



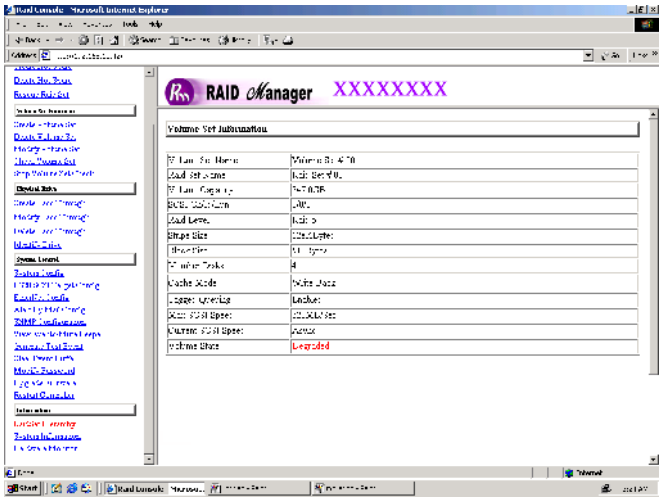
To view the raid set information, move the mouse cursor to the right column and click on the **Raid Set #** link. The Raid Set Information screen appears.



To view the disk information, move the mouse cursor to the right column and click on the **CH #** link. The Disk Information screen appears. The SMART Attribute (Threshold) Is A Normalized Value, The Value Is The Larger The Better. If The Attribute Value Is Smaller Than The Threshold Value, The Disk Is In Unstable State.

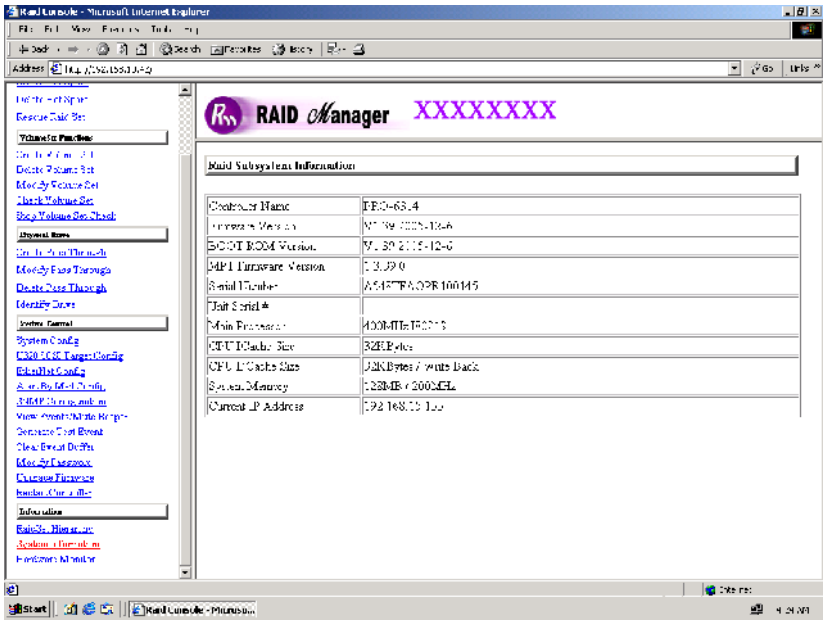


To view the volume set information, move the mouse cursor to the right column and click on the **Volume Set #** link. The Volume Set Information screen appears.



3.10.2 System Information

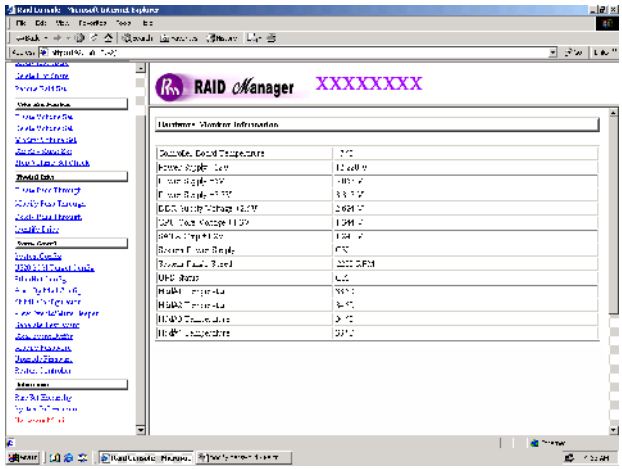
To view the RAID subsystem controller's information, move the mouse cursor to the main menu and click on the **System Information** link. The Raid Subsystem Information screen appears.



Use this feature to view the raid subsystem controller's information. 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 controller's hardware monitor information, move the mouse cursor to the main menu and click the **Hardware Monitor** link. The Hardware Information screen appears.



The Hardware Monitor Information provides the temperature, fan speed (chassis fan) and voltage of the internal RAID subsystem. All items are also unchangeable. The warning messages will indicate through the LCD, LED and alarm buzzer.

Item	Warning Condition
Controller Board Temperature	**> 60 Celsius**
HDD Temperature	**> 60 Celsius**
System Fan Speed	**< 1900 RPM**
Power Supply +12V	**< 10.8V or > 13.2V**
Power Supply +5V	**< 4.75V or > 5.25V**
Power Supply +3.3V	**< 3.135V or > 3.465V**
DDR Supply Voltage +2.5V	**< 2.375V or > 2.625V**
CPU Core Voltage +1.3V	**< 1.235V or > 1.365V**
SATA Chip +1.2V	**< 1.14V or > 1.26V**

3.11 Creating a New RAID or Reconfiguring an Existing RAID

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 spares/pass-through (optional).
2	Choose a configuration method.
3	Create raid set using the available physical drives.
4	Define volume set using the space in the raid set.
5	Initialize the volume set and use volume set in the HOST OS.

Chapter 4

Array Maintenance

This chapter describes more information about your Disk Array. The following items are describes in detail.

- ***Updating Firmware***

4.1 Upgrading the Firmware

Upgrading Flash Firmware Programming Utility

Since the RAID subsystem controller features flash firmware, it is not necessary to change the hardware flash chip in order to upgrade the RAID firmware. The user can simply re-program the old firmware through the RS-232 port. New releases of the firmware are available in the form of a DOS file at OEM'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 drive A or C.

Establishing the Connection for the RS-232

The firmware can be downloaded to the RAID subsystem controller by using an ANSI/VT-100 compatible terminal emulation program or Remote web browser management. You must complete the appropriate installation procedure before proceeding with this firmware upgrade. Whichever terminal emulation program is used must support the ZMODEM file transfer protocol.

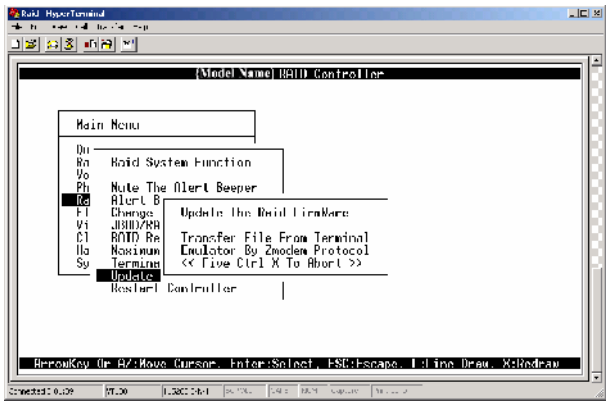
Configuration of the internal RAID subsystem web browser-based remote RAID management. Web browser-based RAID management can be used to update the firmware. You must complete the appropriate installation procedure before proceeding with this firmware upgrade.

Upgrading Firmware Through ANSI/VT-100 Terminal Emulation

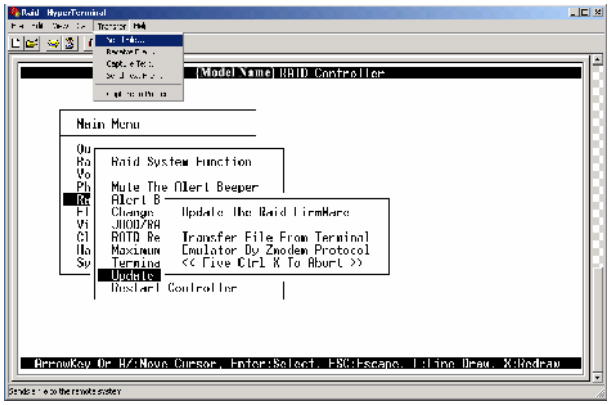
Get the new version firmware for your RAID subsystem controller. For Example, download the bin file from your OEM's web site onto the c:

1. From the Main Menu, scroll down to "Raid System Function"

2. Choose the "Update Firmware", The Update The Raid Firmware dialog box appears.



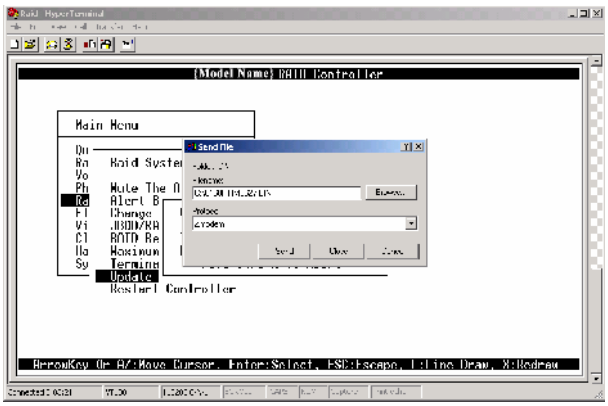
3. Go to the tool bar and select Transfer. Open Send File.



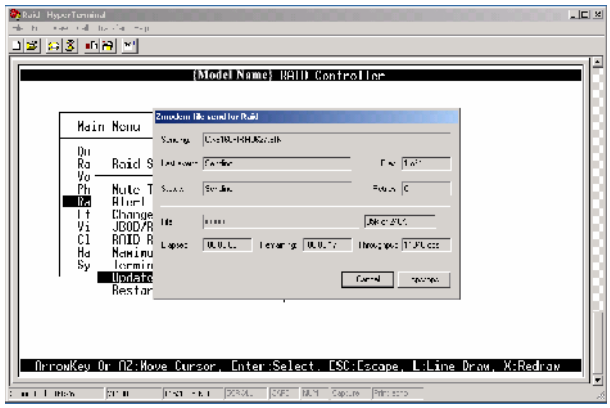
4. Select “ZMODEM modem” under Protocol. ZMODEM as the file transfer protocol of your terminal emulation software.

5. Click Browse. Look in the location where the Firmware upgrade software is located. Select the File name:

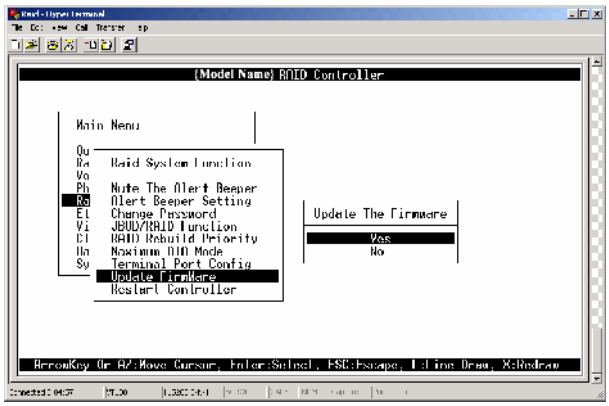
“6160FIRM.BIN” and click open.



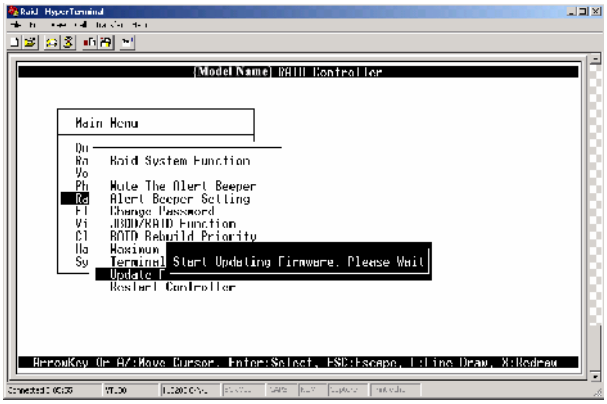
6. Click Send. Send the Firmware Binary to the controller



7. When the Firmware completes downloading, the confirmation screen appears. Press **Yes** to start program the flash ROM.

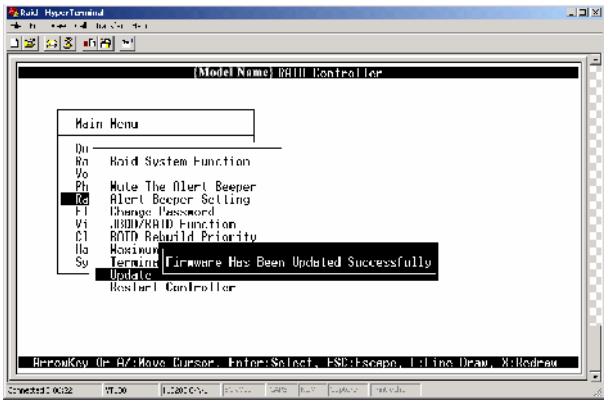


8. When the Flash programming starts, a bar indicator will show " Start Updating Firmware. Please Wait:".



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

10. After the Firmware upgrade is complete, a bar indicator will show " Firmware Has Been Updated Successfully".



NOTE:

The user has to reconfigure all of the settings after the firmware upgrade is complete, because all of the settings will default to the original default values.

Upgrading Firmware Through Web Browser Management

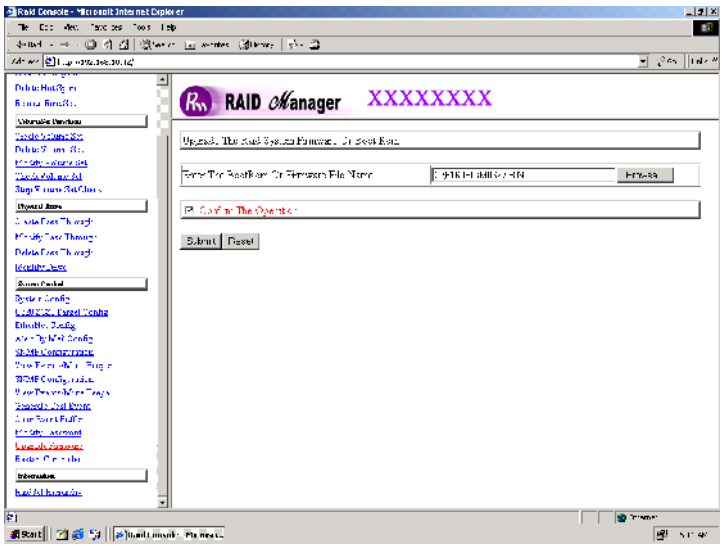
Get the new version firmware for your RAID subsystem controller.

1. To upgrade the RAID subsystem firmware, move the cursor to **Upgrade Firmware** link. The **Upgrade The Raid System Firmware** screen appears.

2. Click Browse. Look in the location where the Firmware upgrade software is located. Select the File name:

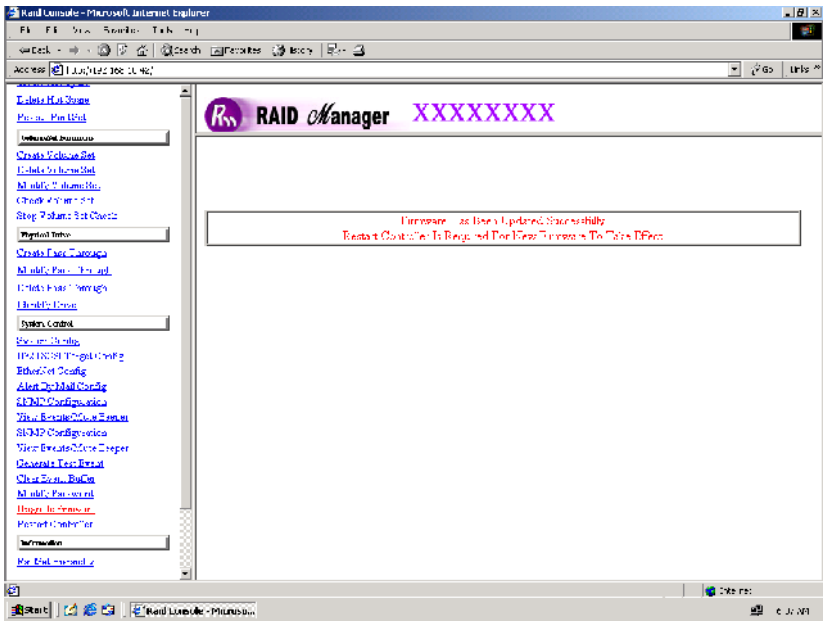
“6160FIRM.BIN” and click open.

3.Click the **Confirm The Operation** and press 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 bar indicator will show “ Firmware Has Been Updated Successfully”



Appendix A

Technical Specification

RAID processor	Intel 80219 RISC 64-bit
RAID level	0, 1, 3, 5, 6, 0+1 and JBOD
Cache memory	128-256MB DDR SDRAM on board
No. of channels (host+disk)	1+4
Host bus interface	Ultra 320 Wide LVD
Data transfer	Up to 320MB / sec
Back Plane Board	S-ATA II
Hot swap disk bays	4
Hot swap power supply	250W w/PFC
Cooling fan	1 (blower)
On-line expansion	Yes
Multiple RAID selection	Yes
Failed disk auto rebuild	Yes
Array Roaming	Yes
Bad block auto-remapping	Yes
Online RAID level migration	Yes
Audible alarm	Yes
Host Independent	Yes
Failed drive indicators	Yes