

RAID Subsystem

ARC-8060 Fibre/SAS/iSCSI RAID Series

User's Manual

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INTRODUCTION

1. Introduction

This section presents a brief overview of the cable solution external SAS RAID controller, ARC-8060-Fibre/SAS/iSCSI.

1.1 Overview

SAS builds on parallel SCSI by providing higher performance, improving data availability, and simplifying system design. The SAS interface supports both SAS disk drives for data-intensive applications and Serial ATA (SATA) drives for low-cost bulk storage of reference data. The ARC-8060-Fibre/SAS/iSCSI controllers attach directly to SATA/SAS midplanes with 4 x SFF-8087 internal connectors or increase capacity using one additional SFF-8088 external connector. When used with SAS expanders, the controller can provide up to (122) devices through one or more SAS JBODs, making it an ideal solution for enterprise-class storage applications that called for maximum configuration flexibility.

The ARC-8060-Fibre/SAS/iSCSI RAID controllers are same as Areca backplane solution external SAS RAID controller. It provides three kinds of host interface link to the host board on the server system. This controller utilizes the same RAID kernel that has been field-proven in existing external SATA/SAS RAID controller products, allowing Areca to quickly bring stable and reliable SAS RAID controllers to an existing external enclosure.

Unparalleled Performance

The ARC-8060-Fibre/SAS/iSCSI SAS RAID controllers raise the standard to higher performance levels with several enhancements including Intel new high-performance IOP341 I/O Processor, a DDR2-533 memory architecture and high performance PCIe x8 link host interface bus interconnection. The controller each includes one DIMM socket with default 512MB of ECC DDR2-533 SDRAM with optional battery backup module, upgrade to 4GB using x8 or x16 devices.

The test result is against overall performance compared to other external SAS RAID controllers. The powerful Intel new 800MHz

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IOP341 I/O processors and LSI SAS controller delivers high performance for servers and workstations.

Unsurpassed Data Availability

As storage capacities continue to rapidly increase, users need greater level of disk drive fault tolerance, which can be implemented without doubling the investment in disk drives. The RAID 6 can offer fault tolerance greater than RAID 1 or RAID 5 but only consumes the capacity of 2 disk drives for distributed parity data. The SAS RAID controllers with extreme performance RAID 6 engine installed provide the highest RAID 6 feature to meet this requirement. The controller can concurrently compute two parity blocks and get very similar RAID 5 performance.

The SAS RAID controllers can also provide RAID levels 0, 1, 10(1E), 3, 5, 6, 30, 50, 60, Single Disk or JBOD for maximum configuration flexibility. Its high data availability and protection derives from the following capabilities: Online RAID Capacity Expansion, Array Roaming, Online RAID Level / Stripe Size Migration, Global Online Spare, Automatic Drive Failure Detection, Automatic Failed Drive Rebuilding, Disk Hot-Swap, Online Background Rebuilding, Instant Availability/Background Initialization, Auto Reassign Sector, Redundant Flash Image and Battery Backup Module. Greater than Two TB Support allows for very large volume set application in 64-bit environment such as data-mining and managing large databases.

Easy RAID Management

The ARC-8060 series SAS RAID controller support key system monitoring features such as enclosure management (SES2,SMP, & SGPIO) and SNMP function. It can be managed either through the LCD control panel, RS232 port or Ethernet port. Manual configuration and monitoring can be done through the LCD control panel. The firmware also contains an embedded terminal emulation via the RS-232 port.

The firmware-embedded web browser-based RAID manager allows local or remote to access it from any standard internet browser via a LAN or WAN with no software or patches required.

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The firmware contains SMTP manager monitors all system events and user can select either single or multiple user notifications to be sent via "Plain English" e-mails.

The firmware-embedded SNMP agent allows remote to monitor events via LAN with no SNMP agent required. The controller also supports API library for customer to write its own monitor utility. The Single Admin Portal (SAP) monitor utility can support one application to manage multiple RAID units in the network. The Disk Stress Test utility kicks out disks meeting marginal spec before the RAID unit is actually put on-line for real business. The hardware monitor can monitor system voltage, temperature and FAN. The warning message will show in the LCD, alarm buzzer and respect LED.

1.2 Features

Adapter Architecture

- Intel 800MHz IOP341 I/O processor
- Up to 4GB DDR2-533 SDRAM on one DIMM socket with ECC protection using x8 or x16 devices
- Intel RAID 6 engine to support extreme performance RAID 6 function
- NVRAM for RAID configuration & transaction log
- Write-through or write-back cache support
- Redundant flash image for adapter availability
- Real time clock support
- Battery Backup Module ready (Option)

RAID Features

- RAID level 0, 1, 10(1E), 3, 5, 6, 30, 50, 60 or JBOD
- Multiple RAID selection
- Online array roaming
- Online RAID level/stripe size migration
- Online capacity expansion and RAID level migration simultaneously
- Online volume set growth
- Instant availability and background initialization
- Automatic drive insertion / removal detection and rebuilding
- Greater than 2TB per volume set (64-bit LBA support)

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- Disk scrubbing/ array verify scheduling for automatic repair of all configured RAID sets
- Login record in the event log with IP address and service (http, telnet and serial)
- Support spin down drives when not in use to extend service life (MAID)
- Support NTP protocol to synchronize RAID controller clock over the on-board Ethernet port
- Max 122 devices
- Max 128 LUNs (volume set) per controller

Monitors/Notification

- LCD Control Panel for setup, alarm mute and configuration
- System status indication through LCD, LED and alarm buzzer
- Enclosure management ready

Drive Interface

- Up to 122 devices using SAS expanders (one external Min SAS 4x connector)
- Up to 3Gb/s per port

Host Interface

- 4Gb Fibre-to-SAS
Two 4Gbps Fibre Channels - 400MB/sec per channel
- 3Gb SAS-to-SAS
Two Min SAS 4x 3Gbps SAS Ports - 300MB/sec per port
- 1Gb iSCSI-to-SAS
Two 1Gbps Ethernet Channel - Full iSCSI offload (complete ULP, TCP offload)

RAID Management

- Field-upgradeable firmware in flash ROM
- Firmware-embedded manager via RS-232 port
- Firmware-embedded web browser-based RAID manager- access your RAID subsystem from any standard internet browser via 10/100 Lan port
- Firmware-embedded SMTP manager Monitor all system events and user can select either single or multiple user notifications to be sent via "Plain English" e-mails
- Firmware-embedded SNMP agent allows remote to monitor events via LAN with no SNMP agent required

INTRODUCTION

- Access terminal menu by telnet via 10/100 LAN port
- API library for customer to write its own monitor utility
- SAP management feature to easily manage multiple RAID units in the network

Software Drivers

- OS Independent

External SAS RAID Card Comparison			
	8060-Fibre	8060-SAS	8060-iSCSI
I/O Processor	IOP341 800MHz		
Form Factor	One 5.25"Half-height Drive Bay 146 (W) x 43 (H) x 292 (L)mm		
Host Bus	2 x 4Gbps Fibre	2 x 4 Lanes 3Gbps SAS	2 x 1Gbps Ethernet
Host Connector	2 x SFP	2 x SFF-8088	2 x RJ45
Drive Connector	(3/4) x Internal SFF-8087 + 1 x External SFF-8088		
Drive Support	122 devices (Using SAS JBOD)		
RAID Level	0, 1, 10(1E), 3, 5, 6, 30, 50, 60, Single Disk and JBOD		
On-Board Cache	On 240-Pin DIMM DDR2-533 Socket with default 512MB, upgrade to 4GB using x8 or x16 devices		
Management Port	In-Band: SAS/Fibre Out-of-Band: LCD, RS-232 and LAN Port		Out-of-Band: LCD, RS-232 and LAN Port
Enclosure Ready	Individual Fault/Activity header, SGPIO and Serial bus interface		
Host Driver	OS Independent		

HARDWARE INSTALLATION

2. Hardware Installation

This section describes the procedures for installing the cable solution external ARC-8060-Fibre/SAS/iSCSI SAS RAID controllers.

2.1 Before Your Begin Installation

Thanks for purchasing the cable solution external ARC-8060 series SAS RAID controller as your RAID data storage subsystem. This user manual gives simple step-by-step instructions for installing and configuring the SAS RAID controller. To ensure personal safety and to protect your equipment and data, reading the following information package list carefully before you begin installing.

Package Contents

If your package is missing any of the items listed below, contact your local dealers before you install. (**Disk drives and disk mounting brackets are not included**)

- 1 x ARC-8060 series RAID controller in an ESD-protective bag
- 1 x Software Installation CD – containing driver, relative software, an electronic version of this manual and other related manual
- 1 x User Manual

HARDWARE INSTALLATION

2.2 Board Layout & Box Outline

The SAS RAID controller can support a family included 12/16 internal SFF-8087 ports with additional 4 external SFF-8088 ports. This section provides the board layout and connector/jumper for the SAS RAID controller.

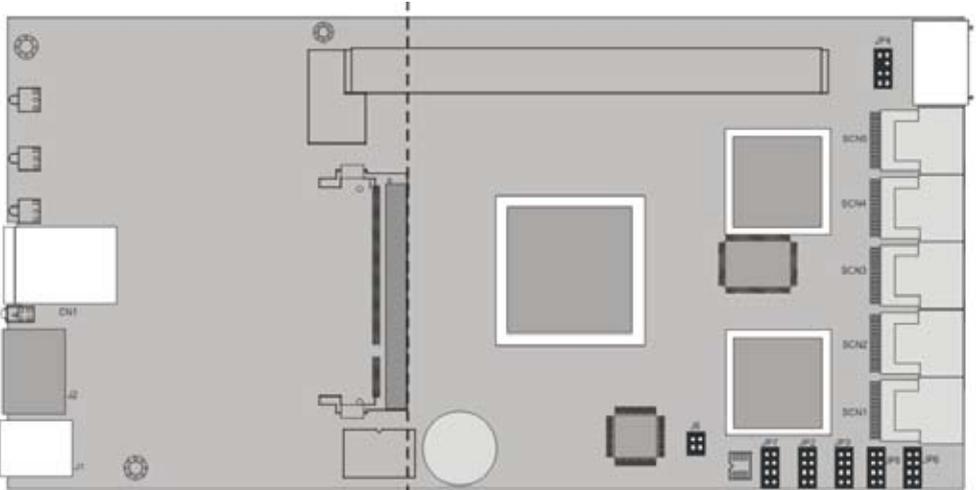


Figure 2-1, ARC-8060 Series External SAS RAID Controllers

Connector	Type	Description
5. (JP4)	I2C/LCD Connector	8-pin header
6. (SCN5)	SAS 17-20 Ports (Reserved for Future Use)	Min SAS 4i
7. (SCN4)	SAS 13-16 Ports (Internal)	Min SAS 4i
8. (SCN3)	SAS 9-12 Ports (Internal)	Min SAS 4i
9. (SCN2)	SAS 5-8 Ports (Internal)	Min SAS 4i
10. (SCN1)	SAS 1-4 Ports (Internal)	Min SAS 4i
11. (JP6)	Individual Fault LED Header for SAS 9-16 Ports	8-Pin Header
12. (JP5)	Individual Fault LED Header for SAS 1-8 Ports	8-Pin Header
13. (JP3)	Individual Activity LED Header for SAS 9-16 Ports	8-Pin Header
14. (JP2)	Individual Activity LED Header for SAS 1-8 Ports	8-Pin Header
15. (JP7)	Fault/Activity LED Header for SAS 17-20 Ports (Reserved for Future Use)	8-Pin Header
16. (J6)	For RS232C Port Function Definition (Please See Table 2-4)	4-Pin Header

Table 2-1, ARC-8060 Series External SAS RAID Connectors

HARDWARE INSTALLATION

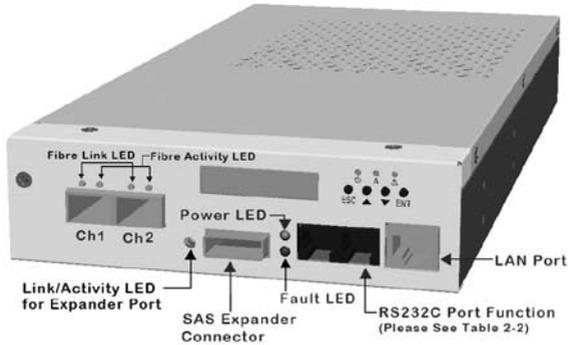


Figure 2-2, Front view of ARC-8060-Fibre External SAS RAID Controller

The following describes the ARC-8060-Fibre channel link/activity LED.

Fibre Host Port LED	Status
Link LED (Green light)	When link LED illuminate light that indicates the Fibre channel host link has connected.
Activity LED (Blue light)	The Fibre channel host accesses to the ARC-8060-Fibre system.

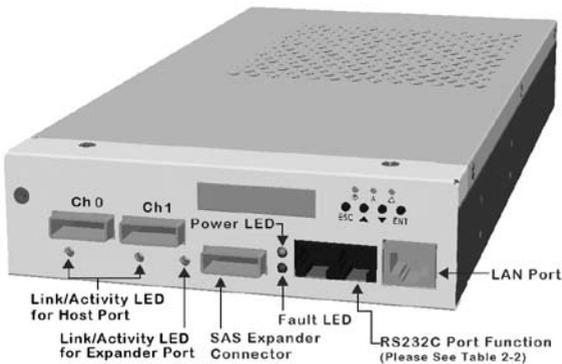


Figure 2-3, Front View of ARC-8060-SAS External SAS RAID Controller

HARDWARE INSTALLATION

The following describes the ARC-8060-SAS channel link/activity LED.

SAS Host Port LED	Status
Link LED (Green light)	When host port link LED illuminate for 1 second and light off for 3 seconds that indicates one link has connected. When host port Link LED illuminate for 2 seconds and light off for 2 seconds that indicates two links have connected. When host port Link LED illuminate for 4 seconds that indicates four links have connected.
Activity LED (Blue light)	When activity LED illuminated that indicates SAS host accesses to the ARC-8060-SAS system.

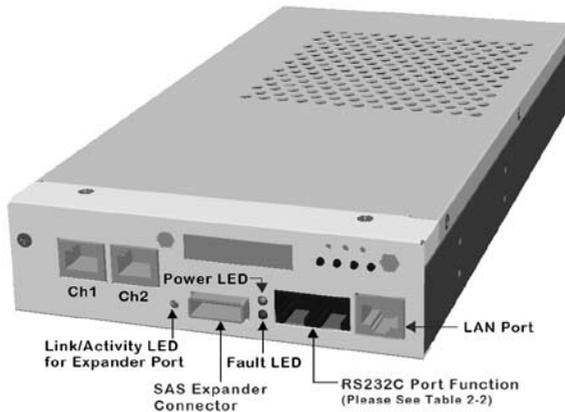


Figure 2-4, Front View of ARC-8060-iSCSI External SAS RAID Controller

The following describes the ARC-8060-Fibre/SAS/iSCSI link/activity LED for Expander Port.

Expander LED	Status
Link LED (Green light)	When link LED illuminate for 1 second and light off for 3 seconds that indicates one expander link has connected. When Link LED illuminate for 2 seconds and light off for 2 seconds that indicates two expander links have connected. When Link LED illuminate for 4 seconds that indicates four expander links have connected.
Activity LED (Blue light)	When activity LED illuminated that indicates SAS expander connector accesses to next JBOD.

HARDWARE INSTALLATION

RS232C Port Function Definition:

Please configure the J6 jumper settings to define the J2 connectors (VT-100 for expander/Debug & VT-100 for controller) function.

J6 jumper	RJ11 beside Expander Port	RJ11 beside LAN Port
1-2	Controller Debug Port	Expander Port
3-4	Expander Port	Controller VT-100 Port
No Cap	Controller Debug Port	Controller VT-100 Port

Table 2-2, RS232C Port Function Definition

Tools Required

An ESD grounding strap or mat is required. Also required are standard hand tools to open your system's case.

System Requirement

- Sever with Fibre/SAS/iSCSI host adapter

Personal Safety Instructions

Use the following safety instructions to help you protect your computer system from potential damage and to ensure your own personal safety.

- Always wear a grounding strap or work on an ESD-protective mat.
- Before opening the system cover, turn off power switches and unplug the power cords. Do not reconnect the power cords until you have replaced the covers.

Warning:

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

HARDWARE INSTALLATION

2.3 Installation

Use the following instructions below to install the ARC-8060 series RAID controller.

Step 1. Power the Enclosure Off

Turn off the enclosure and remove the AC power cord. Remove the enclosure's cover. For the instructions, please see the enclosure documentation.

Step 2. Unpack ARC-8060 Series RAID Controller

Unpack and remove the ARC-8060 series RAID controller from the package. Inspect it carefully, if anything is missing or damaged, contact your local dealer.

Step 3. Open the Controller Canister Top Cover

Loosening the four of mounting screws on the sides of controller box, then open the controller canister top cover.

Step 4. Check Memory Module

Make sure the cache memory module is present and seated firmly in the DIMM socket (DDR2-533) for ARC-8060 series models. To install the DDR-2 SDRAM DIMM:

1. Position the DIMM module toward the socket with the notches in the module aligned with the keys on the socket.
2. Insert the module vertically into the socket. The tabs will hold the DIMM in place.
3. Make sure the selected DIMM module using x8 or x16 device on the module

Step 5. Adding a Battery Backup Module (optional)

Please refer to Appendix B for installing the BBM in your ARC-8060 series RAID controller.

HARDWARE INSTALLATION

Step 6. Re-check Fault LED Cable Connections (optional)

Make sure that the proper failed drive channel information is displayed by the fault LEDs. An improper fault LED cable connection will tell the user to “Hot Swap” the wrong drive. This can result in removing the wrong disk (one that is functioning properly) from the controller. This can result in failure and loss of system data.

Step 7. Install the Controller Canister Top Cover

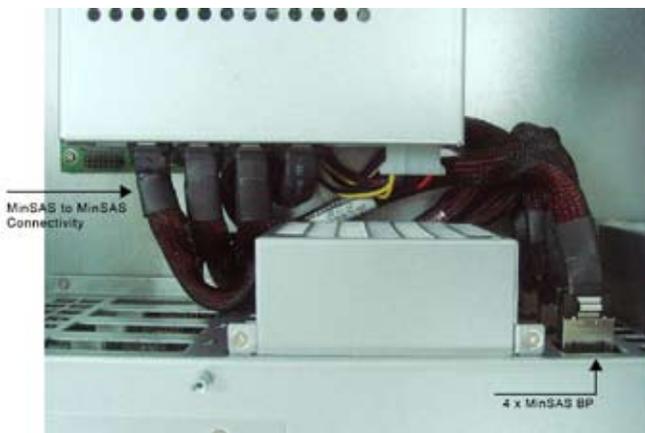
Fasten the four of mounting screws on the sides of controller.

Step 8. Mounting ARC-8060 Series into the Enclosure

Remove the enclosure cover and find a 5.25 inch CD-ROM wide place to fasten the ARC-8060 series RAID controller in the external enclosure. The RAID controller requires one 5.25” half-height drive bay.

Step 9. Connecting Cable to Backplane

The ARC-8060 series supports 4 SFF-8087 connectors on the back side. User uses suitable cable (depends on the backplane) to connect the RAID controller connector to the enclosure backplane. Please refer to section 2.4 SAS cable to find the suitable cable.



HARDWARE INSTALLATION

Step 10. Install the Enclosure Top Cover

Check the installation thoroughly, reinstall the enclosure cover, and reconnect the power cord cables.

Step 11. Loading Drive to the Drive Tray

You can connect the SAS/SATA drives to the controller through direct cable and backplane solutions. In the direct connection, SAS/SATA drives are directly connected to SAS RAID controller PHY port with SAS/SATA cables. The SAS RAID controller can support up to 16 PHY internal ports and 4 PHY external ports. Remove the front bezel from the computer chassis and install the cages or SAS/SATA drives in the computer chassis. Loading drives to the drive tray if cages are installed. Be sure that the power is connected to the individual drives or cage.

In the backplane solution, SAS/SATA drives are directly connected to SAS system backplane. The number of SAS/SATA drives is limited to the number of slots available on the backplane. Your ARC-8060 series RAID controller supports up to 16 SAS or SATA 3.0-Gbps drives, each one contained in its individual drive carrier. Each drive is hot-pluggable, allowing you to remove and insert drives without shutting down your ARC-8060 series RAID enclosure. Install the drives to 12-bays ARC-8060 series RAID enclosure as shown in figure 2-5.

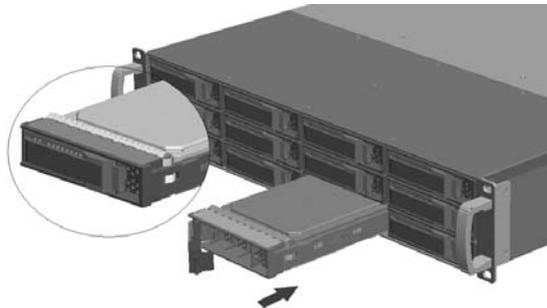


Figure 2-5, Install the drives to 12-bays ARC-8060 series RAID enclosure.

HARDWARE INSTALLATION

Step 12. Connect RAID Controller to Host Port Adapter

The external host connector is provided on the back of the RAID controller for connecting the array to server host adapter. By installing host port adapter and RAID subsystem using the correct external cables which is included in your RAID controller kits. Then connect ARC-8060 series SAS RAID controller and host port adapter as shown below:

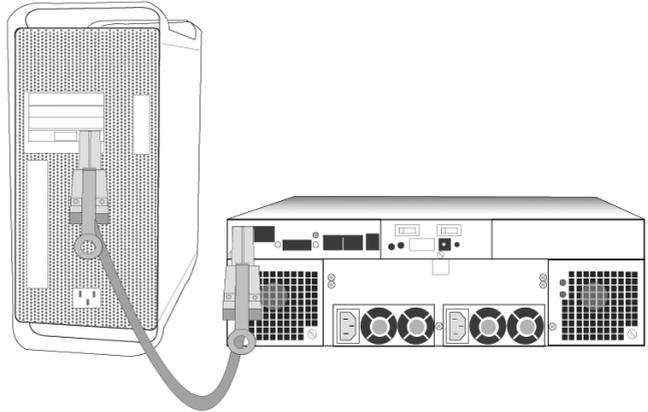


Figure 2-6 Connect ARC-8060 series SAS RAID controller and host port adapter

Step 13. Connecting RAID Controller's Ethernet Port

Connect Ethernet port of the RAID controller using the included Ethernet cable and then to a LAN port or LAN switch.

Step 14. Add More JBODs (Option)

ARC-8060 series external SAS ports support daisy chain expansion to the next JBOD. The SAS RAID controller can support daisy-chain up to 8 enclosures. The maximum drive no. is 122 through 8 enclosures. The following figure shows how to connect the external Min SAS cable from the SAS RAID controller that has external connectors to the external drive boxes or drive enclosures.

HARDWARE INSTALLATION

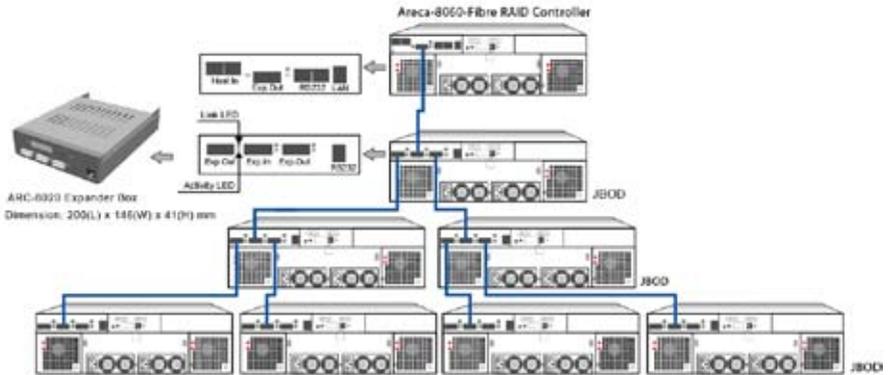


Figure 2-7, SAS Expander connect to a drive box or drive enclosure

The following table is the max no. of SAS RAID controller supported:

	Disks/Enclosure	Expander	Devices/Controller	Volume
Max No.	32	8	122	128

Note:

Turn on the expander enclosure first to make sure the ARC-8060 series RAID controller recognizes the drives in the enclosure.

Step 15. Connect the Power

Turn on the power switch at the rear of the enclosure (if equipped) and then press the power button at the front of the RAID controller enclosure.

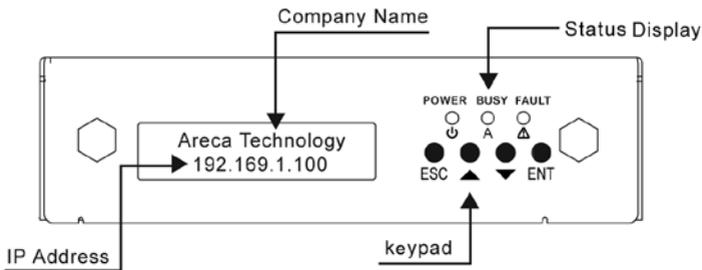
Step 16. Configure RAID Subsystem

The ARC-ARC-8060 series RAID controller is normally delivered with LCD pre-installed. Your ARC-8060 series RAID controller can be configured by using the LCD with keypad, a serial device (terminal emulation) or LAN port.

HARDWARE INSTALLATION

- **Method 1: LCD Panel with Keypad**
You can use LCD front panel and keypad function to simply create the RAID volume. The LCD status panel also informs you of the disk array's current operating status at a glance. For additional information on using the LCD to configure the RAID box see the Chapter 4 of LCD Configuration Menu. 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 initial screen is as following:



- **Method 2: RS-232 Port Connection**
The ARC-8060 series RAID controller can be configured via a VT-100 compatible terminal or a PC running a VT-100 terminal emulation program. You can attach a serial (Character-Based) terminal or server com port to the RAID controller for access to the text-based setup menu. For additional information on using the RS-232 port to configure the RAID box see the Chapter 5 of VT-100 Utility Configuration.
- **Method 3: LAN Port Connection**
The ARC-8060 series RAID controller has embedded the TCP/IP & web browser-based RAID manager in the .firmware(method 3). User can remote manage the ARC-8060 series RAID box without adding any user specific software (platform independent) via standard web browsers directly connected to the 10/100 Ethernet RJ45 LAN port. For additional information on using the LAN port to configure the RAID box see the Chapter 6 of Web Browser-Based Configuration.

HARDWARE INSTALLATION

Step 17. Connect to Host Computer

Once the ARC-8060 series RAID controller has finished the initialization of the array, then you can connect it to a host computer. The ARC-8060 series RAID controller can be connected to a host computer through the SAS, Fibre or iSCSI interface. User can select the right cable connected to the host. When the volume set is ready for system accesses, connect the host cable to the ARC-8060 series RAID controller and to the appropriate port on host computer.

Step 18. Turn on Host Computer Power

Safety checks the installation. Connect all power code. Turn on the AC power switch at the rear of host computer then press the power button at the front of the host computer.

Step 19. Format, Partition and Mount the ARC-8060 series RAID controller Volumes

After you create a unit, it needs to be partitioned, formatted, and mounted by the operating system. There are various steps, that is depend on what operating system you are using (Windows, Linux, FreeBSD or Mac, etc.). Detailed steps for each operating system are provided on their disk utility. After that, the ARC-8060 series RAID controller can be fully used.

Note:

It's a good ideal to turn on your ARC-8060 series RAID controller before turning on the host computer. This will insure that the host computer recognize the volumes and drivers in the ARC-8060 series RAID controller.

HARDWARE INSTALLATION

2.4 SAS Cables

You can connect the end devices to each other through direct cables or through the backplane connections. The SAS RAID controller external port supports daisy-chain expansion up to 7 enclosures. The following is an example of some internal SAS/SATA cables and an external SAS cable.

2.4.1 Internal Min SAS 4i to SATA Cable

The Min SAS 4i to SATA cables are used for connection between the SAS RAID controller internal connectors and connectors on the SAS/SATA disk drives or SAS/SATA connector backplane. The SAS controllers has 5 Min SAS 4i (SFF-8087) internal connectors, each of them can support up to four SAS/SATA drives. These adapters can be installed in a server RAID enclosure with standard SATA connectors backplane. The following diagram shows the picture of Min SAS 4i to 4*SATA cables. Backplane supports SGPIO header can leverage the SGPIO function on the SAS RAID controller through the sideband cable.

The sideband cable is reserved for the backplane with header on it.

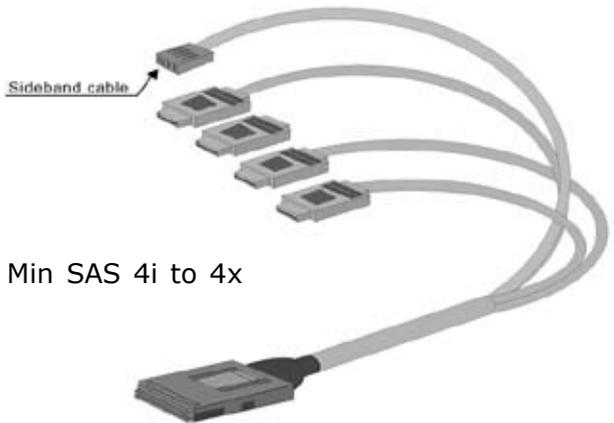


Figure 2-7, Internal Min SAS 4i to 4x SATA Cable

HARDWARE INSTALLATION

2.4.2 Internal Min SAS 4i to 4xSFF-8482 Cable

These controllers can be installed in a server RAID enclosure with out a backplane. The kind of cable will attach directly to the SAS disk drives. The following diagram shows the picture of Min SAS 4i to 4xSFF-8482 cables.

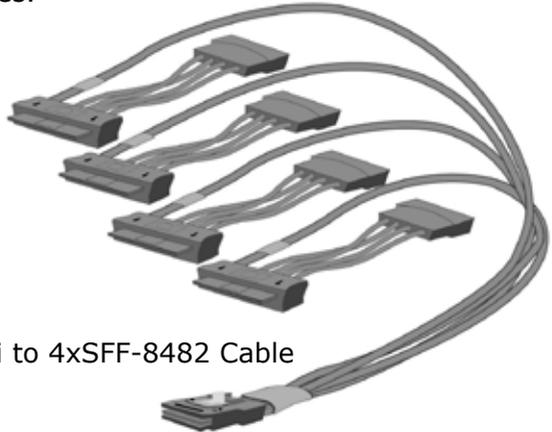


Figure 2-8, Min SAS 4i to 4xSFF-8482 Cable

2.4.3 Internal Min SAS 4i to Internal Min SAS 4i Cable

The SAS RAID controllers have 5 Min SAS 4i internal connectors, each of them can support up to four SAS/SATA signals. These adapters can be installed in a server RAID enclosure with Min SAS 4i internal connectors backplane. This Min SAS 4i cable has eight signal pins to support four SAS/SATA drives and six pins for the SGPIO (Serial General Purpose Input/ Output) side-band signals. The SGPIO bus is used for efficient LED management and for sensing drive Locate status.



Figure 2-9, Min SAS 4i to Min SAS 4i Cable

HARDWARE INSTALLATION

2.4.4 External Min SAS 4i Drive Boxes and Drive Expanders

The external cables are used for connection between the SAS controller external connectors and connectors on the external drive boxes or drive expanders (JBOD). The SAS controller has Min SAS 4x (SFF-8088) external connector, each of them can support up to four SAS/SATA signals.

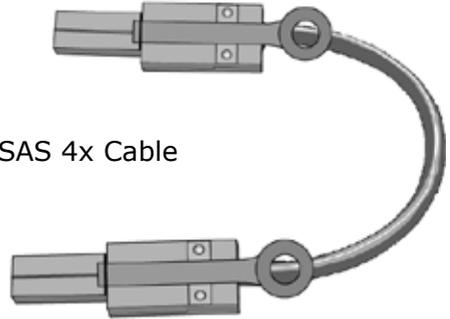


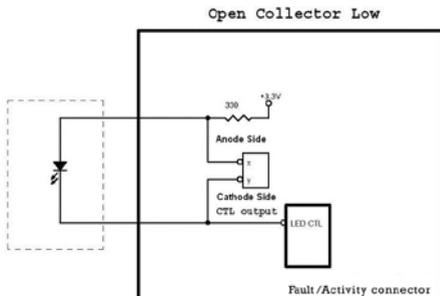
Figure 2-10, Min SAS 4x to Min SAS 4x Cable

2.5 LED Cables

There is no SGPIO supported in the most of old version SATA back-plane. The SAS controller also provides one kind of alternative LED cable header to support the fault/activity status for those back-planes.

The following electronics schematic is the SAS RAID controller logical of fault/activity header. The signal for each pin is cathode (-) side.

The following diagrams and descriptions describe each type of connector.



Note:

Cables for the individual drive LEDs may come with a drive cage, or you may need to purchase them.

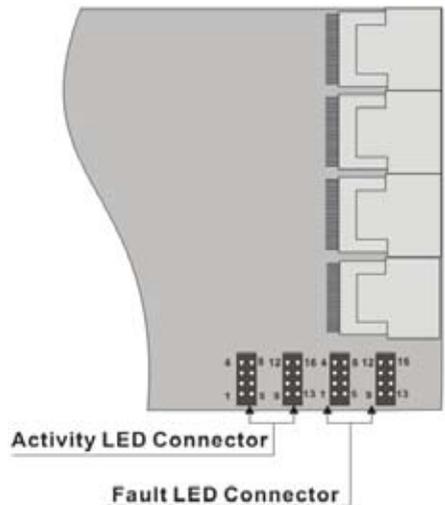
HARDWARE INSTALLATION

A: Individual LED Indicator Connector

Connect the cables for the drive activity LEDs and fault LEDs between the backplane of the cage and the respective connector on the ARC-8060 series RAID controller header . The following describes the activity/fault LED.

LED	Normal Status	Problem Indication
Activity LED	When the activity LED is illuminated, there is I/O activity on that disk drive. When the LED is dark, there is no activity on that disk drive.	N/A
Fault LED	When the fault LED is solid illuminated, there is no disk present and When the fault LED is off, that disk is present and status is normal. When the "Identify Drive" is selected, the selected drive fault LED will blank.	When the fault LED is slow blinking (2 times/sec), that indicate disk drive has failed and should be hot-swapped immediately. When the activity LED is illuminated and fault LED is fast blinking (10 times/sec) that indicate there is rebuilding activity on the disk drive.

Figure 2-11, ARC-8060 Series RAID Controller Activity/Fault LED Connector



HARDWARE INSTALLATION

B: I²C Connector

You can also connect the I²C interface to a proprietary SAS/SATA backplane enclosure. This can reduce the number of activity LED and/or fault LED cables. The I²C interface can also cascade to another SAS/SATA backplane enclosure for the additional channel status display.

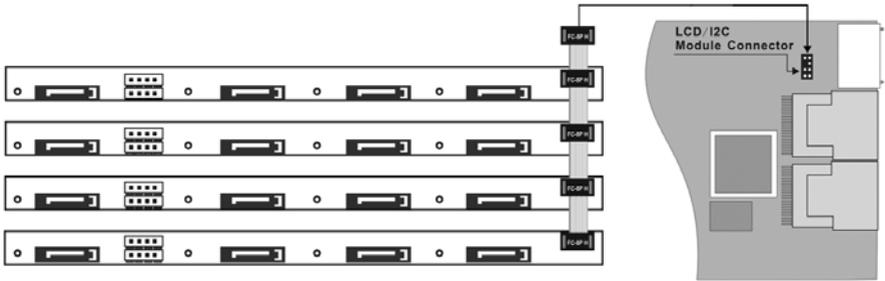
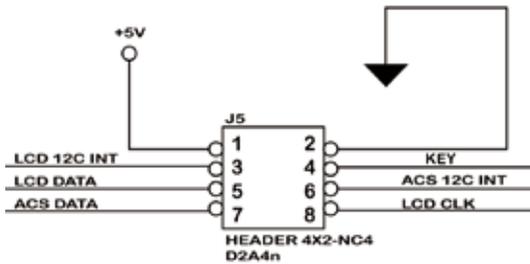


Figure 2-12, Activity/Fault LED I²C connector connected between SAS RAID controller & 4 SATA HDD backplane.

The following picture and table is the I²C signal name description for LCD & fault/activity LED.



PIN	Description	PIN	Description
1	Power (+5V)	2	GND
3	LCD Module Interrupt	4	Protective key
5	LCD Module Serial Data	6	Fault/Activity Clock
7	Fault/Activity Serial Data	8	LCD Module Clock

CONFIGURATION METHOD

3. Configuration Methods

After the hardware installation, the SAS/SATA disk drives connected to the ARC-8060 series RAID controller must be configured and the volume set units initialized before they are ready to use. This can be accomplished by one of the following methods:

- Front panel touch-control keypad.
- VT100 terminal connected through the controller's serial port.
- Firmware-embedded & web browser-based RAID manager/SNMP agent/SMTP via the controller's 10/100 LAN port.

Those user interfaces can access the built-in configuration and administration utility that resides in the controller's firmware. They provide complete control and management of the controller and disk arrays, eliminating the need for additional hardware or software.

Note:

The ARC-8060 series RAID controller allows only one method to access menus at a time.

3.1 Using local front panel touch-control keypad

The front panel keypad and liquid crystal display (LCD) is the primary user interface for the ARC-8060 series RAID box. All configuration and management of the controller and its properly connected disk arrays can be performed from this interface.

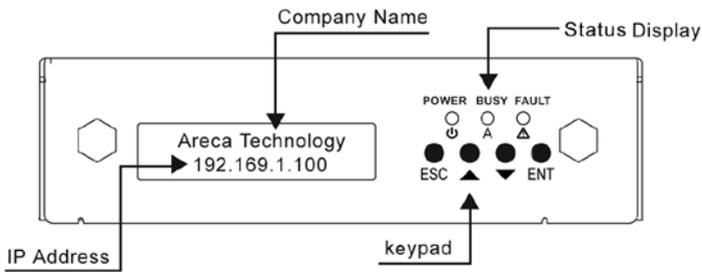
The front panel keypad and LCD are connected to the RAID box to access the built-in configuration and administration utility that resides in the controller's firmware. Complete control and management of the array's physical drives and logical units can be performed from the front panel, requiring no additional hardware or software drivers for that purpose.

CONFIGURATION METHOD

A touch-control keypad and a liquid crystal display (LCD) mounted on the front of the RAID box is the primary operational interface and monitor display for the disk array controller. This user interface controls all configuration and management functions for the RAID box it is properly connected.

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 initial screen as the following:



Function Key Definitions:

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

Key	Function
Up Arrow	Use to scroll the cursor Upward/Rightward
Down Arrow	Use to scroll the cursor Downward/Leftward
ENT Key	Submit Selection Function (Confirm a selected Item)
ESC Key	Return to Previous Screen (Exit a selection configuration)

There are a variety of failure conditions that cause the RAID box monitoring LED to light. Following table provides a summary of the front panel LED.

Panel LED	Normal Status	Problem Indication
Power LED	Solid green, when power on	Unlit, when power on
Busy LED	Blinking amber during host accesses ARC-8060 series controller	Unlit or never flicker
Fault LED	Unlit	Solid red

CONFIGURATION METHOD

For additional information on using the LCD panel and keypad to configure the RAID controller see "LCD Configuration Menu" on Chapter 4.

3.2 VT100 terminal (Using the controller's serial port)

The serial port on the ARC-8060 series RAID controller's front can be used in VT100 mode. The provided interface cable converts the RS232 signal of the 6-pin RJ11 connector on the RAID box into a 9-pin D-Sub female connector. The firmware-based terminal array management interface can access the array through this RS-232 port. You can attach a VT-100 compatible terminal or a PC running a VT-100 terminal emulation program to the serial port for accessing the text-based Setup Menu.

3.2.1 RAID Box RS-232C Port Pin Assignment

To ensure proper communications between the RAID box and the VT-100 Terminal Emulation, Please configure the VT100 terminal emulation settings to the values shown below:

Terminal requirment	
Connection	Null-modem cable
Baud Rate	115,200
Data bits	8
Stop	1
Flow Control	None

The VT-100 port for ARC-8060 series RAID configuration, please refer to table 2-2 in chapter 2. The controller VT-100 RJ11 connector pin assignments are defined as below.

Action			
Pin	Description	Pin	Description
1	RTS	4	GND
2	RXD	5	GND
3	TXD	6	GND

CONFIGURATION METHOD

Keyboard Navigation

The following definition is the VT-100 RAID configuration utility keyboard navigation.

Key	Function
Arrow Key	Move cursor
Enter Key	Submit selection function
ESC Key	Return to previous screen
L Key	Line draw
X Key	Redraw

3.2.2 Start-up VT100 Screen

By connecting a VT100 compatible terminal, or a PC operating in an equivalent terminal emulation mode, all ARC-8060 series RAID box monitoring, configuration and administration functions can be exercised from the VT100 terminal.

There are a wide variety of Terminal Emulation packages, but for the most part they should be very similar. The following setup procedure is an example Setup VT100 Terminal in Windows system using Hyper Terminal use Version 3.0 or higher.

Step 1. From the Desktop open the start menu. Pick Programs, Accessories, Communications and Hyper Terminal. Open Hyper Terminal (requires version 3.0 or higher)

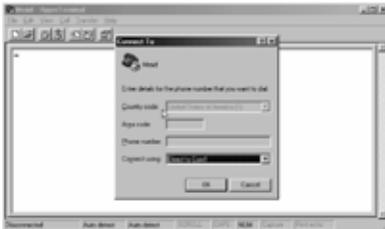


Step 2. Open **HYPERTERM.EXE** and enter a name for your Terminal. Click **OK**.

CONFIGURATION METHOD



Step 3. Select an appropriate connecting port in your Terminal. Click OK. Configure the port parameter settings. Bits per second: **"115200"**, Data bits: **"8"**, Parity: **"None"**, Stop bits: **"1"**, Flow control: **"None"**. Click **"OK"**



Step 4. Open the File menu, and then open Properties.



Step 5. Open the Settings Tab.



CONFIGURATION METHOD

Step 6. 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**.



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.

CONFIGURATION METHOD

3.3 Web browser-based RAID manager

To configure ARC-8060 series RAID box on a local or remote machine, you need to know its IP Address. The IP address will default show in the LCD screen or Ethernet Configuration option on the VT100 utility configuration. Launch your firmware-embedded TCP/IP & web browser-based RAID manager by entering `http://[IP Address]` in the web browser.

The provided LAN interface cable connects the ARC-8060 series RAID box LAN port into a LAN port from your local network. Use only shield cable to avoid radiated emission that may cause interruptions. To ensure proper communications between the RAID subsystem and Web browser-based RAID management, Please connect the RAID box Ethernet LAN port to any LAN switch port.

The ARC-8060 series RAID box has embedded the TCP/IP & web browser-based RAID manager in the firmware. User can remote manage the RAID box without adding any user specific software (platform independent) via standard web browsers directly connected to the 10/100 Ethernet RJ45 LAN port.

The storage console current configuration screen displays the current configuration of your ARC-8060 series RAID box. Detail procedures please refer to the Chapter 6 Web Browser-based configuration method.

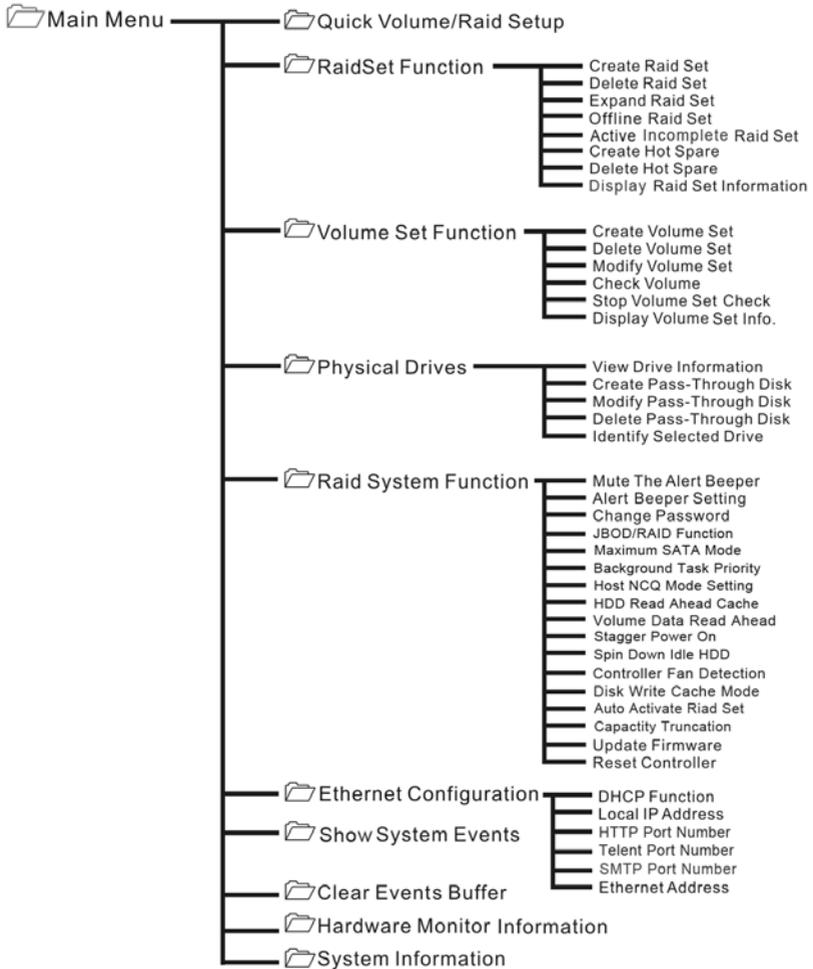
Note:

You must be logged in as administrator with local admin rights on the remote machine to remotely configure it.
The RAID box default user name is "admin" and the password is "0000".

3.4 Configuration Menu Tree

The following is an expansion of the menus in configuration Utility that can be accessed through the LCD panel, RS-232 serial port and LAN port.

CONFIGURATION METHOD



Note:

Ethernet Configuration, Alert By Mail Config, and SNMP Config can only be set in the web-based configuration.

LCD CONFIGURATION MENU

4. LCD Configuration Menu

After the hardware installation, the disk drives connected to the RAID box must be configured and the volume set units initialized before they are ready to use. This can be also accomplished by the Front panel touch-control keypad.

The LCD module on the backside can access the built-in configuration and administration utility that resides in the controller's firmware. To complete control and management of the array's physical drives and logical units can be performed from the front panel, requiring no additional hardware or software drivers for that purpose.

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 LCD display back panel function keys are the primary user interface for the RAID box. Except for the "Firmware update", all configurations can be performed through this interface.

Function Key Definitions

The four function keys at the back panel of the button perform the following functions:

Key	Function
Up Arrow	Use to scroll the cursor Upward/Rightward
Down Arrow	Use to scroll the cursor Downward/Leftward
ENT Key	Submit Select ion Function (Confirm a selected Item)
ESC Key	Return to Previous Screen (Exit a selection configuration)

4.1 Starting LCD Configuration Utility

After power on the ARC-8060 series RAID box, press **ENT** to verify password for entering the main menu from LCD panel. Using the **UP/DOWN** buttons to select the menu item, then press **ENT** to confirm it. Press **ESC** to return to the previous screen.

LCD CONFIGURATION MENU

4.2 LCD Configuration Utility Main Menu Options

Select an option, related information or submenu items to display beneath it. The submenus for each item are explained on the section 4.7.2. The configuration utility main menu options are:

Option	Description
Quick Volume And Raid Set Setup	Create a default configurations which are based on 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
Ethernet Configuration	Ethernet LAN setting
Show System Events	Record all system events in the buffer
Clear All Event Buffers	Clear all event buffer information
Hardware Monitor Information	Show all system environment status
Show System information	View the controller information

4.3 Configuring Raid Sets and Volume Sets

You can use "Quick Volume And Raid Set Setup" or "Raid Set Functions" and "Volume Set Functions" to configure raid sets and volume sets from LCD panel. 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

LCD CONFIGURATION MENU

4.4 Designating Drives as Hot Spares

To designate drives as hot spares, press **ENT** to enter the Main menu. Press **UP/DOWN** buttons to select the " RAID Set Functions " option and then press **ENT**. All raid set functions will be displayed. Press up and down arrow to select the " Create Hot Spare Disk " option and then press **ENT**. The first unused physical device connected to the current RAID box appears. Press **UP/DOWN** buttons to scroll the unused physical devices and select the target disk to assign as a Hot Spare and press **ENT** to designate it as a hot spare.

4.5 Using Easy RAID Configuration

In " Quick Volume And Raid Setup " configuration, the RAID set you create is associated with exactly one volume set, and you can modify the RAID Level, Stripe Size, and Capacity. Designating drives as Hot Spares will also combine with RAID level in this setup.

The volume set default settings will be:

The default setting values can be changed after configuration is completed.

Parameter	Setting
Volume Name	Volume Set # 00
SAS Port#/LUN Base/LUN	0/0/0
Cache Mode	Write Back
Tag Queuing	Yes

Follow the steps below to create RAID set using " Quick Volume And Raid Setup " configuration:

Step	Action
1	Choose " Quick Volume And Raid Setup " from the main menu. The available RAID levels with hot spare for the current volume set drive are displayed.

LCD CONFIGURATION MENU

2	<p>It is recommended to use drives that have the same capacity in a specific array. If you use drives with different capacities in an array, all drives in the RAID set will select the lowest capacity of the drive in the RAID set.</p> <p>The numbers of physical drives in a specific array determine the RAID levels that can be implemented with the array.</p> <p>RAID 0 requires 1 or more physical drives RAID 1 requires at least 2 physical drives RAID 1+Spare requires at least 3 physical drives RAID 3 requires at least 3 physical drives RAID 5 requires at least 3 physical drives RAID 3 +Spare requires at least 4 physical drives RAID 5 + Spare requires at least 4 physical drives RAID 6 + Spare requires at least 5 physical drives.</p> <p>Using UP/DOWN buttons to select RAID level for the volume set and press ENT to confirm it.</p>
3	<p>Using UP/DOWN buttons to create the current volume set capacity size and press ENT to confirm it. The available stripe sizes for the current volume set are displayed.</p>
4	<p>Using UP/DOWN buttons to select the current volume set stripe size and press ENT key to confirm it. This parameter specifies the size of the stripes written to each disk in a RAID 0, 1, 10(1E), or 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 provides better-read performance, especially if your computer does mostly sequential reads. However, if you are sure that your computer does random read requests more often, choose a small stripe size.</p>
5	<p>When you finished defining the volume set, press ENT to confirm the "Quick Volume And Raid Set Setup" function.</p>
6	<p>Press ENT to define "FGrnd Init (Foreground initialization)" or press ESC to define "BGrnd Init (Background initialization)". When "FGrnd Init", the initialization proceeds until it must be completed before the volume set is ready for system accesses. When "BGrnd Init", the initialization proceeds as a background task, the volume set is fully accessible for system reads and writes. The operating system can instantly access the newly created arrays without requiring a reboot and waiting for the initialization to complete.</p>
7	<p>Initialize the volume set you have just configured.</p>
8	<p>If you need to add additional volume set, use the main menu "Create Volume Set" functions.</p>

LCD CONFIGURATION MENU

4.6 Using Raid Set and Volume Set Functions

In "Raid Set Function", you can use the create RAID set function to generate the new RAID set. In "Volume Set Function", you can use the create volume set function to generate its associated volume set and parameters. If the current ARC-8060 series RAID box has unused physical devices connected, you can choose the "Create Hot Spare" option in the "Raid Set Function" to define a global hot spare.

Select this method to configure new RAID sets and volume sets. This configuration option allows you to associate volume set with partial and full RAID set.

Step	Action
1	To setup the Hot Spare (option), choose "Raid Set Function" from the main menu. Select the "Create Hot Spare" and press ENT to set the Hot Spare.
2	Choose "Raid Set Function" from the main menu. Select the "Create Raid Set" and press ENT .
3	Select a drive for RAID set from the SATA drive connected to the ARC-8060 series RAID box
4	Press UP/DOWN buttons to select specific physical drives. Press the ENT key to associate the selected physical drive with the current RAID set. Recommend use drives has same capacity in a specific RAID set. If you use drives with different capacities in an array, all drives in the RAID set will select the lowest capacity of the drive in the RAID set. The numbers of physical drives in a specific RAID set determine the RAID levels that can be implemented with the RAID set. RAID 0 requires 1 or more physical drives per RAID set. RAID 1 requires at least 2 physical drives per RAID set. RAID 1 + Spare requires at least 3 physical drives per RAID set. RAID 3 requires at least 3 physical drives per RAID set. RAID 5 requires at least 3 physical drives per RAID set. RAID 3 + Spare requires at least 4 physical drives per RAID set. RAID 5 + Spare requires at least 4 physical drives per RAID set. RAID 6 + Spare requires at least 5 physical drives per RAID set.
5	After adding physical drives to the current raid set as desired, press ENT to confirm the "Create Raid Set" function.
6	An edit the RAID set name screen appears. 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. #. Press ENT to finish the name editing.

LCD CONFIGURATION MENU

7	Press ENT when you are finished creating the current RAID set. To continue defining another RAID set, repeat step 3. To begin volume set configuration, go to step 8.
8	Choose "Volume Set Functions" from the main menu. Select the "Create Volume Set" and press ENT .
9	Choose one RAID set from the screen. Press ENT to confirm it.
10	The volume set attributes screen appears: The volume set attributes screen shows the volume set default configuration value that is currently being configured. The volume set attributes are: Volume Name, Raid Level, Stripe Size, Cache Mode, SAS Port/SAS LUN Base/SAS LUN, Fibre Port/ Fibre LUN Base/Fibre LUN and iSCSI Target Node/iSCSI LUN and Tagged Queuing. All value can be changing by the user. Press the UP/DOWN buttons to select the attributes. Press the ENT to modify each attribute of the default value. Using UP/DOWN buttons to select attribute value and press the ENT to accept the default value.
11	After user completed modifying the attribute, press ESC to enter the select capacity for the volume set. Using the UP/DOWN buttons to set the volume set capacity and press ENT to confirm it.
12	When you finished defining the volume set, press ENT to confirm the Create function.
13	Press ENT to define "FGrnd Init (Foreground initialization)" or press ESC to define "BGrnd Init (Background initialization)". The controller will begin to initialize the volume set, you have just configured. If space remains in the RAID set, the next volume set can be configured. Repeat steps 8 to 13 to configure another volume set.

4.7 Navigation Map of the LCD

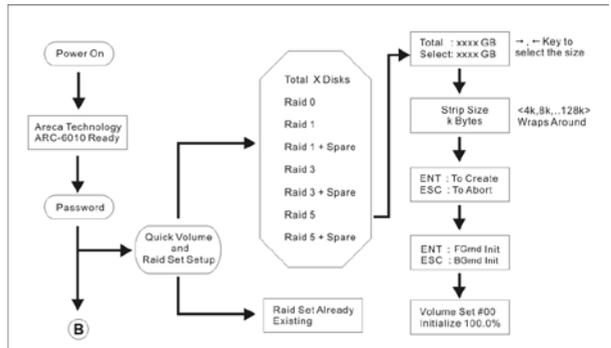
The password option allows user to set or clear the RAID subsystem's password protection feature. Once the password has been set, the user can only monitor and configure the RAID subsystem by providing the correct password. The password is used to protect the ARC-8060 series RAID controller from unauthorized entry. The RAID controller will check the password only when entering the Main menu from the initial screen. The RAID controller will automatically go back to the initial screen when it does not receive any command in five minutes. The RAID controller password is default setting at 0000 by the manufacture.

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4.7.1 Quick Volume And Raid Setup

“Quick Volume And Raid Setup” is the fastest way to prepare a RAID set and volume set. It only needs a few keystrokes to complete it. Although disk drives of different capacity may be used in the RAID set, it will use the smallest capacity of the disk drive as the capacity of all disk drives in the RAID set. The “Quick Volume And Raid Setup” option creates a RAID set with the following properties:

Figure 4.7.1-1



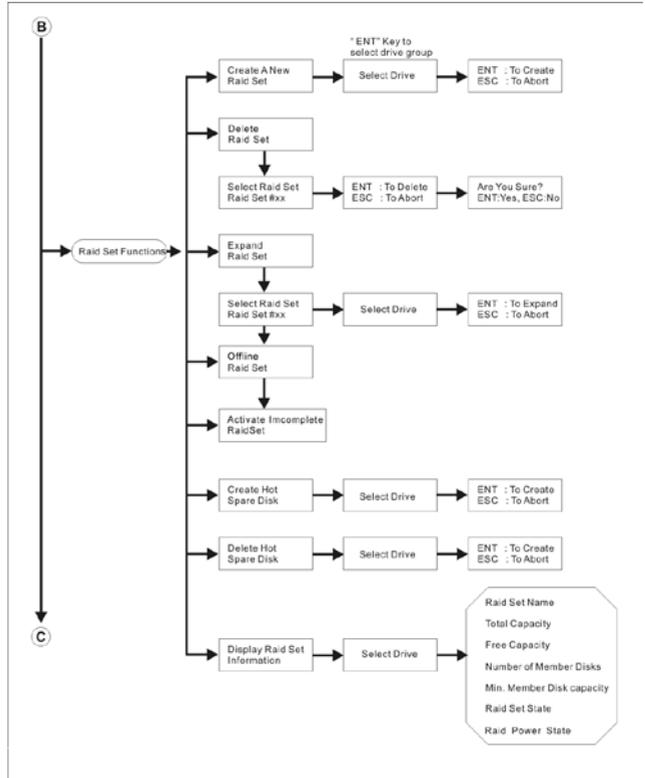
1. All of the physical disk drives are contained in a RAID set.
2. The RAID levels associated with hot spare, capacity, and stripe size are selected during the configuration process.
3. A single volume set is created and consumed all or a portion of the disk capacity available in this RAID set.
4. If you need to add additional volume set, using main menu “Volume Set functions”. Detailed procedure refer to this chapter section 4.7.3.

4.7.2 Raid Set Functions

User manual configuration can complete control of the RAID set setting, but it will take longer time to complete than the “Quick Volume And Raid Setup” configuration. Select the “Raid Set Functions” to manually configure the RAID set for the first time or deletes existing RAID set and reconfigures the RAID set. To enter a “Raid Set Functions”, press **ENT** to enter the main menu. Press **UP/DOWN** buttons to select the “Raid Set Functions” option and then press **ENT** to enter further submenus. All RAID set submenus will be displayed.

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Figure 4.7.2-1



4.7.2.1 Create A New Raid Set

For detailed procedure please refer to chapter section 4.6.

4.7.2.2 Delete Raid Set

Press **UP/DOWN** buttons to choose the "Delete Raid Set" option. Using **UP/DOWN** buttons to select the RAID set number that user want to delete and then press **ENT** to accept the raid set number. The confirmation screen appears, then press **ENT** to accept the delete RAID set function. The double confirmation screen appears, then press **ENT** to make sure of the delete existed RAID set function

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4.7.2.3 Expand Raid Set

Instead of deleting a RAID set and recreating it with additional disk drives, the "Expand Existed Raid Set" function allows the user to add disk drives to the RAID set that was created.

To expand existed RAID set, press **UP/DOWN** buttons to choose the "Expand Raid Set" option. Using **UP/DOWN** buttons to select the RAID set number that user want to expand and then press **ENT** to accept the RAID set number. If there is an available disk, then the "Select Drive" appears. Using up and down arrow to select the target disk and then press **ENT** to select it. Press **ENT** to start expanding the existed raid set. The new add capacity will be define one or more volume sets. Follow the instruction presented in the "Volume Set Function" to create the volume sets.

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

Note:

1. Once the "Expand Raid Set" process has started, user can not 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.

4.7.2.4 Offline Raid Set

Press **UP/DOWN** buttons to choose the "Offline Raid Set" option. This function is for customer being able to mount and remount a multi-disk volume. All Hdds of the selected RAID set will be put into offline state, spun down and fault LED will be in fast blinking mode.

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4.7.2.5 Activate Incomplete RaidSet

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 ARC-8060 series RAID controller is power on. User can use the "Activate Incomplete RaidSet" option to active the RAID set. After user completed the function, the Raid State will change to Degraded Mode.

4.7.2.6 Create Hot Spare Disk

Please refer to this chapter section 4.4. Designating drives as Hot Spares.

4.7.2.7 Delete Hot Spare Disk

To delete hot spare, press **UP/DOWN** buttons to choose the "Delete Hot Spare Disk" option. Using **UP/DOWN** buttons to select the hot spare number that user want to delete and then press **ENT** to select it. The confirmation screens appear and press **ENT** to delete the hot spare.

4.7.2.8 Display Raid Set Information

Choose the "Display Raid Set Information" option and press **ENT**. Using **UP/DOWN** buttons to select the RAID set number. Then the RAID set information will be displayed.

Using **UP/DOWN** buttons to see the RAID set information, it will show Raid Set Name, Total Capacity, Free Capacity, Number of Member Disks, Min. Member Disk Capacity, Raid Set State and Raid Power Status.

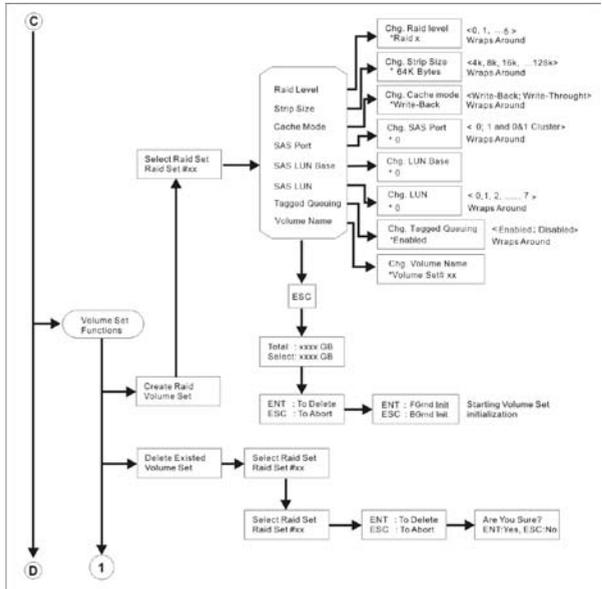
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4.7.3 Volume Set Functions

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.

To enter a "Volume Set Functions", press **ENT** to enter the main menu. Press **UP/DOWN** buttons to select the "Volume Set Functions" option and then press **ENT** to enter further submenus. All volume set submenus will be displayed.

Figure 4.7.3.1-1



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4.7.3.1 Create Raid Volume Set

To create a volume set, Please refer to this chapter section 4.7. Using "Raid Set and Volume Set" Functions. The volume set attributes screen shows the volume set default configuration value that is currently being configured.

The attributes for ARC-8060 series are Volume Name, Raid Level, Stripe Size, Cache Mode, SAS Port/ SAS LUN Base/SAS LUN, Fibre Port/Fibre LUN Base/Fibre LUN, iSCSI Target Node/iSCSI LUN and Tagged Queuing . See Figure 4.7.3.1-1

All value can be changed by user. Press the **UP/DOWN** buttons to select attribute. Press **ENT** to modify the default value. Using the up and down arrow buttons to select attribute value and press **ENT** to accept the default value. The following is the attributes descriptions. Please refer to this chapter section 4.7 Using Raid Set and Volume Set Functions to complete the create volume set function.

4.7.3.1.1 Volume Name

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

4.7.3.1.2 Raid Level

The RAID controller can support RAID level 0, 1, 10(1E), 3, 5 and 6.

4.7.3.1.3 Stripe Size

This parameter sets the size of the segment written to each disk in a RAID 0, 1, 10(1E), or 5 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.

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4.7.3.1.4 Cache Mode

User can set the cache mode as Write-Through Cache or Write-Back Cache.

4.7.3.1.5 SAS Port/SAS LUN Base/SAS LUN

SAS Port: Two 4-lanes SAS ports can be applied to the RAID subsystem. The RAID subsystem supports Port 0,1 and 0&1 cluster option.

SAS LUN base: Each SAS device attached to the SAS host adapter must be assigned a unique SAS ID number. A SAS port can connect up to 122 (0 to 121) devices. The RAID subsystem is as a large SAS device. We should assign an LUN base from a list of SAS LUN Base.

SAS LUN: Each LUN Base can support up to 8 SAS LUNs. Most SAS port host adapter treats each SAS LUN like a SAS disk.

● Fibre Port/Fibre LUN Base/Fibre LUN

Fibre Port: Two 4Gbps Fibre channel can be applied to the internal RAID subsystem. Choose the Fibre Host#1. A Select Fibre Channel dialog box appears, select the channel number and press **Enter** key to confirm it.

Fibre LUN Base: Each fibre device attached to the Fibre card, as well as the card itself, must be assigned a unique fibre ID number. A Fibre channel can connect up to 128(0 to 127) devices. The RAID subsystem is as a large Fibre device. We should assign an LUN base from a list of Fibre LUN Base.

Fibre LUN: Each Fibre LUN base can support up to 8 LUNs. Most Fibre Channel host adapter treats each LUN like a Fibre disk.

● iSCSI Target Node/iSCSI LUN

iSCSI Target Node: A iSCSI RAID controller can connect up to 16 target nodes. The iSCSI RAID subsystem is as a large SAS/SATA device. We should assign a Node from a list of Target Node.

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iSCSI LUN: Each Target Node can support up to 8 LUNs. Most iSCSI host adapter treats each LUN like a SAS/SATA disk.

4.7.3.1.6 Tagged 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.

4.7.3.1.7 Initialization Mode

Press **ENT** to define "FGrnd Init (Foreground initialization)" or press **ESC** to define "BGrnd Init (Background initialization)". When "FGrnd Init", the initialization proceeds must be completed before the volume set ready for system accesses. When "BGrnd Init", 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.

4.7.3.2 Delete Existed Volume Set

Choose the "Delete Existed Volume Set" option. Using **UP/DOWN** buttons to select the raid set number that user want to delete and press **ENT**. The confirmation screen appears, and then press **ENT** to accept the delete volume set function. The double confirmation screen appears, then press **ENT** to make sure of the delete volume set function.

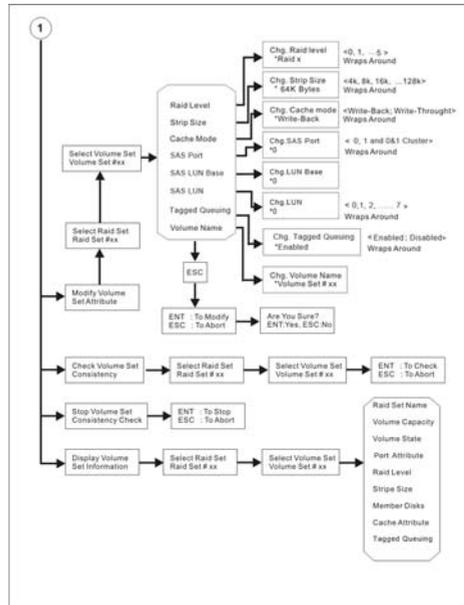
4.7.3.3 Modify Volume Set Attribute

Use this option to modify volume set configuration. To modify volume set attributes from RAID set system function, press up and down arrow to choose the "Modify Volume Set Attribute" option. Using **UP/DOWN** buttons to select the RAID set number that user want to modify and press **ENT**.

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Press **ENT** to select the existed volume set attribute. The volume set attributes screen shows the volume set setting configuration attributes that was currently being configured. The attributes are Raid Level, Stripe Size, Cache Mode, SAS Port/SAS LUN Base/SAS LUN, Fibre Port/Fibre LUN Base/Fibre LUN, iSCSI Target Node/ iSCSI LUN and Tagged Queuing and Volume Name (number). All value can be modified by user. Press the **UP/DOWN** buttons to select attribute. Press **ENT** to modify the default value. Using the **UP/DOWN** buttons to select attribute value and press the **ENT** to accept the selection value. Choose this option to display the properties of the selected volume set.

Figure 4.7.3.2-1



4.7.3.3.1 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 state area of the "Display Volume Set" Information.

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4.7.3.4 Check Volume Set Consistency

Use this option to check volume set consistency. To check volume set consistency from volume set system function, press **UP/DOWN** buttons to choose the "Check Volume Set Consistency" option. Using **UP/DOWN** button to select the RAID set number that user want to check and press **ENT**. The confirmation screen appears, press **ENT** to start the check volume set consistency.

4.7.3.5 Stop Volume Set Consistency Check

Use this option to stop volume set consistency check. To stop volume set consistency check from volume set system function, press **UP/DOWN** buttons to choose the "Stop Volume Set Consistency Check" option and then press **ENT** to stop the check volume set consistency.

4.7.3.6 Display Volume Set Information

To display volume set information from volume set function, press **UP/DOWN** buttons to choose the "Display Volume Set Information" option. Using **UP/DOWN** buttons to select the raid set number that user wants to show and press **ENT**. The volume set information will show Volume Set Name, Raid Set Name, Volume Capacity, Port Attribute, RAID Level, Stripe Size, Member Disks, Cache Attribute and Tagged Queuing. All value cannot be modifying by this option.

4.7.4 Physical Drive Functions

Choose this option from the main menu to select a physical disk and to perform the operations listed below. To enter a physical drive functions, press **ENT** to enter the main menu. Press **UP/DOWN** buttons to select the "Physical Drive Functions" option and then press **ENT** to enter further submenus. All physical drive submenus will be displayed.

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Figure 4.7.4-1

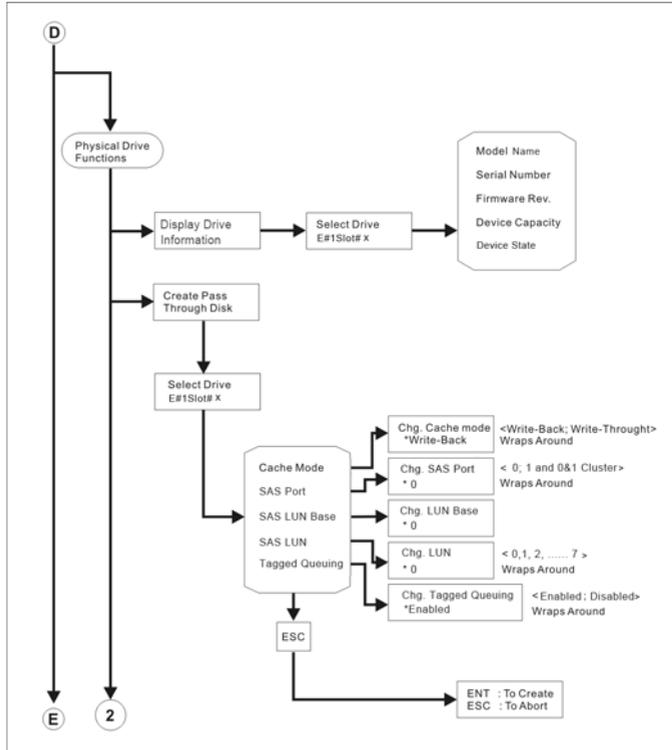
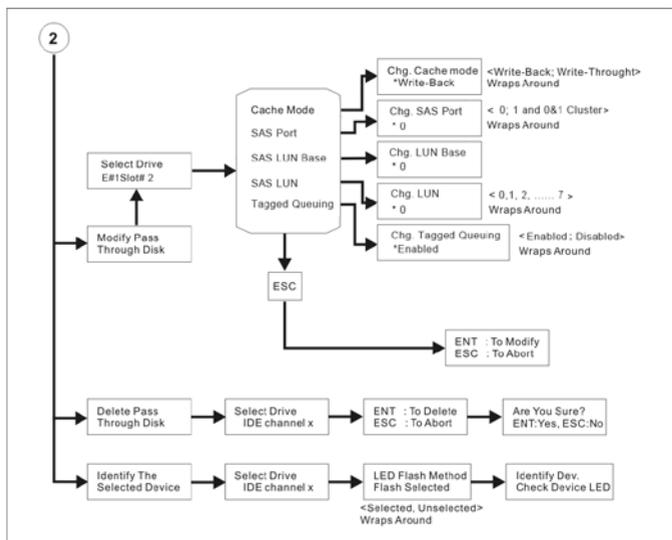


Figure 4.7.4-2



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4.7.4.1 Display Drive Information

Using **UP/DOWN** buttons to choose the "Display Drive Information" option and press **ENT**. Using **UP/DOWN** buttons to select the drive SAS/SATA number that user want to display. The drive information will be displayed. The SATA drive information screen shows the Model Name, Serial Number, Firmware Rev., Device Capacity, Current SATA, Supported SATA, and Device State.

4.7.4.2 Create Pass Through Disk

Disk is no controlled by the ARC-8060 series RAID controller firmware and thus cannot be a part of a RAID 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 ARC-8060 series RAID box firmware. Using **UP/DOWN** buttons to choose the "Create Pass-Through Disk" option and press **ENT**. Using **UP/DOWN** buttons to select the drive SAS/SATA number that user want to create. The drive attributes will be displayed.

The attributes for Pass-Through disk show the Volume Cache Mode, SAS Port/ SAS LUN Base/SAS LUN, Fibre Port/Fibre LUN Base/Fibre LUN, iSCSI Target Node/iSCSI LUN and Tagged Queuing .

All values can be changed by user. Press the **UP/DOWN** buttons to attribute and then press **ENT** to modify the default value. Using the up and down arrow buttons to select attribute value and press **ENT** to accept the selection value.

4.7.4.3 Modify Pass Through Disk

To modify Pass Through Disk attributes from Pass Through drive pool, press **UP/DOWN** buttons to choose the "Modify Pass Through Disk" option, and then press **ENT**. The select drive function menu will show all Pass Through disk number items. Using **UP/DOWN** buttons to select the Pass Through Disk that user wants to modify and press **ENT**. The attributes screen shows the Pass Through Disk setting value that was currently being configured.

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The attributes for Pass-Through Disk are the Volume Cache Mode, Tagged Command Queuing and SAS Port/ SAS LUN Base/ SAS LUN, Fibre Port/Fibre LUN Base/Fibre LUN, iSCSI Target Node/ iSCSI LUN. All value can be modified by user. **UP/DOWN** buttons to select attribute. Press **ENT** to modify the default value. Using the up and down arrow buttons to select attribute value and press **ENT** to accept the selection value. After completing the modification, press **ESC** to enter the confirmation screen and then press **ENT** to accept the "Modify Pass Through Disk" function.

4.7.4.4 Delete Pass Through Disk

To delete Pass-Through disk from the pass-through drive pool, press **UP/DOWN** buttons to choose the "Delete Pass Through Disk" option, and then press **ENT**. The Select Drive Function menu will show all Pass Through disk number items. Using **UP/DOWN** buttons to select the Pass Through Disk that user want to delete and press **ENT**. The delete Pass Through confirmation screen will appear, press **ENT** to delete it.

4.7.4.5 Identify The Selected Drive

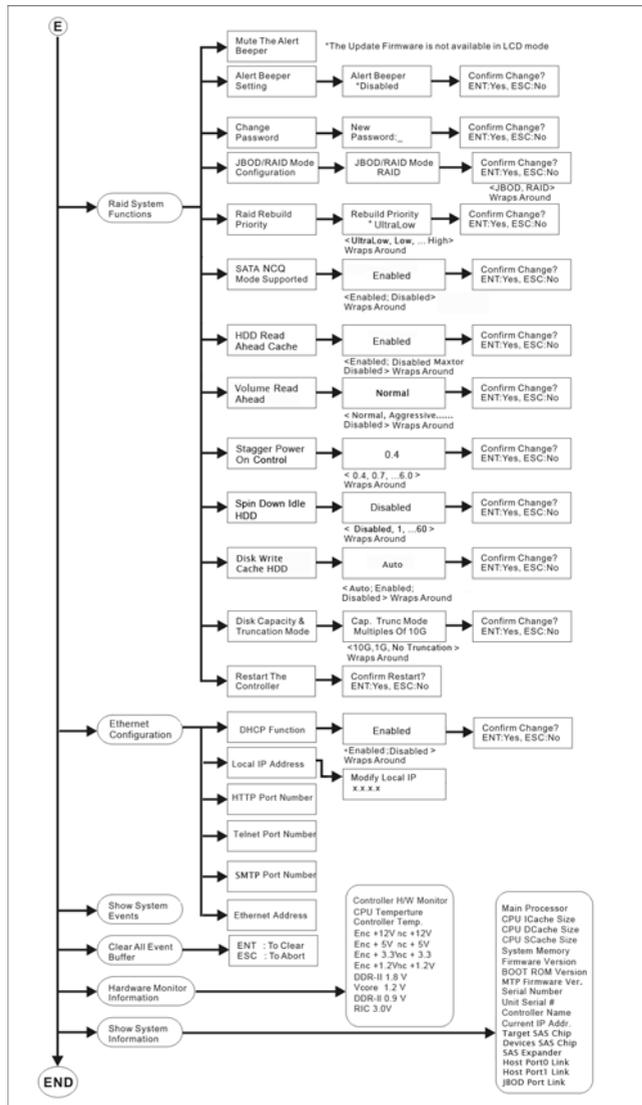
To prevent removing the wrong drive, the selected disk Fault LED indicator will light for physically locating the selected disk when the "Identify The Selected Drive" function is selected. To identify selected drive from the physical drive pool, press **UP/DOWN** buttons to choose the "Identify The Selected Drive" option, then press **ENT** key. The Select Drive function menu will show all physical drive number items. Using **UP/DOWN** buttons to select the disk that user want to identify and press **ENT**. The selected disk Fault LED indicator will flash.

4.7.5 Raid System Functions

To enter a "Raid System Functions", press **ENT** to enter the main menu. Press **UP/DOWN** buttons to select the "Raid System Functions" option and then press **ENT** to enter further submenus. All raid system submenus will be displayed. Using **UP/DOWN** buttons to select the submenus option and then press **ENT** to enter the selection function.

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Figure 4.7.5-1



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4.7.5.1 Mute The Alert Beeper

The "Mute The Alert Beeper" function item is used to control the RAID box beeper. Select **No** and press **ENT** button to turn the beeper off temporarily. The beeper will still activate on the next event.

4.7.5.2 Alert Beeper Setting

The "Alert Beeper Setting" function item is used to disable or enable the RAID box alarm tone generator. Using the **UP/DOWN** buttons to select "Alert beeper Setting" and press **ENT** to accept the selection. After completed the selection, the confirmation screen will be displayed and then press **ENT** to accept the function. Select the "Disabled" and press **ENT** key in the dialog box to turn the beeper off.

4.7.5.3 Change Password

To set or change the ARC-6080 series RAID box password, press the **UP/DOWN** buttons to select "Change Password" option and then press **ENT** to accept the selection. The New Password: screen appears and enter new password that user want to change. Using **UP/DOWN** buttons to set the password value. After completed the modification, the confirmation screen will be displayed and then press **ENT** to accept the function. To disable the password, press **ENT** only in the New Password: column. The existing password will be cleared. No password checking will occur when entering the main menu from the starting screen. The ARC-8060 series RAID controller will automatically go back to the initial screen when it does not receive any command in 5 minutes. Do not use spaces when you enter the password, If spaces are used, it will lock out the user.

4.7.5.4 JBOD/RAID Mode Configuration

JBOD is an acronym for "Just a Bunch Of Disk". A group of hard disks in a RAID box are not set up as any type of RAID configuration. All drives are available to the operating system as an individual disk. JBOD does not provide data redundancy. User needs to delete the RAID set, when you want to change the option from the RAID to the JBOD function.

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4.7.5.5 Raid Rebuild Priority

The "Raid Rebuild Priority" is a relative indication of how much time the controller devotes to a rebuild operation. The RAID box allows user to choose the rebuild priority (UltraLow, Low, ... High) to balance volume set access and rebuild tasks appropriately. To set or change the ARC-8060 series RAID box's RAID Rebuild Priority, press the **UP/DOWN** buttons to select "RAID Rebuild Priority" and press **ENT** to accept the selection. The rebuild priority selection screen appears and uses the **UP/DOWN** buttons to set the rebuild value. After completing the modification, the confirmation screen will be displayed and then press **ENT** to accept the function.

4.7.5.6 SATA NCQ Mode Support

The controller supports both SAS and SATA disk drives. The SATA NCQ 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. The ARC-8060 series RAID controller allows the user to select the SATA NCQ support: "Enabled" or "Disabled".

4.7.5.7 HDD Read Ahead Cache

Allow Read Ahead (Default: Enabled)—When Enabled, the drive's read ahead cache algorithm is used, providing maximum performance under most circumstances.

4.7.5.8 Volume Data Read Ahead

The Read data ahead parameter specifies the controller firmware algorithms which process the Read Ahead data blocks from the disk. The Read Ahead parameter is normal by default. To modify the value, you must know your application behavior. The default normal option satisfies the performance requirements for a typical volume. The disabled value implies no read ahead. The most efficient value for the controllers depends on your

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application. Aggressive read ahead is optimal for sequential access but it degrades random access.

4.7.5.9 Stagger Power On Control

In a PC system with only one or two drives, the power can supply enough power to spin up both drives simultaneously. But in systems with more than two drives, the startup current from spinning up the drives all at once can overload the power supply, causing damage to the power supply, disk drives and other system components. This damage can be avoided by allowing the host to stagger the spin-up of the drives. New SATA drives have support staggered spin-up capabilities to boost reliability. Staggered spin-up is a very useful feature for managing multiple disk drives in a storage subsystem. It gives the host the ability to spin up the disk drives sequentially or in groups, allowing the drives to come ready at the optimum time without straining the system power supply. Staggering drive spin-up in a multiple drive environment also avoids the extra cost of a power supply designed to meet short-term startup power demand as well as steady state conditions.

Areca ARC-8060 series RAID controller has included the option for customer to select the disk drives sequentially stagger power up value. The values can be selected from 0.4s to 6s step which powers up one drive.

4.7.5.10 Spin Down Idle HDD

This function can automatically spin down the drive if it hasn't been accessed for a certain amount of time. This value is used by the drive to determine how long to wait (with no disk activity, before turning off the spindle motor to save power.)

4.7.5.11 Disk Write Cache HDD

User can set the "Disk Write Cache Mode" to Auto, Enabled, or Disabled. "Enabled" increases speed, "Disabled" increases reliability.

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4.7.5.12 Disk Capacity Truncation Mode

The ARC-8060 series RAID controller 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. The RAID controller provides three truncation modes in the system configuration: Multiples Of 10G, Multiples Of 1G and No Truncation.

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. "Multiples Of 10G" truncates the number under tens. This makes 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. "Multiples Of 1G" truncates the fractional part. This makes the same capacity for both of these drives so that one could replace the other.

Disabled: It does not truncate the capacity.

4.7.5.13 Restart Controller

To restart the RAID controller, press **UP/DOWN** buttons to select "Restart Controller" and then press **ENT** to accept the selection. The confirmation screen will be displayed and then press **ENT** to accept the function.

Note:

It only can work properly at host and drive without any activity.

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4.7.6 Ethernet Configuration

To configuration Ethernet function, press **ENT** to enter the main menu. Press **UP/DOWN** buttons to select the option.

4.7.6.1 DHCP

DHCP (Dynamic Host Configuration Protocol) allows network administrators centrally manage and automate the assignment of IP (Internet Protocol) addresses on a computer network. When using the TCP/IP protocol (Internet protocol), it is necessary for a computer to have a unique IP address in order to communicate to other computer systems. Without DHCP, the IP address must be entered manually at each computer system. DHCP lets a network administrator supervise and distribute IP addresses from a central point. The purpose of DHCP is to provide the automatic (dynamic) allocation of IP client configurations for a specific time period (called a lease period) and to minimize the work necessary to administer a large IP network. To manually configure the IP address of the RAID box, press the UP/DOWN buttons to select "Ethernet Configuration" function and press ENT. Using UP/DOWN buttons to select DHCP, then press ENT.

Select the "Disabled" or "Enabled" option to enable or disable the DHCP function. If DHCP is disabled, it will be necessary to manually enter a static IP address that does not conflict with other devices on the network.

4.7.6.2 Local IP Adress

If you intend to set up your client computers manually (no DHCP), make sure that the assigned IP address is in the same range as the default router address and that it is unique to your private network. However, it is highly recommend to use DHCP if that option is available on your network. An IP address allocation scheme will reduce the time it takes to set-up client computers and eliminate the possibilities of administrative errors and duplicate addresses. To manually configure the IP address of the RAID controller, press the **UP/DOWN** buttons to select "Ethernet Configuration" function and press **ENT**. Using **UP/DOWN** buttons to select "Local IP Adress", then press **ENT**. It

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will show the default address setting in the RAID controller. You can then reassign the static IP address of the RAID controller.

4.7.6.3 HTTP Port Number

To manually configure the HTTP Port Number of the RAID controller, press **UP/DOWN** buttons to select "Ethernet Configuration" function and press **ENT**. Using **UP/DOWN** buttons to select "HTTP Port Number", then press **ENT**. It will show the default address setting in the RAID controller. Then You can reassign the default HTTP Port Number of the controller.

4.7.6.4 Telnet Port Number

To manually configure the Telnet Port Number of the RAID controller, press the **UP/DOWN** buttons to select "Ethernet Configuration" function and press **ENT**. Using **UP/DOWN** buttons to select "Telnet Port Number", then press **ENT**. It will show the default address setting in the RAID controller. You can then reassign the default Telnet Port Number of RAID controller.

4.7.6.5 SMTP Port Number

To manually configure the "SMTP Port Number" of the controller, move the cursor bar to the main menu "Ethernet Configuration" function item and then press Enter key. The "Ethernet Configuration" menu appears on the screen. Move the cursor bar to "SMTP Port Number" item, then press Enter key to show the default address setting in the RAID controller. You can then reassign the default "SMTP Port Number" of the controller.

4.7.6.6 Ethernet Address

Each Ethernet port has its unique Mac address, which is also factory assigned. Usually, Ethernet Address is used to uniquely identify a port in the Ethernet network.

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4.7.7 Show System Events

To view the RAID box events, press **ENT** to enter the main menu. Press **UP/DOWN** buttons to select the "Show System Events" option, and then press **ENT**. The system events will be displayed. Press **UP/DOWN** buttons to browse all the system events.

4.7.8 Clear all Event Buffers

Use this feature to clear the entire events buffer information. To clear all event buffers, press **ENT** to enter the main menu. Press **UP/DOWN** buttons to select the "Clear all Event Buffers" option, and then press **ENT**. The confirmation message will be displayed and press **ENT** to clear all event buffers or **ESC** to abort the action.

4.7.9 Hardware Monitor Information

To view the ARC-8060 series RAID controller monitor information, press **ENT** to enter the main menu. Press **UP/DOWN** buttons to select the "Hardware Information" option, and then press **ENT**. All hardware monitor information will be displayed. Press **UP/DOWN** buttons to browse all the hardware information. The hardware information provides the CPU temperature, Controller temperature, fan speed (chassis fan), battery atatus and voltage of the RAID controller. All items are also unchangeable. The warning messages will indicate through the LCM, LED and alarm buzzer.

4.7.10 System Information

Choose this option to display Main processor, CPU Instruction cache and data cache size, system memory, firmware version, BOOT ROM version, MTP firmware, serial number, unit serial, controller name, current IP, target SAS chip, devices chip, SAS expander, host port link and JBOD port link. To check the system information, press **ENT** to enter the main menu. Press **UP/DOWN** button to select the "Show System Information" option, and then press **ENT**. All major controller system information will be displayed. Press **UP/DOWN** buttons to browse all the system information.

VT-100 UTILITY CONFIGURATION

VT-100 Utility Configuration

The RAID box configuration utility is firmware-based and uses to configure RAID sets and volume sets. Because the utility resides in the RAID controller firmware, its operation is independent of the operating systems on your computer. Use this utility to:

- Create RAID set,
- Expand RAID set,
- Define volume set,
- Add physical drive,
- Modify volume set,
- Modify RAID level/stripe size,
- Define pass-through disk drives,
- Update firmware,
- Modify system function and,
- Designate drives as hot spares.

Keyboard Navigation

The following definition is the VT-100 RAID configuration utility keyboard navigation

Key	Function
Arrow Key	Move Cursor
Enter Key	Submit selection function
ESC Key	Return to previous screen
L Key	Line Draw
X Key	Redraw

5.1 Configuring Raid Sets/Volume Sets

You can configure RAID sets and volume sets with VT-100 utility configuration automatically. Using "Quick Volume/Raid Setup" or manually using "Raid Set/Volume Set Function". Each configuration method requires a different level of user input. The general flow of operations for RAID set and volume set configuration is:

VT-100 UTILITY CONFIGURATION

Step	Action
1	Designate hot spares/pass-through (optional).
2	Choose a configuration method.
3	Create RAID sets using the available physical drives.
4	Define volume sets using the space in the RAID set.
5	Initialize the volume sets (logical drives) and use volume sets in the host OS.

5.2 Designating Drives as Hot Spares

Any unused disk drive that is not part of a RAID set can be designated as a hot spare. The "Quick Volume/Raid Setup" configuration will add the spare disk drive and automatically display the appropriate RAID level from which the user can select. For the "Raid Set Function" configuration option, the user can use the "Create Hot Spare" option to define the hot spare disk drive.

When a hot spare disk drive is being created using the "Create Hot Spare" option (in the "Raid Set Function"), all unused physical devices connected to the current controller appear:

Choose the target disk by selecting the appropriate check box. Press **Enter** key to select a disk drive, and press **Yes** in the "Create Hot Spare" to designate it as a hot spare.

5.3 Using Quick Volume /Raid Setup Configuration

"Quick Volume / Raid Setup configuration" collects all available drives and includes them in a RAID set. The RAID set you created is associated with exactly one volume set. You will only be able to modify the default RAID level, stripe size and capacity of the new volume set. Designating drives as hot spares is also possible in the "Raid Level" selection option. The volume set default settings will be:

Parameter	Setting
Volume Name	Volume Set # 00
SAS Port#/LUN Base/LUN	0/0/0
Cache Mode	Write Back
Tag Queuing	Yes

VT-100 UTILITY CONFIGURATION

The default setting values can be changed after configuration is complete. Follow the steps below to create arrays using "Quick Volume /Raid Setup" Configuration:

Step	Action
1	Choose "Quick Volume /Raid Setup" from the main menu. The available RAID levels with hot spare for the current volume set drive are displayed.
2	It is recommended that you use drives of the same capacity in a specific array. If you use drives with different capacities in an array, all drives in the RAID set will be set to the capacity of the smallest drive in the RAID set. The numbers of physical drives in a specific array determines which RAID levels that can be implemented in the array. RAID 0 requires 1 or more physical drives. RAID 1 requires at least 2 physical drives. RAID 10(1E) requires at least 3 physical drives. RAID 3 requires at least 3 physical drives. RAID 5 requires at least 3 physical drives. RAID 3 +Spare requires at least 4 physical drives. RAID 5 + Spare requires at least 4 physical drives. RAID 6 requires at least 4 physical drives. RAID 6 + Spare requires at least 5 physical drives. Highlight the desired RAID level for the volume set and press the Enter key to confirm.
3	The capacity for the current volume set is entered after highlighting the desired RAID level and pressing the Enter key. The capacity for the current volume set is displayed. Use the UP and DOWN arrow keys to set the capacity of the volume set and press the Enter key to confirm. The available stripe sizes for the current volume set are then displayed.
4	Use the UP and DOWN arrow keys to select the current volume set stripe size and press the Enter key to confirm. This parameter specifies the size of the stripes written to each disk in a RAID 0, 1, 10(1E), 5 or 6 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 provides better read performance, especially when the computer performs mostly sequential reads. However, if the computer performs random read requests more often, choose a smaller stripe size.
5	When you are finished defining the volume set, press the Yes key to confirm the "Quick Volume And Raid Set Setup" function.
6	Foreground (Fast Completion) Press Enter key to define fast initialization or selected the Background (Instant Available) or No Init (To Rescue Volume). In the "Background 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. In "Foreground Initialization", the initialization proceeds must be completed before the volume set ready for system accesses. In "No Init", there is no initialization on this volume.

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7	Initialize the volume set you have just configured
8	If you need to add additional volume set, using main menu "Create Volume Set" function.

5.4 Using Raid Set/Volume Set Function Method

In "Raid Set Function", you can use the "Create Raid Set" function to generate a new RAID set. In "Volume Set Function", you can use the "Create Volume Set" function to generate an associated volume set and configuration parameters.

If the current controller has unused physical devices connected, you can choose the "Create Hot Spare" option in the "Raid Set Function" to define a global hot spare. Select this method to configure new RAID sets and volume sets. The "Raid Set/Volume Set Function" configuration option allows you to associate volume sets with partial and full RAID sets.

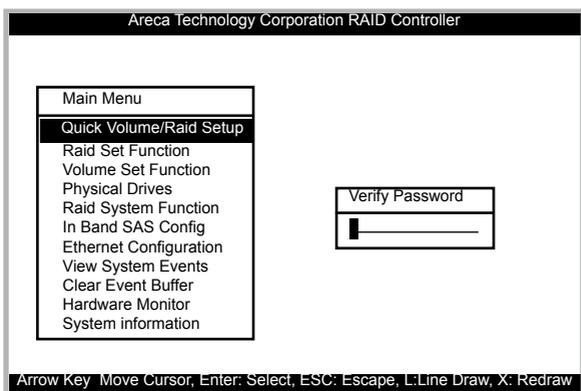
Step	Action
1	To setup the hot spare (option), choose "Raid Set Function" from the main menu. Select the "Create Hot Spare" and press the Enter key to define the hot spare.
2	Choose "RAID Set Function" from the main menu. Select "Create Raid Set" and press the Enter key.
3	The "Select a Drive For Raid Set" window is displayed showing the SAS/SATA drives connected to the SAS RAID controller.
4	<p>Press the UP and DOWN arrow keys to select specific physical drives. Press the Enter key to associate the selected physical drive with the current RAID set.</p> <p>It is recommended that you use drives of the same capacity in a specific array. If you use drives with different capacities in an array, all drives in the RAID set will be set to the capacity of the smallest drive in the RAID set. The numbers of physical drives in a specific array determines which RAID levels that can be implemented in the array.</p> <p>RAID 0 requires 1 or more physical drives. RAID 1 requires at least 2 physical drives. RAID 10(1E) requires at least 3 physical drives. RAID 3 requires at least 3 physical drives. RAID 5 requires at least 3 physical drives. RAID 6 requires at least 4 physical drives. RAID 30 requires at least 6 physical drives. RAID 50 requires at least 6 physical drives. RAID 60 requires at least 8 physical drives.</p>

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5	After adding the desired physical drives to the current RAID set, press the Enter to confirm the "Create Raid Set" function.
6	An "Edit The Raid Set Name" dialog box appears. Enter 1 to 15 alphanumeric characters to define a unique identifier for this new RAID set. The default RAID set name will always appear as Raid Set. #. Press Enter to finish the name editing.
7	Press the Enter key when you are finished creating the current RAID set. To continue defining another RAID set, repeat step 3. To begin volume set configuration, go to step 8.
8	Choose the "Volume Set Function" from the main menu. Select "Create Volume Set" and press the Enter key.
9	Choose a RAID set from the "Create Volume From Raid Set" window. Press the Yes key to confirm the selection.
10	Choosing Foreground (Fast Completion) Press Enter key to define fast initialization or selected the Background (Instant Available) or No Init (To Rescue Volume). In the "Background 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. In "Foreground Initialization", the initialization proceeds must be completed before the volume set ready for system accesses. In "No Init", there is no initialization on this volume.
11	If space remains in the RAID set, the next volume set can be configured. Repeat steps 8 to 10 to configure another volume set.

5.5 Main Menu

The main menu shows all functions that are available for executing actions, which is accomplished by clicking on the appropriate link.



Note:

The manufacture default password is set to 0000, this password can be by selected the "Change Password" in the section of "Raid System Function".

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Option	Description
Quick Volume/Raid Setup	Create a default configuration which based on numbers of physical disk installed
Raid Set Function	Create a customized RAID set
Volume Set Function	Create a customized volume set
Physical Drives	View individual disk information
Raid System Function	Setting the RAID system configuration
In Band SAS Config	In Band management configuration
Ethernet Configuration	Ethernet LAN Setting
View 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

This password option allows user to set or clear the RAID controller's password protection feature. Once the password has been set, the user can only monitor and configure the RAID controller by providing the correct password. The password is used to protect the internal RAID controller from unauthorized entry. The controller will prompt for the password only when entering the main menu from the initial screen. The RAID controller will automatically return to the initial screen when it does not receive any command in five minutes.

5.5.1 Quick Volume/Raid Setup

"Quick Volume/RAID Setup" is the fastest way to prepare a RAID set and volume set. It requires only a few keystrokes to complete. Although disk drives of different capacity may be used in the RAID Set, it will use the capacity of the smallest disk drive as the capacity of all disk drives in the RAID Set. The "Quick Volume/RAID Setup" option creates a RAID set with the following properties:

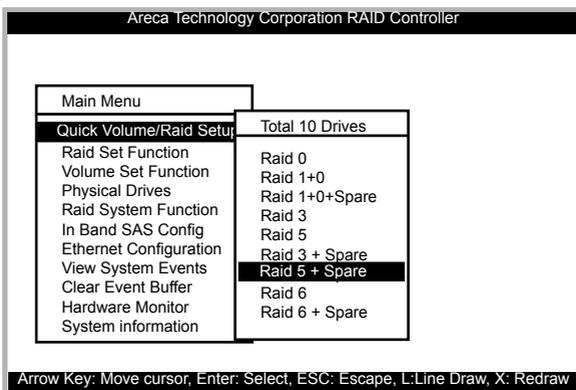
1. All of the physical drives are contained in one RAID set.
2. The RAID level, hot spare, capacity, and stripe size options are selected during the configuration process.
3. When a single volume set is created, it can consume all or

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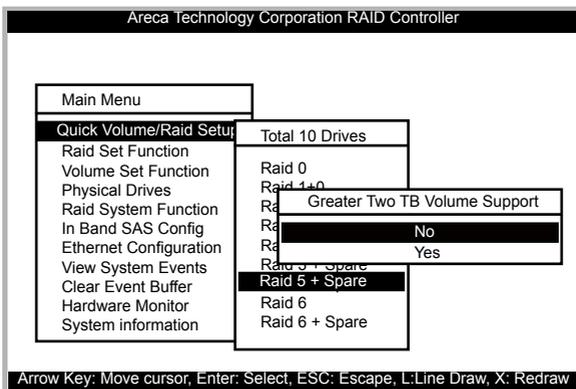
a portion of the available disk capacity in this RAID set.

4. If you need to add an additional volume set, use the main menu "Create Volume Set" function.

The total number of physical drives in a specific RAID set determine the RAID levels that can be implemented within the RAID set. Select "Quick Volume/Raid Setup" from the main menu; all possible RAID level will be displayed on the screen.



If volume capacity will exceed 2TB, controller will show the "Greater Two TB Volume Support" sub-menu.



- No
It keeps the volume size with max. 2TB limitation.

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- Yes

This option uses 16 bytes CDB instead of 10 bytes. The maximum volume capacity up to 512TB.

This option works on different OS which supports 16 bytes CDB. Such as:

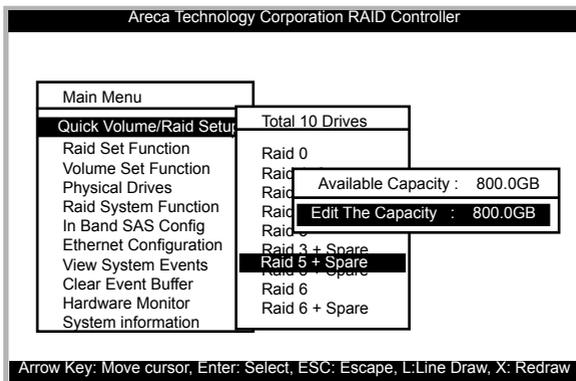
Windows 2003 with SP1

Linux kernel 2.6.x or latter

This option works under Windows platform only. And it can not be converted to "Dynamic Disk", because 4k sector size is not a standard format.

For more details, please download pdf file from **ftp://ftp.areca.com.tw/RaidCards/Documents/Manual_Spec/Over2TB_050721.zip**

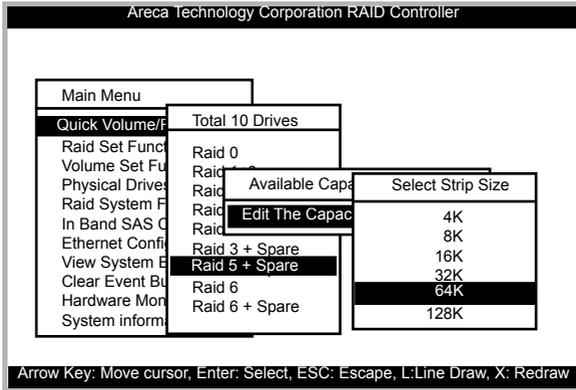
A single volume set is created and consumes all or a portion of the disk capacity available in this RAID set. Define the capacity of volume set in the "Available Capacity" popup. The default value for the volume set, which is 100% of the available capacity, is displayed in the selected capacity. use the **UP** and **DOWN** arrow key to set capacity of the volume set and press **Enter** key to accept this value. If the volume set uses only part of the RAID set capacity, you can use the "Create Volume Set" option in the main



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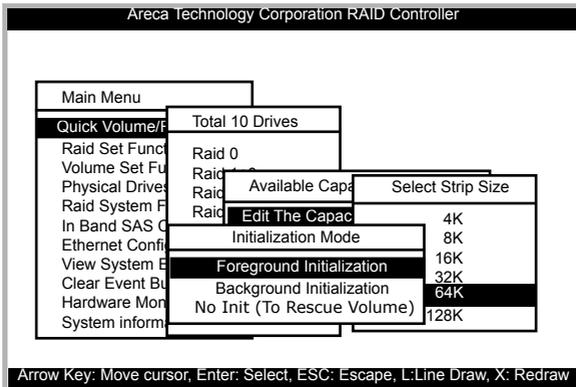
menu to define additional volume sets.

Stripe Size This parameter sets the size of the stripe written to each disk in a RAID 0, 1, 10(1E), 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 performs random reads more often, select a smaller stripe size.

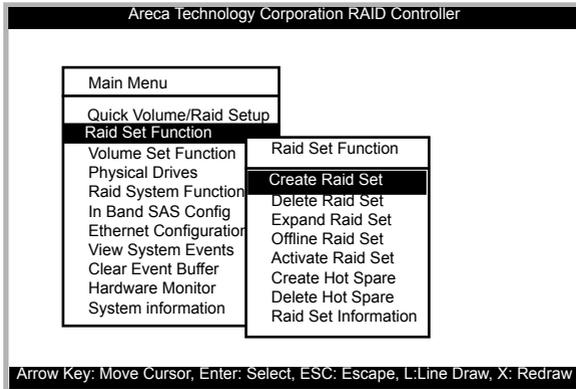
Press **Yes** key in the "Create Vol/Raid Set" dialog box, the RAID set and volume set will start to initialize it. Select "Foreground (Faster Completion)" or "Background (Instant Available)" for initialization and "No Init (To Rescue Volume)" for



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5.5.2 Raid Set Function

Manual configuration gives complete control of the RAID set setting, but it will take longer to configure than "Quick Volume/Raid Setup" configuration. Select "Raid Set Function" to manually configure the RAID set for the first time or delete existing RAID sets and reconfigure the RAID set.



5.5.2.1 Create Raid Set

The following is the RAID set features for the SAS RAID controller.

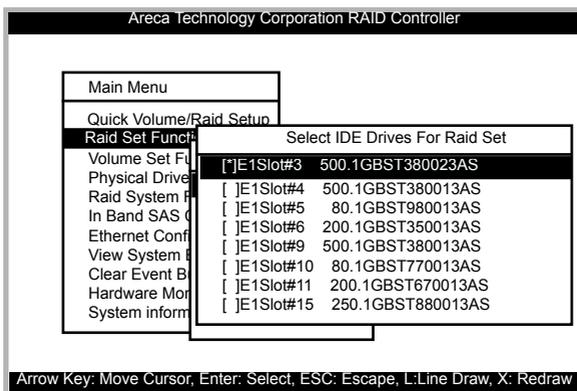
1. Up to 32 disk drives can be included in a single RAID set.
2. Up to 128 RAID sets can be created per controller. RAID level 30 50 and 60 can support up to eight sub-volumes (RAID set).

To define a RAID set, follow the procedures below:

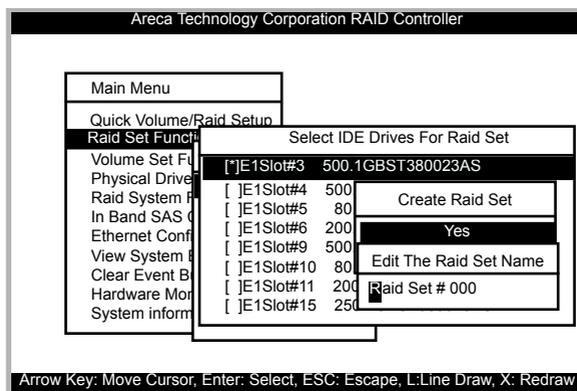
1. Select "Raid Set Function" from the main menu.
2. Select "Create Raid Set " from the "Raid Set Function" dialog box.
3. A "Select IDE Drive For Raid Set" window is displayed showing the SAS/SATA drives connected to the current controller. Press the **UP** and **DOWN** arrow keys to select specific physical drives. Press the **Enter** key to associate the selected physical drive with the current RAID set. Repeat this step; the user can add as many disk drives as are available to a single RAID set.

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When finished selecting SAS/SATA drives for RAID set, press **Esc** key. A "Create Raid Set Confirmation" screen will appear, select the **Yes** option to confirm it.



4. An "Edit The Raid Set Name" dialog box appears. Enter 1 to 15 alphanumeric characters to define a unique identifier for the RAID set. The default RAID set name will always appear as Raid Set. #.
5. Repeat steps 3 to define another RAID sets.



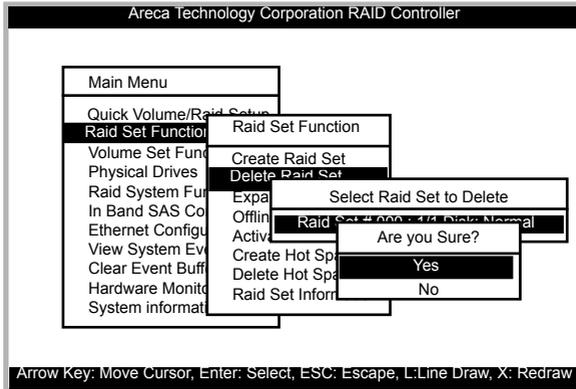
Note:

1. You only can edit the Raid set name in "Create Raid Set".
2. To create RAID 30/50/60 volume, you need to create multiple RAID sets first with the same disk members on each RAID set. The max no. disk drives per volume set: 32 for RAID 0/1/10(1E)/3/5/6 and 128 for RAID 30/50/60.

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5.5.2.2 Delete Raid Set

To completely erase and reconfigure a RAID set, you must first delete it and re-create the RAID set. To delete a RAID set, select the RAID set number that you want to delete in the "Select Raid Set To Delete" screen. Then "Delete Raid Set" dialog box will appear, press the **Yes** to delete it. Warning, data on RAID set will be lost if this option is used. But for deleting RAID set with the Raid 30/50/60 volume, firstly, you need to delete the volumes belonging those RAID sets.



5.5.2.3 Expand Raid Set

Instead of deleting a RAID set and recreating it with additional disk drives, the "Expand Raid Set" function allows the users to add disk drives to the RAID set that have already been created.

To expand a RAID set:

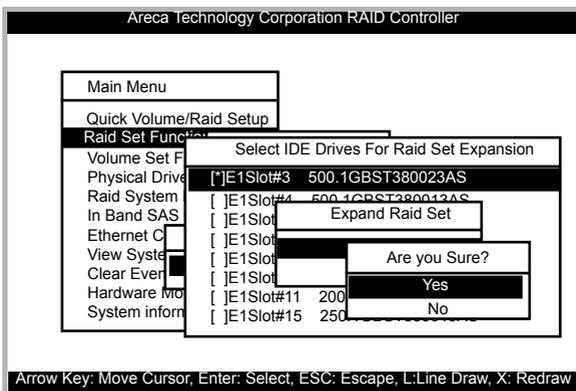
Select the "Expand Raid Set" option. If there is an available disk, then the "Select SATA Drives For Raid Set Expansion" screen appears.

Select the target RAID set by clicking on the appropriate radio button. Select the target disk by clicking on the appropriate check box.

Press the **Yes** key to start the expansion on the RAID set.

The new additional capacity can be utilized by one or more volume sets. The volume sets associated with this RAID set appear for you to have chance to modify RAID level or stripe size. Follow the instruction presented in the "Modify Volume Set" to modify the volume sets; operation system specific utilities may be required to expand operating system partitions.

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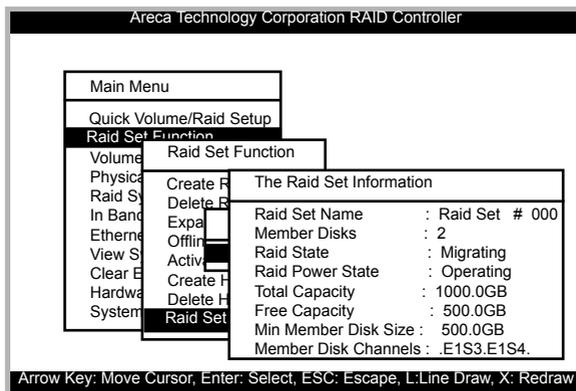


Note:

1. Once the "Expand Raid Set" process has started, user can not 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.
3. RAID 30/50/60 doesn't support the "Expand Raid Set"..

• Migrating

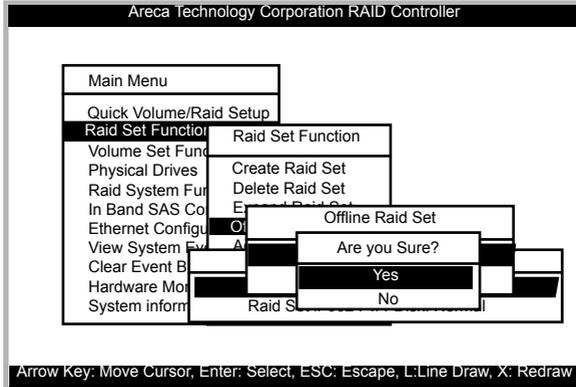
Migration occurs when a disk is added to a RAID set. Migrating state is displayed in the RAID state area of "The Raid Set Information" screen when a disk is being added to a RAID set. Migrating state is also displayed in the associated volume state area of the "Volume Set Information" which belongs this RAID set.



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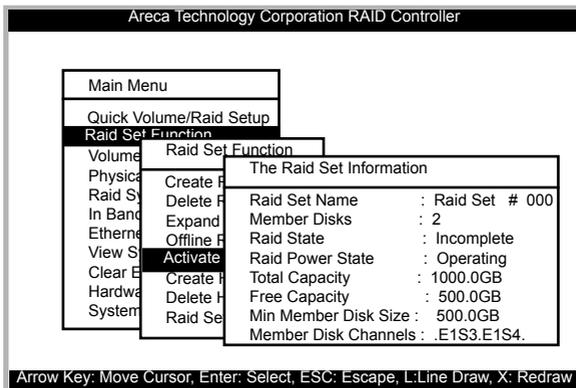
5.5.2.4 Offline Raid Set

This function is for customer being able to unmount and remount a multi-disk volume. All Hdds of the selected RAID set will be put into offline state and spun down and fault LED will be in fast blinking mode.



5.5.2.5 Activate Raid Set

The following screen is used to activate the RAID set after one of its disk drive was removed in the power off state. When one of the disk drives is removed in power off state, the RAID set state will change to "Incomplete State". If user wants to continue to work while the SAS RAID controller is powered on, the user can use the "Activate Incomplete Raid Set" option to activate the RAID set. After user selects this function, the RAID state will change to "Degraded Mode" and start to work.



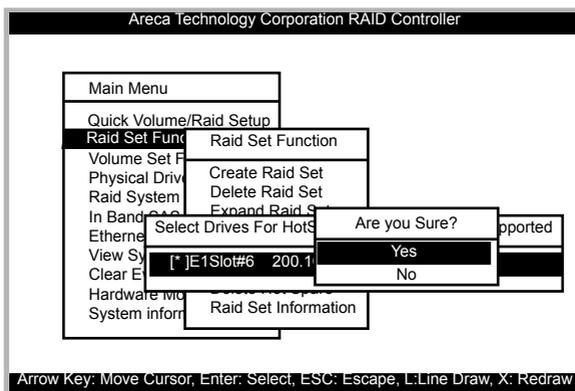
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5.5.2.6 Create Hot Spare

When you choose the "Create Hot Spare" option in the "Raid Set Function", all unused physical devices connected to the current controller will result in the screen.

Select the target disk by clicking on the appropriate check box. Press the **Enter** key to select a disk drive and press **Yes** in the "Create Hot Spare" to designate it as a hot spare.

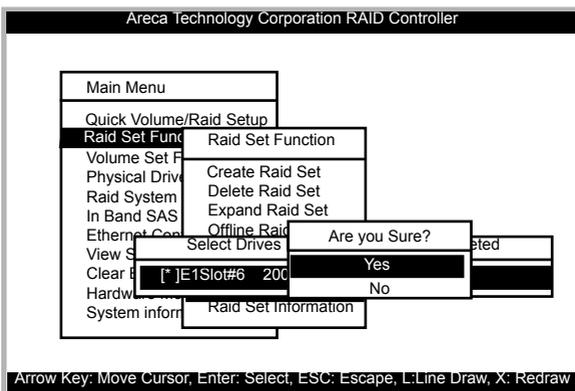
The "Create Hot Spare" option gives you the ability to define a global hot spare.



5.5.2.7 Delete Hot Spare

Select the target hot spare disk to delete by clicking on the appropriate check box.

Press the **Enter** key to select a hot spare disk drive, and press **Yes** in the "Delete Hot Spare" screen to delete the hot spare.

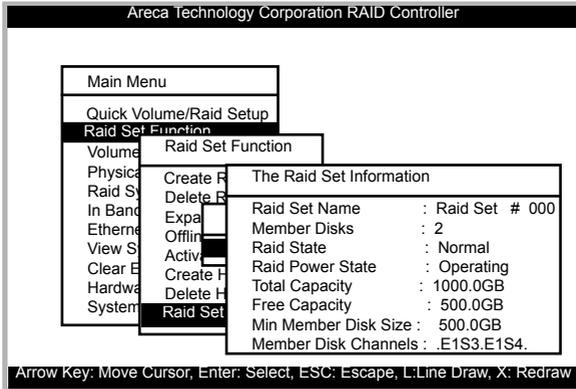


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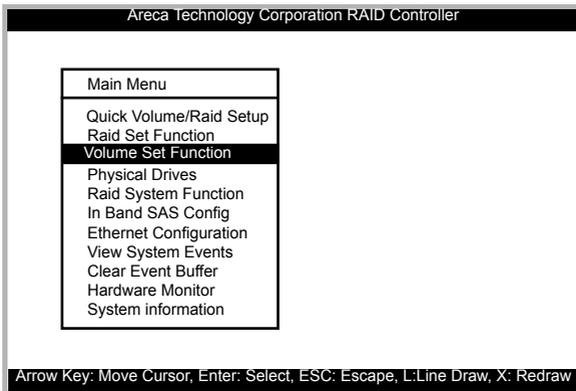
5.5.2.8 Raid Set Information

To display RAID set information, move the cursor bar to the desired RAID set number, then press the **Enter** key. The "Raid Set Information" will appear.

You can only view information for the RAID set in this screen.



5.5.3 Volume Set Function



A volume set is seen by the host system as a single logical device; it is organized in a RAID level within the controller utilizing one or more physical disks. RAID level refers to the level of data performance and protection of a volume set. A volume set can consume all of the capacity or a portion of the available disk capacity of a RAID set. Multiple volume sets can exist on a RAID

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set. If multiple volume sets reside on a specified RAID set, all volume sets will reside on all 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 rather than one volume set using some of the available disks and another volume set using other disks.

The following is the volume set features for the SAS RAID controller.

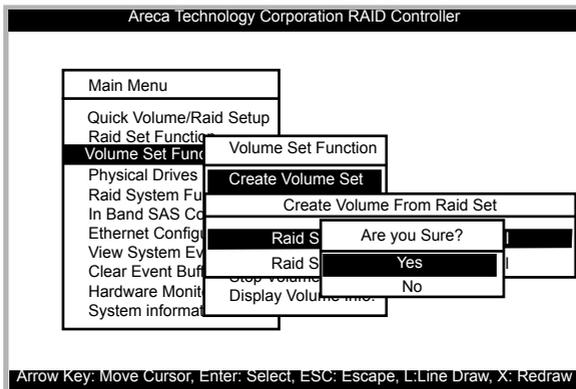
1. Volume sets of different RAID levels may coexist on the same RAID set.
2. Up to 128 volume sets can be created in a RAID set.
3. The maximum addressable size of a single volume set is not limited to 2TB, because the controller is capable of 64-bit LBA mode. However the operating system itself may not be capable of addressing more than 2TB.

See Areca website ftp://ftp.areca.com.tw/RaidCards/Documents/Manual_Spec/Over2TB_050721.ZIP file for details.

5.5.3.1 Create Volume Set (0/1/10/3/5/6)

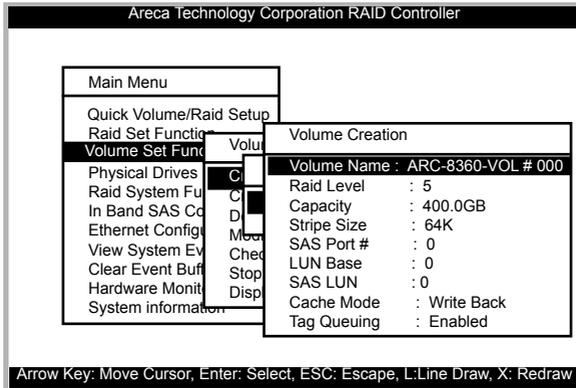
To create a volume set, following the steps:

1. Select the "Volume Set Function" from the main menu.
2. Choose the "Create Volume Set" from "Volume Set Functions" dialog box screen.
3. The "Create Volume From Raid Set" appears. This screen displays the existing arranged RAID sets. Select the RAID set number and press the **Enter** key. The "Volume Creation" dialog is displayed in the screen.



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4. The new create volume set attribute allows user to select the Volume Name, RAID level, Capacity, Strip Size, SAS Port#/LUN Base/LUN, Cache Mode, Tagged Command Queuing .



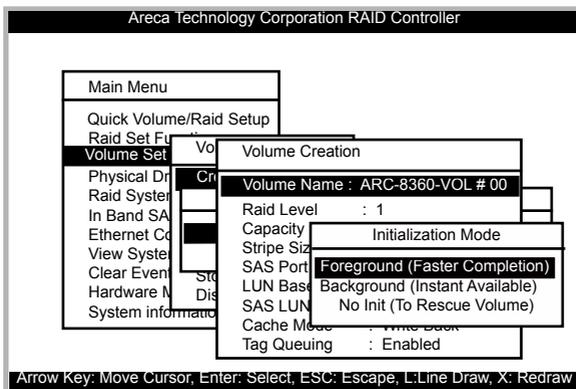
5. After completed the modification of the volume set, press the **Esc** key to confirm it. An "Initialization Mode" screen appears.

•Select "Foreground (Faster Completion)" for faster initialization of the selected volume set.

- Select "Background (Instant Available)" for normal initialization of the selected volume set.

- Select "No Init (To Rescue Volume)" for no initialization of the selected volume.

6. Repeat steps 3 to 5 to create additional volume sets.

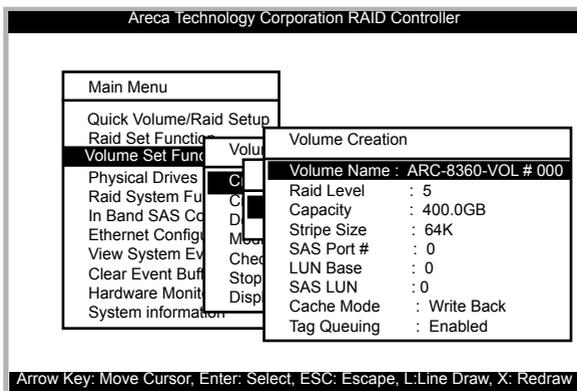


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7. The initialization percentage of volume set will be displayed at the button line.

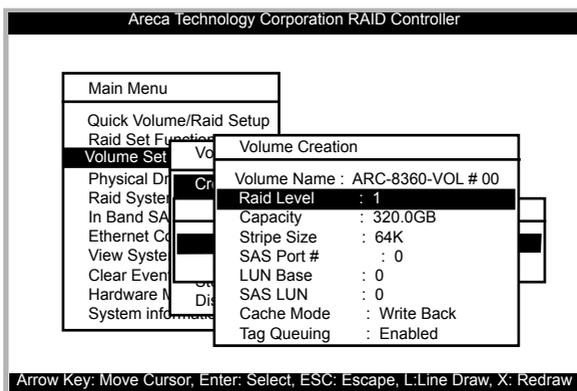
5.5.3.1.1 Volume Name

The default volume name will always appear as ARC-8360-VOL #. You can rename the volume set providing it does not exceed the 15 characters limit.



5.5.3.1.2 Raid Level

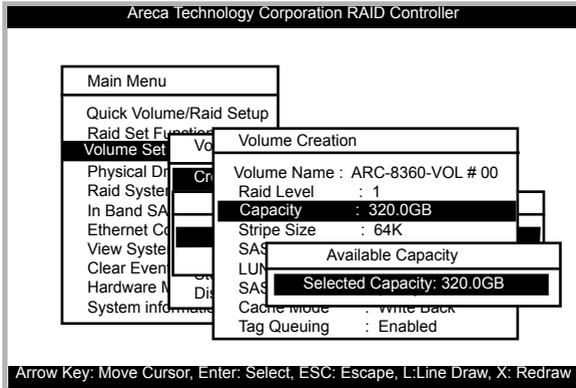
Set the RAID level for the volume set. Highlight RAID Level and press the **Enter** key. The available RAID levels for the current volume set are displayed. Select a RAID level and press the **Enter** key to confirm.



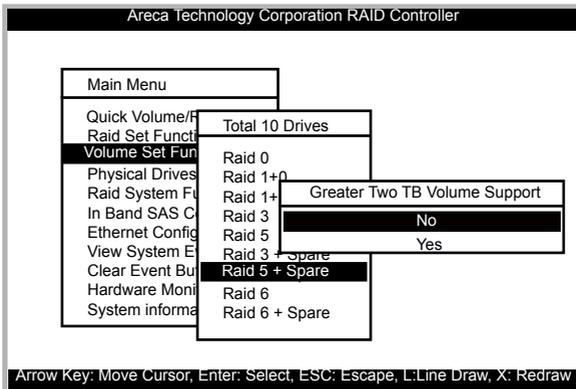
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5.5.3.1.3 Capacity

The maximum available volume size is the default value for the first setting. Enter the appropriate volume size to fit your application. The capacity value can be increased or decreased by the **UP** and **DOWN** arrow keys. The capacity of each volume set must be less than or equal to the total capacity of the RAID set on which it resides.



If volume capacity will exceed 2TB, controller will show the "Greater Two TB Volume Support" sub-menu.



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- **No**

It keeps the volume size with max. 2TB limitation.

- **Yes**

This option uses 16 bytes CDB instead of 10 bytes. The maximum volume capacity up to 512TB.

This option works on different OS which supports 16 bytes CDB. Such as:

Windows 2003 with SP1

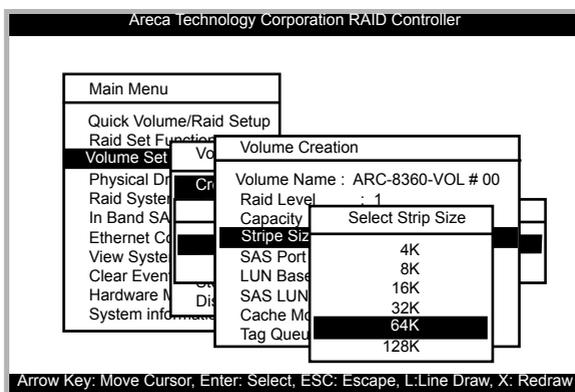
Linux kernel 2.6.x or latter

This option works under Windows platform only. And it can not be converted to "Dynamic Disk", because 4k sector size is not a standard format.

For more details, please download pdf file from **ftp://ftp.areca.com.tw/RaidCards/Documents/Manual_Spec/Over2TB_050721.zip**

5.5.3.1.4 Stripe Size

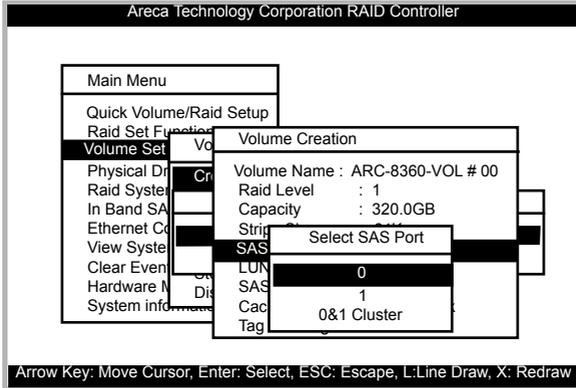
This parameter sets the size of segment written to each disk in a RAID 0, 1, 10(1E), 5, 6, 50 or 60 logical drive. You can set the stripe size to 4 KB, 8 KB, 16 KB, 32 KB, 64 KB, or 128 KB.



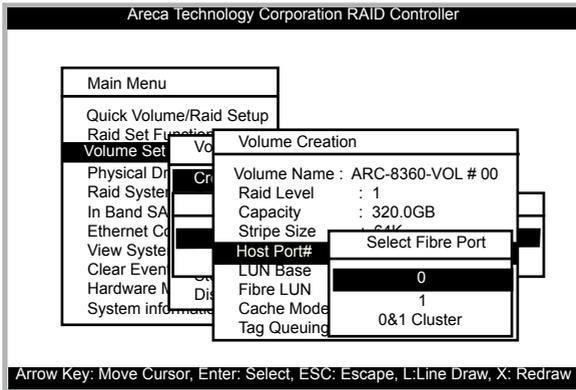
VT-100 UTILITY CONFIGURATION

5.5.3.1.5 SAS Port # / Fibre Host

Two 4-lanes SAS ports can be applied to the RAID subsystem. Choose the SAS Port# option 0, 1 and 0&1 cluster.



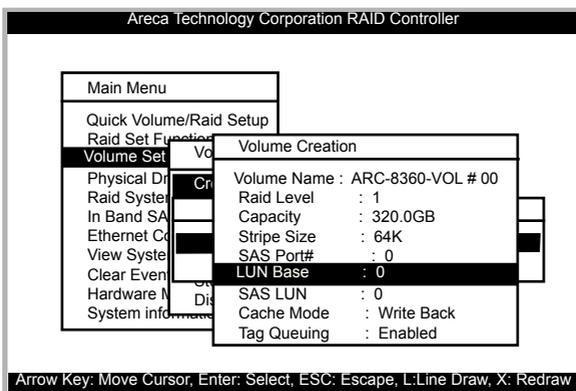
Two 4Gbps Fibre channel can be applied to the ARC-8060-Fibre RAID subsystem. Choose the Fibre Host#. A **Select Fibre Channel** dialog box appears, select the channel number and press **Enter** key to confirm it.



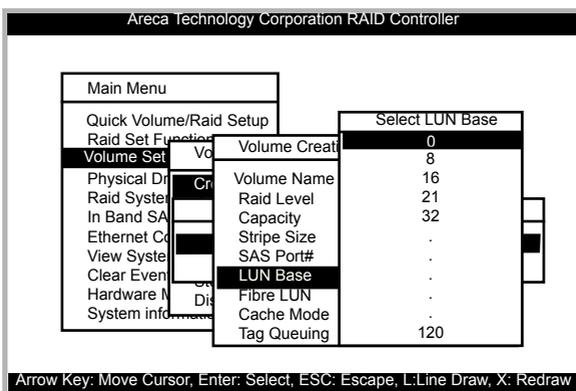
VT-100 UTILITY CONFIGURATION

5.5.3.1.6 SAS LUN Base/Fibre LUN Base/iSCSI Target Node

Each SAS device attached to the SAS host adapter must be assigned a unique SAS ID number. A SAS port can connect up to 122 (0 to 121) devices. The RAID subsystem is as a large SAS device. We should assign an LUN base from a list of SAS LUNs.

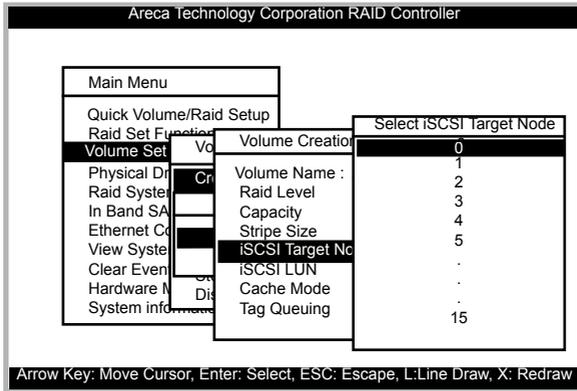


Fibre LUN Base: Each fibre device attached to the Fibre card, as well as the card itself, must be assigned a unique fibre ID number. A Fibre channel can connect up to 128(0 to 127) devices. The RAID subsystem is as a large Fibre device. We should assign an LUN base from a list of Fibre LUNs.



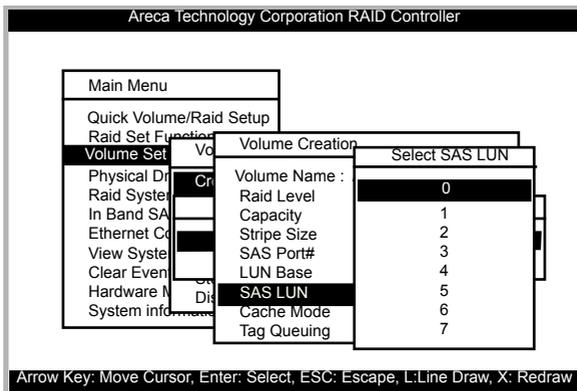
VT-100 UTILITY CONFIGURATION

Target Node: A iSCSI RAID controller can connect up to 16 target nodes. The iSCSI RAID subsystem is as a large SAS/ SATA device. We should assign a Node from a list of Target Node.



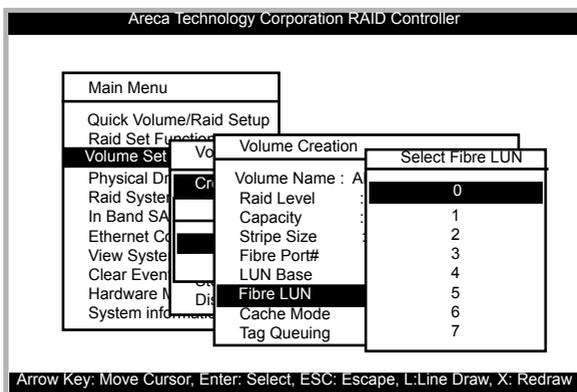
5.5.3.1.7 SAS LUN/Fibre LUN/iSCSI LUN

Each LUN Base can support up to 8 SAS LUNs. Most SAS port host adapter treats each SAS LUN like a SAS disk.

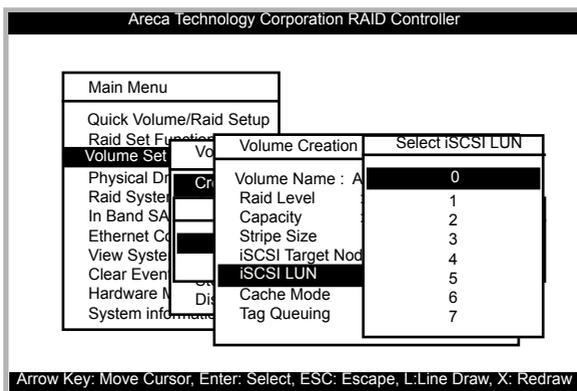


Fibre LUN: Each Fibre LUN base can support up to 8 LUNs. Most Fibre Channel host adapter treats each LUN like a Fibre disk.

VT-100 UTILITY CONFIGURATION



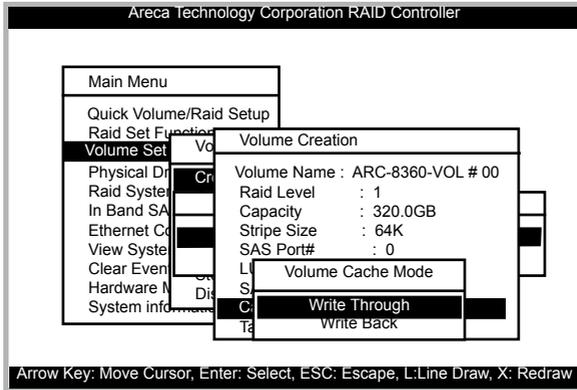
iSCSI LUN: Each Target Node can support up to 8 LUNs. Most iSCSI host adapter treats each LUN like a SAS/SATA disk.



5.5.3.1.8 Cache Mode

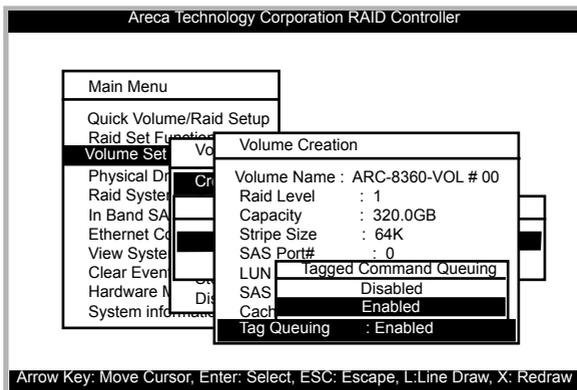
User can set the cache mode to: Write-Through Cache or Write-Back Cache.

VT-100 UTILITY CONFIGURATION



5.5.3.1.9 Tag Queuing

This option, when enabled, can enhance overall system performance under multi-tasking operating systems. The Command Tag (Drive Channel) function controls the SAS command tag queuing support for each drive channel. This function should normally remain enabled. Disabled this function only when using older drives that do not support command tag queuing.

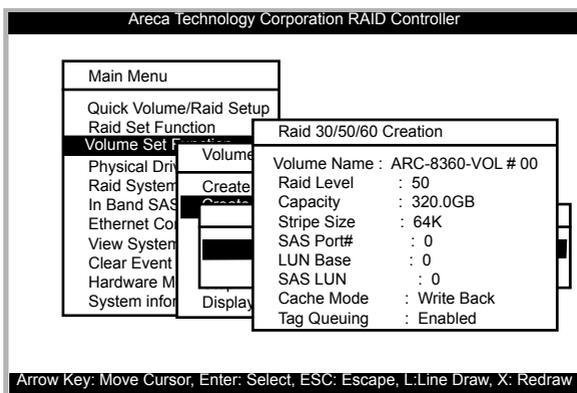


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5.5.3.2 Create Raid30/50/60

To create 30/50/60 volume set from RAID set group, move the cursor bar to the main menu and click on the "Create Raid30/50/60" link. The "Select The Raid Set To Create Volume On It" screen will show all RAID set number. Tick on the RAID set numbers (same disk No per RAID set) that you want to create and then click on it.

The created new volume set attribute option allows users to select the Volume Name, Capacity, RAID Level, Strip Size, SAS Port#/LUN Base/LUN, Cache Mode, and Tagged Command Queuing. The detailed description of those parameters can refer to section 5.5.3.1. User can modify the default values in this screen; the modification procedures are in section 5.5.3.4



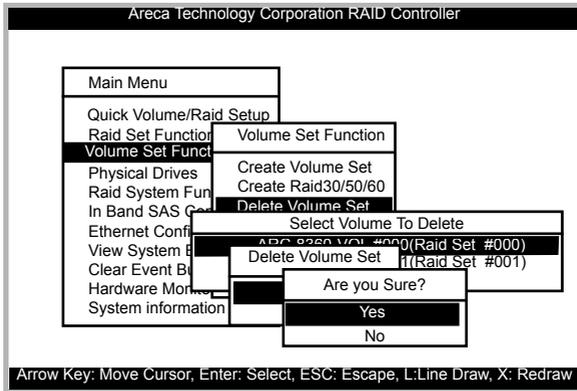
Note:

RAID level 30 50 and 60 can support up to eight RAID set.

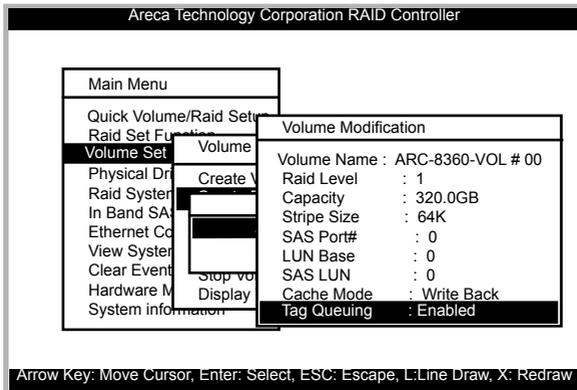
5.5.3.3 Delete Volume Set

To delete volume set from a RAID set, move the cursor bar to the "Volume Set Functions" menu and select the "Delete Volume Set" item, then press the **Enter** key. The "Volume Set Functions" menu will show all Raid Set # items. Move the cursor bar to a RAID set number, then press the **Enter** key to show all volume sets within that RAID set. Move the cursor to the volume set number that is to be deleted and press the **Enter** to delete it.

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5.5.3.4 Modify Volume Set



Use this option to modify volume set configuration. To modify volume set values from RAID set system function, move the cursor bar to the "Modify Volume Set" item, then press the **Enter** key. The "Volume Set Functions" menu will show all RAID set items. Move the cursor bar to a RAID set number item, then press the **Enter** key to show all volume set items. Select the volume set from the list to be changed, press the **Enter** key to modify it.

As shown, volume information can be modified at this screen. Choose this option to display the properties of the selected volume set. But user can only modify the last volume set capacity.

VT-100 UTILITY CONFIGURATION

5.5.3.4.1 Volume Growth

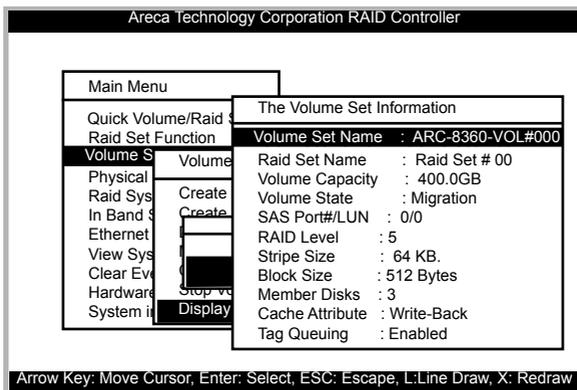
Use "Expand RAID Set" function to add disk to a RAID set. The additional capacity can be used to enlarge the last volume set size or to create another volume set. The "Modify Volume Set" function can support the "Volume Modification" function. To expand the last volume set capacity, move the cursor bar to the "Capacity" item and entry the capacity size. When finished the above action, press the **ESC** key and select the **Yes** option to complete the action. The last volume set starts to expand its capacity.

To expand an existing volume noticed:

- Only the last volume can expand capacity.
- When expand volume capacity, you can't modify stripe size or modify RAID level simultaneously.
- You can expand volume capacity, but can't shrink volume capacity size.
- After volume expansion, the volume capacity can't be decreased.

For greater 2TB expansion:

- If your system installed in the volume, don't expand the volume capacity greater 2TB, currently OS can't support boot up from a greater 2TB capacity device.
- Expand over 2TB used LBA64 mode. Please make sure your OS supports LBA64 before expand it.



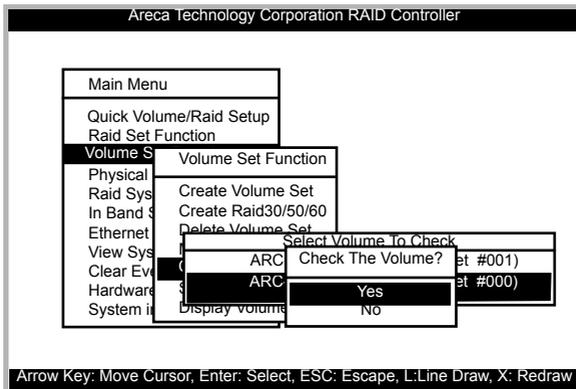
VT-100 UTILITY CONFIGURATION

5.5.3.4.2 Volume Set Migration

Migrating occurs when a volume set is migrating from one RAID level to another, when a volume set strip size changes, or when a disk is added to a RAID set. Migration state is displayed in the volume state area of the "Volume Set Information" screen.

5.5.3.5 Check Volume Set

Use this option to verify the correctness of the redundant data in a volume set. For example, in a system with a dedicated parity disk drive, a volume set check entails computing the parity of the data disk drives and comparing those results to the contents of the dedicated parity disk drive. To check volume set, move the cursor bar to the "Check Volume Set" item, then press the **Enter** key. The "Volume Set Functions" menu will show all RAID set number items. Move the cursor bar to an RAID set number item and then press the **Enter** key to show all volume set items. Select the volume set to be checked from the list and press **Enter** to select it. After completed the selection, the confirmation screen appears, press **Yes** to start the check.



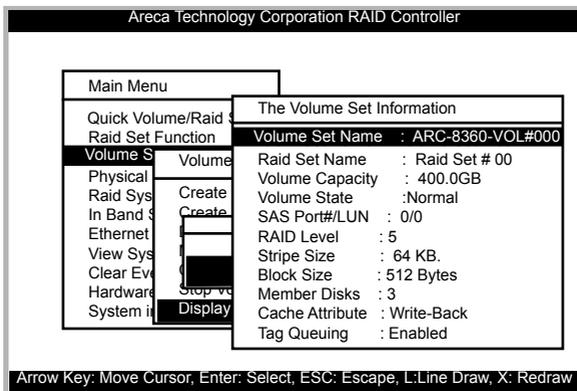
5.5.3.6 Stop Volume Set Check

Use this option to stop all of the "Check Volume Set" operations.

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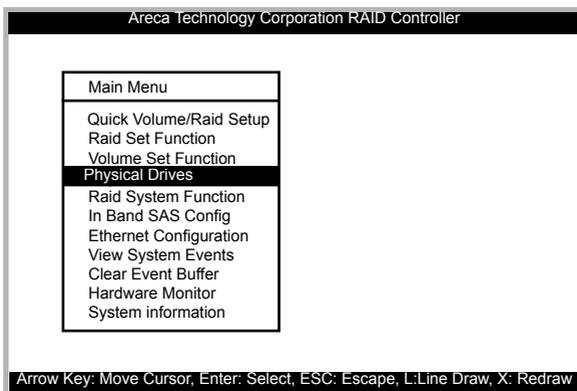
5.5.3.7 Display Volume Set Info.

To display volume set information, move the cursor bar to the desired volume set number and then press the **Enter** key. The "Volume Set Information" screen will be shown. You can only view the information of this volume set in this screen, but can not modify it.



5.5.4 Physical Drives

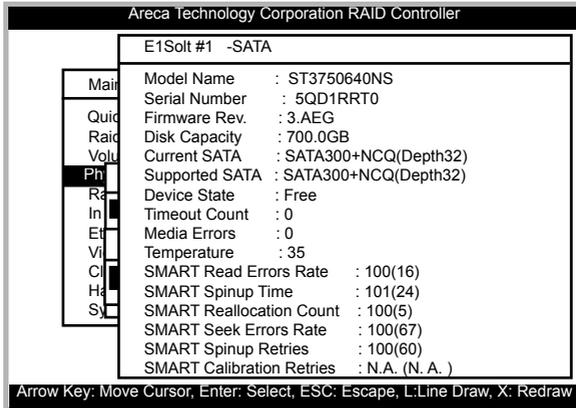
Choose this option from the main menu to select a physical disk and perform the operations listed above. Move the cursor bar to an item, then press **Enter** key to select the desired function.



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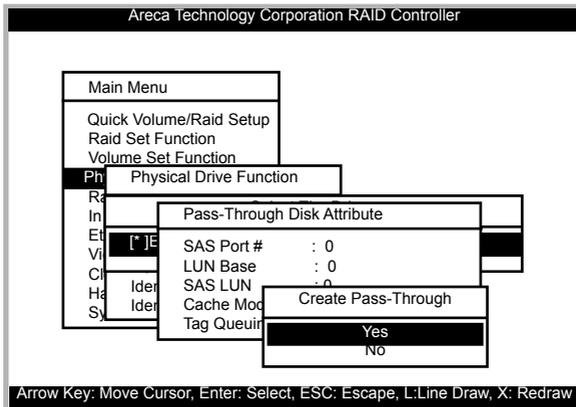
5.5.4.1 View Drive Information

When you choose this option, the physical disks connected to the SAS RAID controller are listed. Move the cursor to the desired drive and press **Enter** key to view drive information.



5.5.4.2 Create Pass-Through Disk

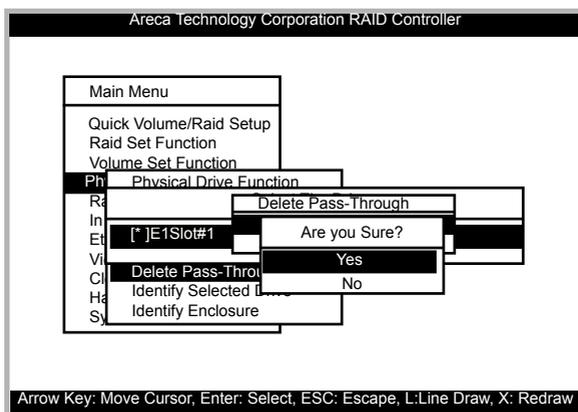
A pass-through disk is not controlled by the ARC-8060 series SAS RAID controller firmware and thus cannot be a part of a volume set. The disk is available directly to the operating system as an individual disk. It is typically used on a system where the operating system is on a disk not controlled by the SAS RAID controller firmware. The SAS Port#/SAS LUN Base/SAS LUN, Cache Mode, and Tag Queuing must be specified to create a pass-through disk.



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5.5.4.3 Modify Pass-Through Disk

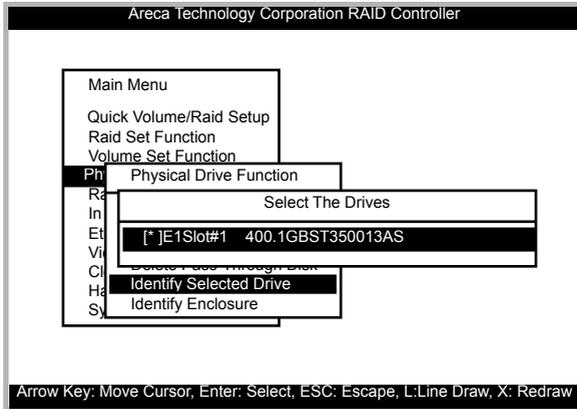
Use this option to modify "Pass-Through Disk Attributes". To select and modify a pass-through disk from the pool of pass-through disks, move the "Modify Pass-Through Drive" option and then press the **Enter** key. The "Physical Drive Function" menu will show all pass-through drive number options. Move the cursor bar to the desired number and then press the **Enter** key to show all pass-through disk attributes. Select the parameter from the list to be changed and then press the **Enter** key to modify it.



5.5.4.4 Delete Pass-Through Disk

To delete a pass-through drive from the pass-through drive pool, move the cursor bar to the "Delete Pass-Through Drive" item, then press the **Enter** key. The "Delete Pass-Through confirmation" screen will appear; select **Yes** to delete it.

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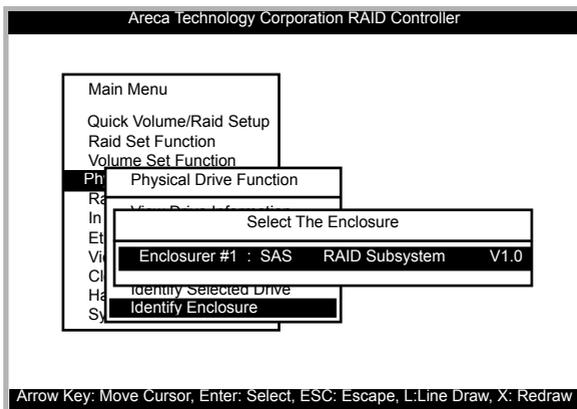


5.5.4.5 Identify Selected Drive

To prevent removing the wrong drive, the selected disk fault LED Indicator will light for physically locating the selected disk when the "Identify Selected Device" is selected.

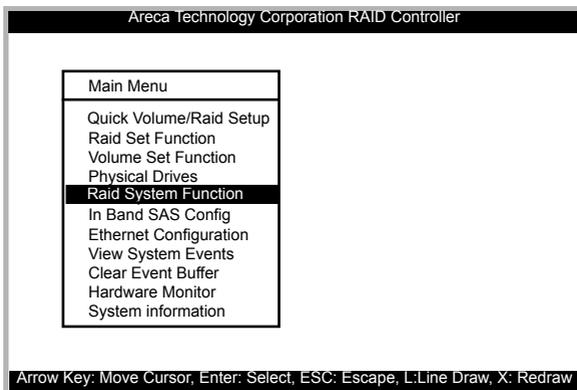
5.5.4.6 Identify Enclosure

To prevent removing the wrong enclosure, the selected Areca expander enclosure all disks fault LED Indicator will light for physically locating the selected enclosure when the "Identify Enclosure" is selected. This function will also light the enclosure LED indicator, if it is existed.



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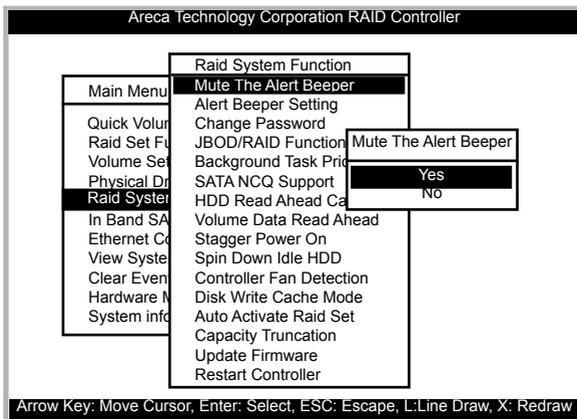
5.5.5 Raid System Function



To set the "Raid System Function", move the cursor bar to the main menu and select the "Raid System Function" item and then press **Enter** key. The "Raid System Function" menu will show multiple items. Move the cursor bar to an item, then press **Enter** key to select the desired function.

5.5.5.1 Mute The Alert Beeper

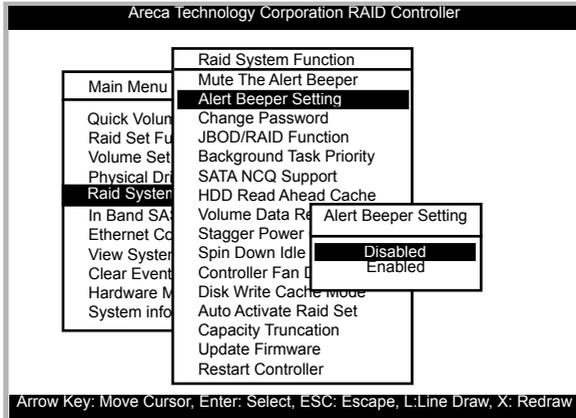
The "Mute The Alert Beeper" function item is used to control the SAS RAID controller Beeper. Select **Yes** and press the **Enter** key in the dialog box to turn the beeper off temporarily. The beeper will still activate on the next event.



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5.5.5.2 Alert Beeper Setting

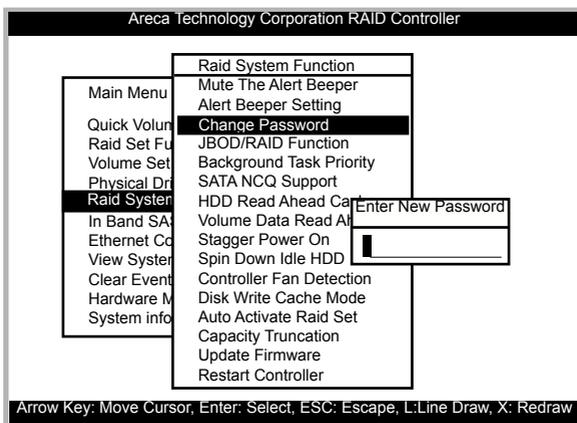
The "Alert Beeper Setting" function item is used to "Disabled" or "Enabled" the SAS RAID controller alarm tone generator. Select "Disabled" and press the **Enter** key in the dialog box to turn the beeper off.



5.5.5.3 Change Password

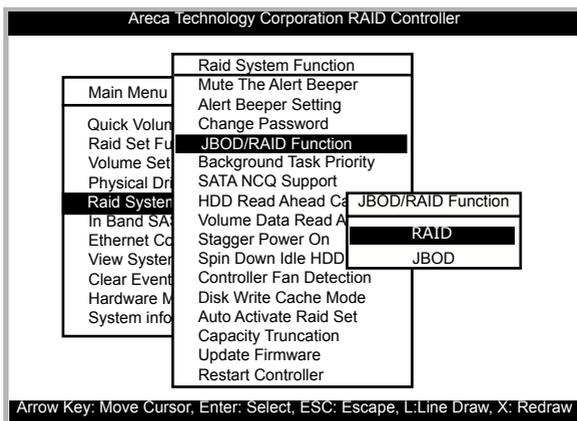
The manufacture default password is set to 0000. The password option allows user to set or clear the password protection feature. Once the password has been set, the user can monitor and configure the controller only by providing the correct password. This feature is used to protect the internal RAID system from unauthorized access. The controller will check the password only when entering the main menu from the initial screen. The system will automatically go back to the initial screen if it does not receive any command in 5 minutes. To set or change the password, move the cursor to "Raid System Function" screen, press the "Change Password" item. The "Enter New Password" screen will appear. Do not use spaces when you enter the password, If spaces are used, it will lock out the user. To disable the password, only press **Enter** key in both the "Enter New Password" and "Re-Enter New Password" column. The existing password will be cleared. No password checking will occur when entering the main menu.

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5.5.5.4 JBOD/RAID Function

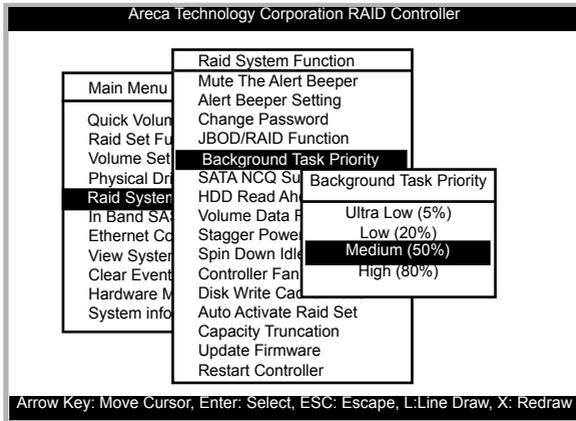
JBOD is an acronym for "Just a Bunch Of Disk". A group of hard disks in a RAID box are not set up as any type of RAID configuration. All drives are available to the operating system as an individual disk. JBOD does not provide data redundancy. User needs to delete the RAID set, when you want to change the option from the RAID to the JBOD function.



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5.5.5.5 Background Task Priority

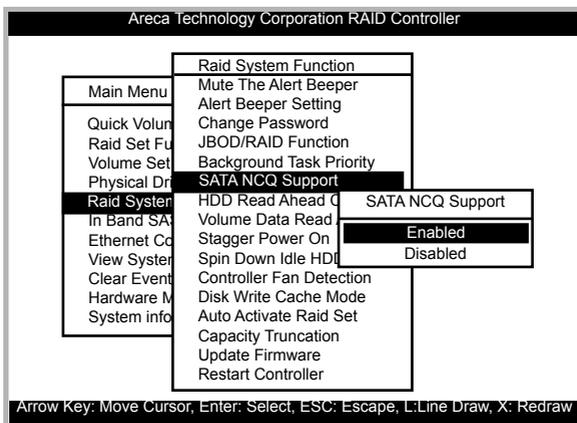
The “Background Task Priority” is a relative indication of how much time the controller devotes to a rebuild operation. The SAS RAID controller allows the user to choose the rebuild priority (UltraLow, Low, Normal, High) to balance volume set access and rebuild tasks appropriately.



5.5.5.6 SATA NCQ Support

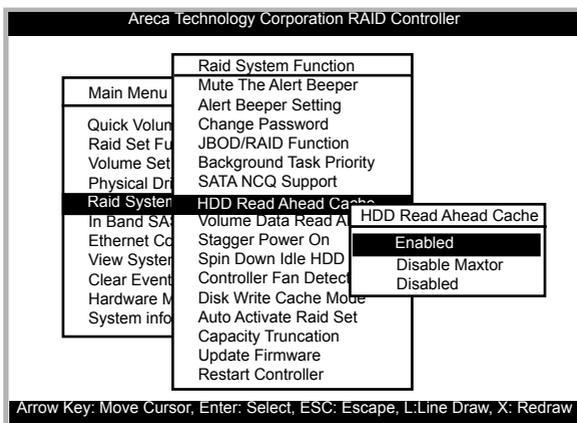
The controller supports both SAS and SATA disk drives. The SATA NCQ allows multiple commands to be outstanding within a drive at the same time. Drives that support NCQ have an internal queue where outstanding commands can be dynamically rescheduled or re-ordered, along with the necessary tracking mechanisms for outstanding and completed portions of the workload. The ARC-8060 series SAS RAID controller allows the user to select the SATA NCQ support: “Enabled” or “Disabled”.

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5.5.5.7 HDD Read Ahead Cache

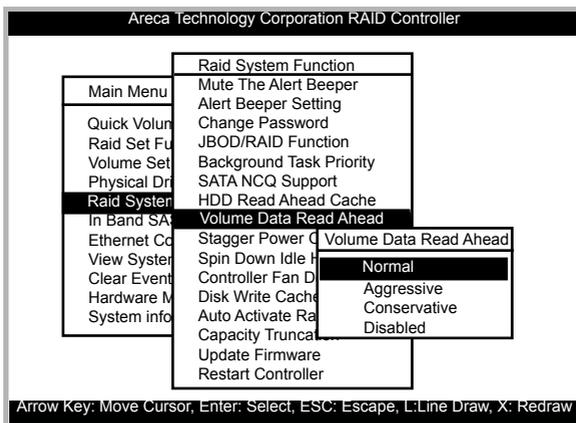
Allow Read Ahead (Default: Enabled)—When Enabled, the drive's read ahead cache algorithm is used, providing maximum performance under most circumstances.



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5.5.5.8 Volume Data Read Ahead

The Read data ahead parameter specifies the controller firmware algorithms which process the Read Ahead data blocks from the disk. The Read Ahead parameter is normal by default. To modify the value, you must know the application behavior. The default normal option satisfies the performance requirements for a typical volume. The disabled value implies no read ahead. The most efficient value for the controllers depends on your application. Aggressive read ahead is optimal for sequential access but it degrades random access.



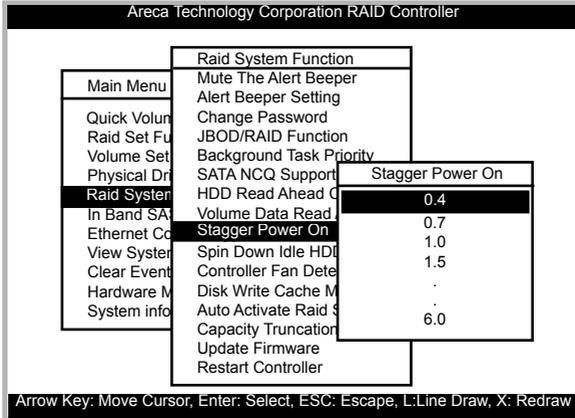
5.5.5.9 Stagger Power On

In a PC system with only one or two drives, the power can supply enough power to spin up both drives simultaneously. But in systems with more than two drives, the startup current from spinning up the drives all at once can overload the power supply, causing damage to the power supply, disk drives and other system components. This damage can be avoided by allowing the host to stagger the spin-up of the drives. The SAS/SATA drives have support stagger spin-up capabilities to boost reliability. Stagger spin-up is a very useful feature for managing multiple disk drives in a storage subsystem. It gives the host the ability to spin up the disk drives sequentially or in groups, allowing the drives to come ready at the optimum time without straining the system power supply. Staggering drive spin-up in a multiple drive environment also avoids the extra cost of a power

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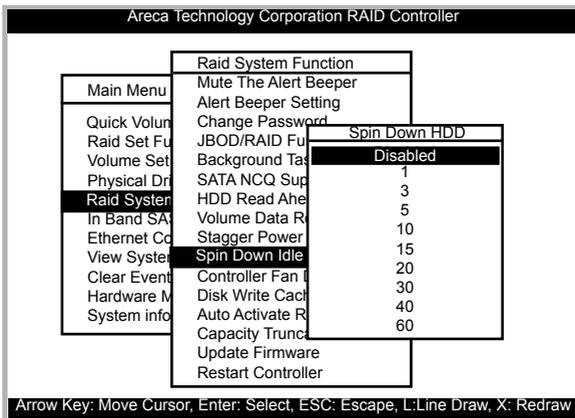
supply designed to meet short-term startup power demand as well as steady state conditions.

Areca RAID controller has included the option for customer to select the disk drives sequentially stagger power up value. The values can be selected from 0.4 s to 6s per step which powers up one drive.



5.5.5.10 Spin Down Idle HDD

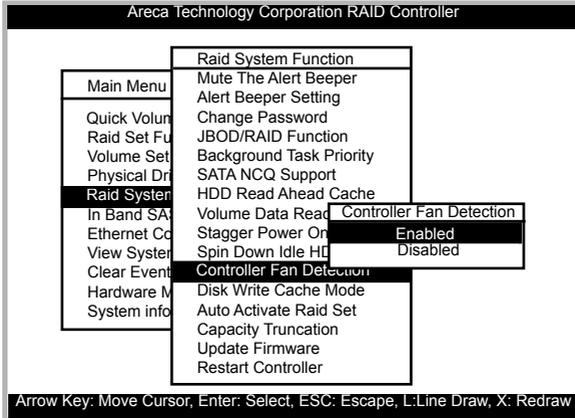
This function can automatically spin down the drive if it hasn't been accessed for a certain amount of time. This value is used by the drive to determine how long to wait (with no disk activity, before turning off the spindle motor to save power. The values can be selected from 1 minutes to 60 minutes.)



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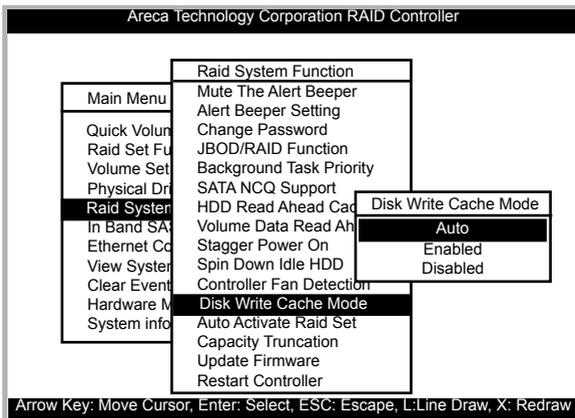
5.5.5.11 Controller Fan Detection

The “Controller Fan Detection” function is available in the firmware for preventing the buzzer warning. The following screen shot shows how to change the VT-100 utility configuration setting to disable the beeper function. **(This function is not available in the web browser setting.)**



5.5.5.12 Disk Write Cache Mode

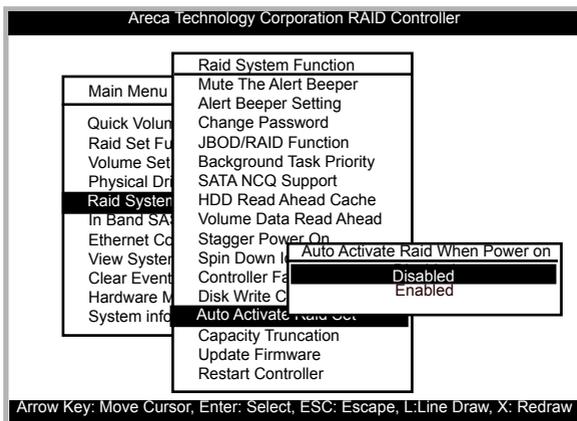
A user can set the “Disk Write Cache Mode”: Auto, Enabled, or Disabled.



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5.5.5.13 Auto Activate Raid Set

When some of the disk drives are removed in power off state or boot up stage, the RAID set state will change to "Incomplete State". But if a user wants to automatically continue to work while the SAS RAID controller is powered on, then user can set the "Auto Activate Raid Set" option to "Enabled". The RAID state will change to "Degraded Mode" while it powers on.



5.5.5.14 Capacity Truncation

Areca RAID controllers use drive truncation so that drives from different vendors are more likely to be usable as spares for one another. Drive truncation slightly decreases the usable capacity of a drive that is used in redundant units. The controller provides three truncation modes in the system configuration: Multiples Of 10G, Multiples Of 1G and Disabled.

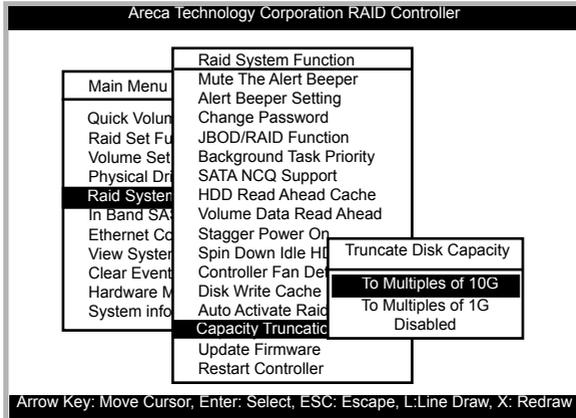
Multiples Of 10G: If you have 120 GB drives from different vendors; chances are that the capacity varies slightly. For example, one drive might be 123.5 GB, and the other 120 GB. "Multiples Of 10G" truncates the number under tens. This makes the same capacity for both of these drives so that one could 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.

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“Multiples Of 1G” truncates the fractional part. This makes the same capacity for both of these drives so that one could replace the other. Example, one drive might be 123.5 GB, and the other 123.4 GB. “Multiples Of 1G” truncates the fractional part. This makes the same capacity for both of these drives so that one could replace the other.

Disabled: It does not truncate the capacity.



Note:

1. User can only update the firmware through the VT-100 Terminal or web browser-based RAID Management through the controller's LAN port.

5.5.5.15 Update Firmware

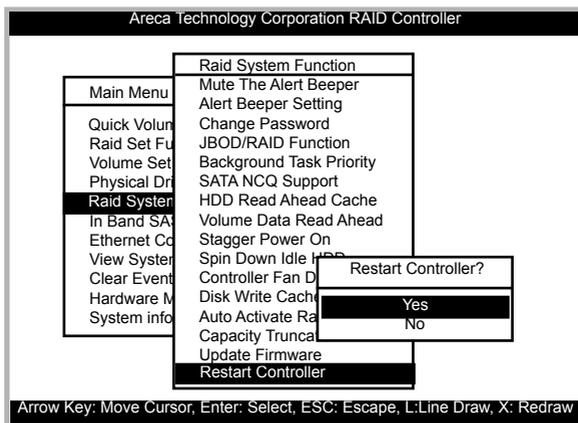
Please refer to the appendix A Upgrading Flash Firmware Programming Utility.

5.5.5.16 Restart Controller

Use the “Restart Controller” function to restart the RAID controller, move the cursor bar to the main menu “Raid System Function” item and then press the **Enter** key. The “Raid system

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Function" menu appears on the screen. Press **Enter** key to select "Restart Controller" item. The restart controller confirmation screen appears. Select **Yes** key to restart entire ARC-8360 RAID controller.



Note:

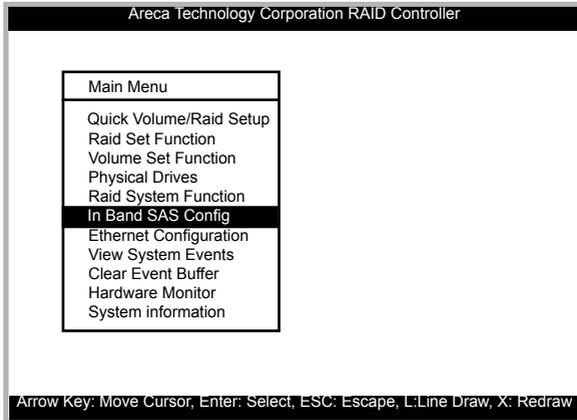
It can only work properly at Host and Drive without any activity.

5.5.6 In Band SAS Config

The RAID manager supports both in-band and out-of-band management to control the disk array system. In-band management refers to management of the SAS disk array from a SAS host management transactions traverse the SAS bus. Out-of-band management refers to management of the disk array from a remote station connected to the controller either via a RS-232 or through a network cable. In-band management is simpler than out-of-band management for it requires less hardware in its configuration.

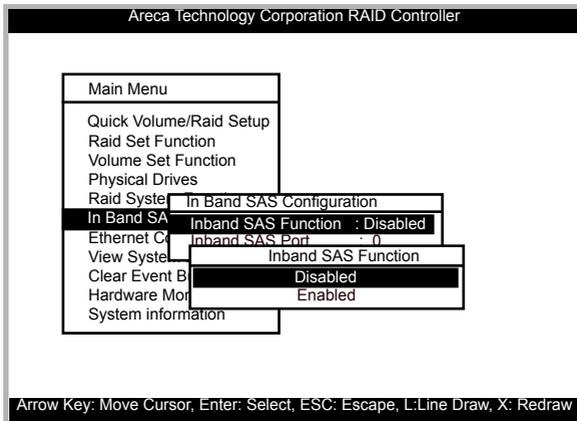
Since the host adapter is already installed in the host system, no extra connection is necessary. Just load the necessary in-band driver for the controller and then combine the API with user's RAID manager from the local host to start management of the disk array system.

VT-100 UTILITY CONFIGURATION



5.5.6.1 Inband SAS Function

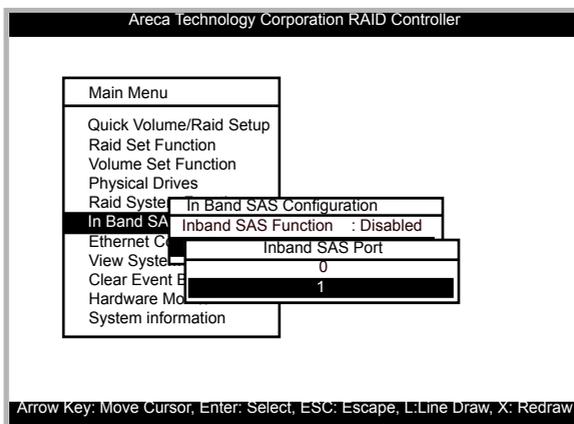
The SAS RAID controller reserves one LUN for In-band management transactions. This option is for user to release the LUN when In-band management is not enabled.



5.5.6.2 Inband SAS Port

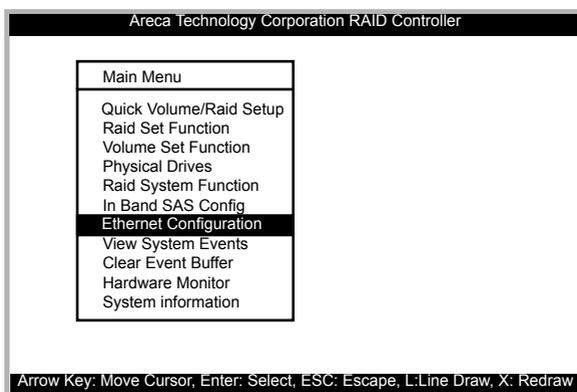
Since the SAS RAID controller supports two SAS host ports, the In-band can through either SAS port 0 or port 1.

VT-100 UTILITY CONFIGURATION



5.5.7 Ethernet Configuration

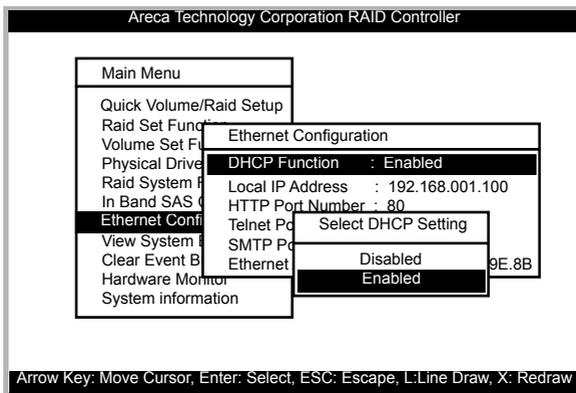
Use this feature to set the controller Ethernet port configuration. It is not necessary to create reserved disk space on any hard disk for the Ethernet port and HTTP service to function; these functions are built into the controller firmware. move the cursor bar to the main menu "Ethernet Configuration Function" item and then press the **Enter** key. The "Ethernet Configuration" menu appears on the screen. Move the cursor bar to an item, then press **Enter** key to select the desired function.



VT-100 UTILITY CONFIGURATION

5.5.7.1 DHCP Function

DHCP (Dynamic Host Configuration Protocol) allows network administrators centrally manage and automate the assignment of IP (Internet Protocol) addresses on a computer network. When using the TCP/IP protocol (Internet protocol), it is necessary for a computer to have a unique IP address in order to communicate to other computer systems. Without DHCP, the IP address must be entered manually at each computer system. DHCP lets a network administrator supervise and distribute IP addresses from a central point. The purpose of DHCP is to provide the automatic (dynamic) allocation of IP client configurations for a specific time period (called a lease period) and to minimize the work necessary to administer a large IP network. To manually configure the IP address of the controller, move the cursor bar to DHCP Function item, then press **Enter** key to show the DHCP setting. Select the "Disabled" or "Enabled" option to enable or disable the DHCP function. If DHCP is disabled, it will be necessary to manually enter a static IP address that does not conflict with other devices on the network.

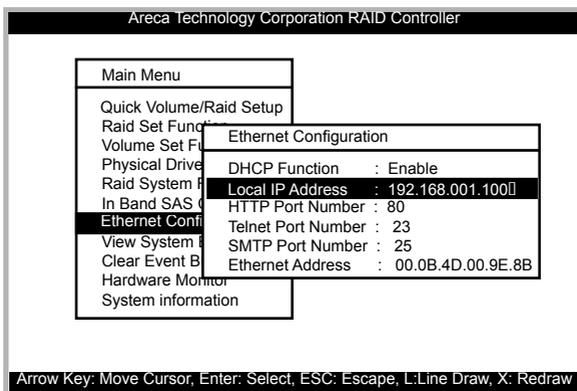


5.5.7.2 Local IP Address

If you intend to set up your client computers manually (no DHCP), make sure that the assigned IP address is in the same range as the default router address and that it is unique to your private network. However, it is highly recommend to use DHCP

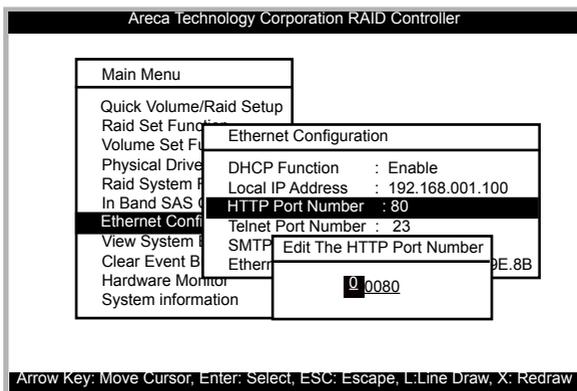
VT-100 UTILITY CONFIGURATION

if that option is available on your network. An IP address allocation scheme will reduce the time it takes to set-up client computers and eliminate the possibilities of administrative errors and duplicate addresses. To manually configure the IP address of the controller, move the cursor bar to Local IP address item, then press the **Enter** key to show the default address setting in the RAID controller. You can then reassign the static IP address of the controller.



5.5.7.3 HTTP Port Number

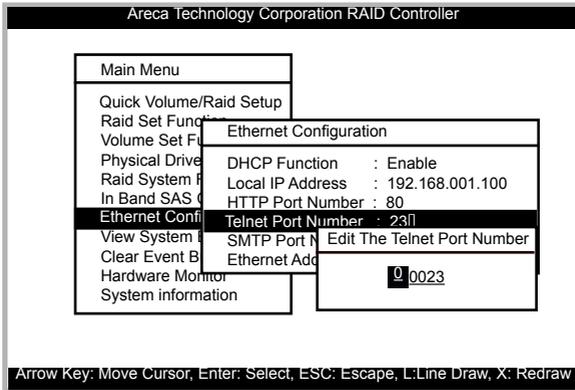
To manually configure the "HTTP Port Number" of the controller, move the cursor bar to "HTTP Port Number" item, then press the **Enter** key to show the default address setting in the RAID controller. Then You can reassign the default "HTTP Port Number" of the controller.



VT-100 UTILITY CONFIGURATION

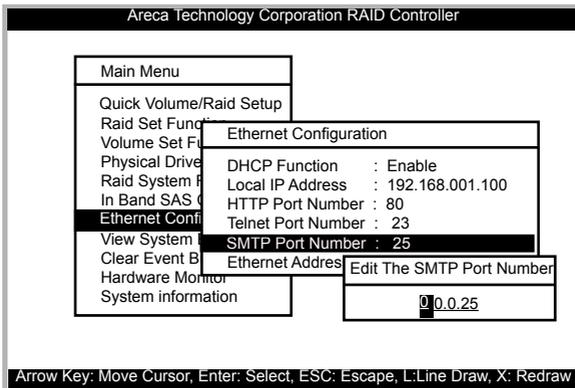
5.5.7.4 Telnet Port Number

To manually configure the “Telnet Port Number” of the controller, move the cursor bar to “Telnet Port Number” item, then press the Enter key to show the default address setting in the RAID controller. You can then reassign the default “Telnet Port Number” of the controller.



5.5.7.5 SMTP Port Number

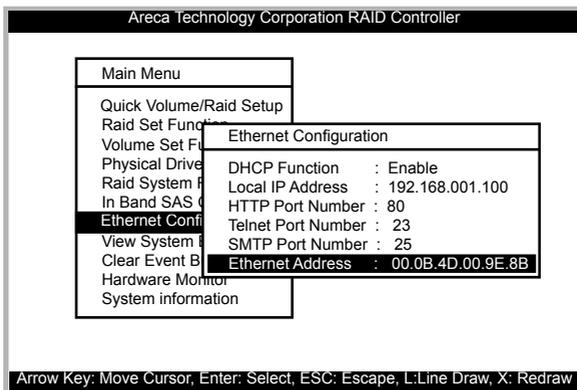
To manually configure the “SMTP Port Number” of the controller, move the cursor bar to the main menu “Ethernet Configuration” function item and then press **Enter** key. The “Ethernet Configuration” menu appears on the screen. Move the cursor bar to “SMTP Port Number” item, then press **Enter** key to show the default address setting in the RAID controller. You can then reassign the default “SMTP Port Number” of the controller.



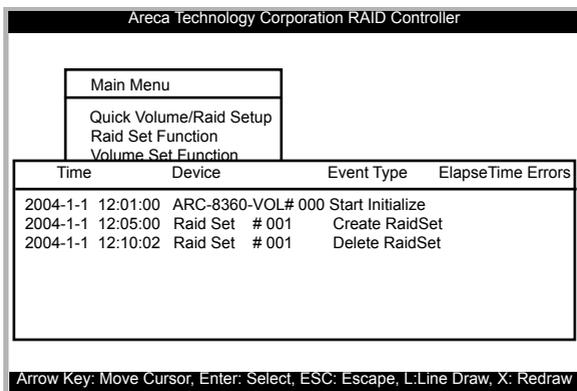
VT-100 UTILITY CONFIGURATION

5.5.7.6 Ethernet Address

Each Ethernet port has its unique Mac address, which is also factory assigned. Usually, Ethernet address is used to uniquely identify a port in the Ethernet network.



5.5.8 View System Events



To view the ARC-8060 series SAS RAID controller's system events information, move the cursor bar to the main menu and select the "View System Events" link, then press the **Enter** key. The ARC-8060 series SAS RAID controller's events screen appear.

Choose this option to view the system events information: Timer, Device, Event type, Elapsed Time, and Errors. The RAID system does not have a build-in real time clock. The time information is the relative time from the SAS RAID controller powered on.

VT-100 UTILITY CONFIGURATION

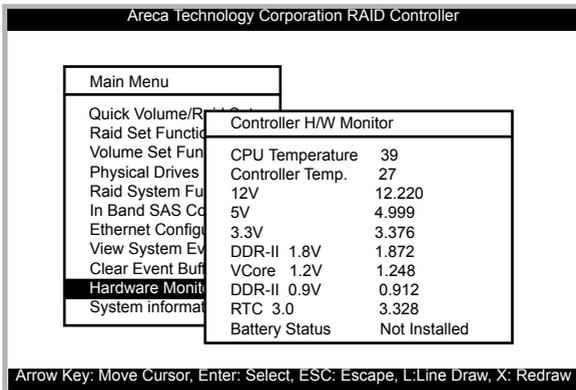
5.5.9 Clear Events Buffer

Use this feature to clear the entire events buffer.

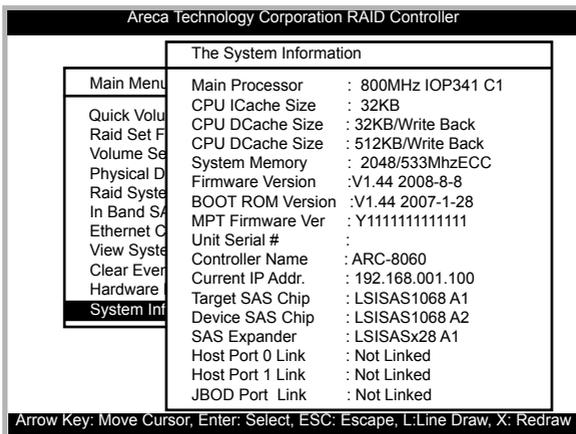
5.5.10 Hardware Monitor Information

To view the RAID controller's hardware monitor information, move the cursor bar to the main menu and click the "Hardware Monitor" link. The "Controller H/W Monitor" screen appears.

The "Controller H/W Monitor" provides the CPU temperature, controller temperature, voltage and battery status of the SAS RAID controller.



5.5.11 System Information



VT-100 UTILITY CONFIGURATION

Choose this option to display the controller's hardware firmware information. The controller provides two four-link connector for the host and one four-link connector for JBOD. It may has problem between the host/JBOD and controller. The port link provides current working port link status. The option for port link is defined below.

Not Linked → Fail or no link to host/JBOD

1x300 → Single-link for use

2x300 → Two-link for use

4x300 → Four-link for use

WEB BROWSER-BASED CONFIGURATION

6. Web Browser-based Configuration

The RAID box web browser-based configuration utility is firmware-based and uses to configure RAID sets and volume sets. Use this utility to:

- Create RAID set,
- Expand RAID set,
- Define volume set,
- Add physical drive,
- Modify volume set,
- Modify RAID level/stripe size,
- Define pass-through disk drives,
- Modify system function,
- Update firmware and,
- Designate drives as hot spares.

If you need to boot the operating system from a RAID box, you must first create a RAID volume by using LCD panel, RS232 or Ethernet LAN port.

6.1 Firmware-embedded TCP/IP & web browser-based RAID manager (using the controller's 10/100 LAN port)

To ensure proper communications between the RAID box and Web browser-based RAID management, Please connect the RAID system LAN port to any LAN switch port.

The RAID box has embedded the TCP/IP & Web Browser-based RAID manager in the firmware. User can remote manage the RAID box without adding any user specific software (platform independent) via standard web browsers directly connected to the 10/100 RJ45 LAN port.

To configure RAID box on a local or remote machine, you need to know its IP Address. The IP address will default show in the LCD screen. Launch your firmware-embedded TCP/IP & Web Browser-based RAID manager by entering `http://[IP Address]` in the web browser.

WEB BROWSER-BASED CONFIGURATION

You must be logged in as administrator with local admin rights on the remote machine to remotely configure it. The RAID box default User Name is "admin" and the Password is "0000".

6.2 Web Browser Start-up Screen

The web browser start-up screen will display the current configuration of your RAID box. It displays the Raid Set List, Volume Set List and Physical Disk List. The raid set information, volume set information and drive information can also be viewed by clicking on the "RaidSet Hierarchy" screen. The current configuration can also be viewed by clicking on "RaidSet Hierarchy" in the menu.



To display RAID set information, move the mouse cursor to the desired raid set number, then click it. The raid set information will show in the screen.

To display volume set information, move the mouse cursor to the desired volume set number, then click it. The volume set information will show in the screen.

To display drive information, move the mouse cursor to the desired physical drive number, then click it. The drive information will show in the screen.

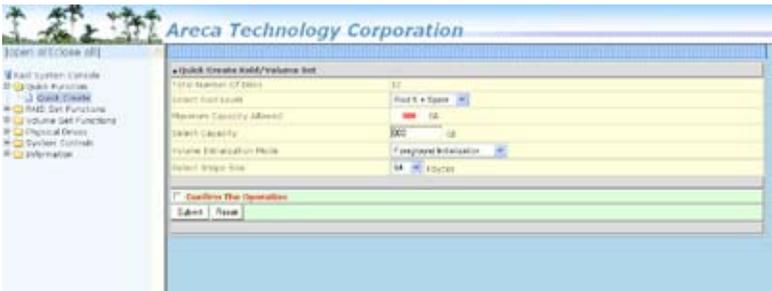
WEB BROWSER-BASED CONFIGURATION

6.3 Main Menu

The main menu shows all available functions, accessible by clicking on the appropriate link.

Individual Category	Description
Quick Function	Create a default configuration, which is based on the number of physical disks 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 Drives	Create pass through disks and modify the existing pass through drives parameters. Also provides the function to identify disk drives (blinking fault LED).
System Controls	Setting the RAID system configuration.
Information	Viewing the controller information. The Raid Set Hierarchy can be viewed through the "Raid Set Hierarchy" item.

6.4 Quick Function



The number of physical drives in the SAS RAID controller 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, Initialization Mode and Stripe Size. A hot spare option is also created, depending on the exist configuration. Click the "Confirm The Operation" check box and click on the "Submit" button in the "Quick Create" screen, the RAID set and volume set will start to initialize.

WEB BROWSER-BASED CONFIGURATION

Note:

In "Quick Create", your volume set is automatically configured based on the number of disks in your system. Use the "Raid Set Functions" and "Volume Set Functions" if you prefer to customize your volume set, or RAID 30/50/60 volume set.

6.5 Raid Set Functions

Use the "Raid Set Function" and "Volume Set Function" if you prefer to customize your volume set. Manual configuration can provide full control of the RAID set settings, 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 delete and reconfigure existing RAID sets. (A RAID set is a group of disks containing one or more volume sets.)

6.5.1 Create a New Raid Set

To create a RAID set, click on the "Create Raid Set" link. A "Select The Drive For RAID Set" screen is displayed showing the drive(s) connected to the current controller and enclosures. Click on the selected physical drives within 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 #". Click the "Confirm The Operation" check box and click on the "Submit" button on the screen; the RAID set will start to initialize. If you have available disk member, you can repeat above procedures to define another RAID sets.



WEB BROWSER-BASED CONFIGURATION

Note:

To create RAID 30/50/60 volume, you need create multiple RAID sets first with the same disk members on each RAID set. The max no. disk drives per volume set:
32 for RAID 0/1/10(1E)/3/50/60 and 128 for RAID 30/50/60.

6.5.2 Delete Raid Set

To delete a RAID set, click on the "Deleted Raid Set" link. A "Select The RAID Set To Delete" screen is displayed showing all exist RAID sets in the current controller. Click the RAID set number which you want to delete in the select column on the delete screen. Then, click the "Confirm The Operation" check box and click on the "Submit" button in the screen to delete it. The volume sets included in the "Delete RAID Set". It will be deleted by this action. But for the Raid 30/50/60, you need to delete the volumes belonging to those RAID sets.



6.5.3 Expand Raid Set

Instead of deleting a RAID set and recreating it with additional disk drives, the "Expand Raid Set" function allows the users to add disk drives to the RAID set that have already been created. To expand a RAID set:

Select the "Expand Raid Set" option. If there is an available disk, then the "Select SATA Drives For Raid Set Expansion" screen appears.

Select the target RAID set by clicking on the appropriate radio button. Select the target disk by clicking on the appropriate check box.

WEB BROWSER-BASED CONFIGURATION



Press the **Yes** to start the expansion on the RAID set. The new additional capacity can be utilized by one or more volume sets. The volume sets associated with this RAID set appear for you to have chance to modify RAID level or stripe size. Follow the instruction presented in the "Modify Volume Set" to modify the volume sets; operation system specific utilities may be required to expand operating system partitions.

Note:

1. Once the "Expand Raid Set" process has started, user can not 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.
3. RAID 30/50/60 does not support the "Expand Raid set".

6.5.4 Offline RAID Set

This function is for customer being able to unmount and remount a multi-disk volume. All Hdds of the selected RAID set will be put into offline state, spun down and fault LED in fast blinking mode. User can remove those Hdds and insert new Hdds on those empty slots without needing power down the controller.



WEB BROWSER-BASED CONFIGURATION

6.5.5 Activate Incomplete Raid Set

If one of the disk drives is removed in power off state, the RAID set state will change to "Incomplete State". If the user wants to continue to operate the controller without power-off the SAS RAID controller, the user can use the "Activate Incomplete Raid Set" option to active the RAID set. After the user completes this function, the Raid State will change to "Degraded Mode" and start to work. 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 sets existing on the current controller. Click the RAID set number to activate in the select column. Click on the "Submit" button on the screen to activate the RAID set that had a disk removed (or failed) in the power off state. The SAS RAID controller will continue to work in degraded mode.



6.5.6 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. Click the "Confirm The Operation" check box and click 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.

WEB BROWSER-BASED CONFIGURATION



6.5.7 Delete Hot Spare

Select the target hot spare disk to delete by clicking on the appropriate check box. Click the “Confirm The Operation” check box and click the “Submit” button on the screen to delete the hot spares.



6.5.8 Rescue Raid Set

When the system is powered off in the RAID set update/creation period, the configuration possibly could disappear due to this abnormal condition. The “RESCUE” function can recover the missing RAID set information. The RAID controller uses the time as the RAID set signature. The RAID set may have different time after the RAID set is recovered. The “SIGANT” function can regenerate the signature for the RAID set. Please contact with Areca technical support before you use this configuration.

WEB BROWSER-BASED CONFIGURATION



6.6 Volume Set Functions

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. The following is the volume set features for the SAS RAID controller.

1. Volume sets of different RAID levels may coexist on the same RAID set.
2. Up to 128 volume sets can be created in a RAID set.
3. The maximum addressable size of a single volume set is not limited to two TB, because the controller is capable of 64-bit LBA mode. However the operating system itself may not be capable of addressing more than two TB.

See Areca website ftp://ftp.areca.com.tw/RaidCards/Documents/Manual_Spec/Over2TB_050721.ZIP file for details.

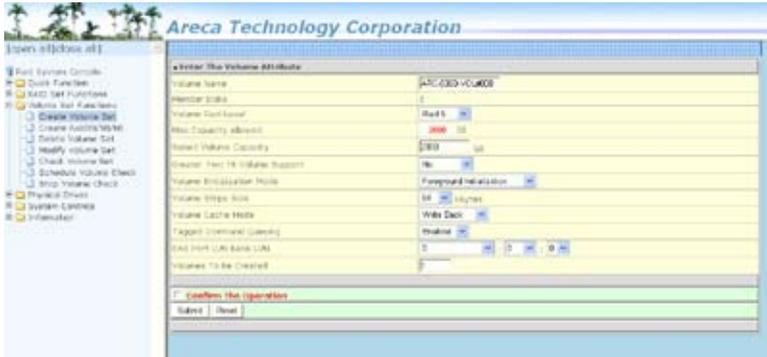
6.6.1 Create Volume Set (0/1/10/3/5/6)

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 attribute allows user to select the Volume Name, RAID Level, Capacity, Greater Two TB Volume

WEB BROWSER-BASED CONFIGURATION

Support, Initialization Mode, Strip Size, Cache Mode, Tagged Command Queuing, SAS Port/LUN Base/LUN and Volumes To Be Created.



- **Volume Name**

The default volume name will always appear as "ARC-1680-VOL". You can rename the volume set providing it does not exceed the 15 characters limit.

- **Volume Raid Level**

Set the RAID level for the volume set. Highlight the desired RAID Level and press **Enter** key.

The available RAID levels for the current volume set are displayed. Select a RAID level and press **Enter** key to confirm.

- **Capacity**

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

- **Greater Two TB Volume Support**

If volume capacity will exceed Two TB, controller will show the "Greater Two TB Volume Support" sub-menu. Greater Two TB Volume Support option: No and Yes.

For more details please download PDF file from ftp://ftp.areca.com.tw/RaidCards/Documents/Manual_Spec/Over2TB_050721.zip

WEB BROWSER-BASED CONFIGURATION

- **Initialization Mode**

Press **Enter** key to define "Background Initialization", "Foreground Initialization" or "No Init (To Rescue Volume)". When "Background 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. When "Foreground Initialization", the initialization proceeds must be completed before the volume set ready for system accesses. There is no initialization happened when you select "No Init" option. "No Init" is for customer to rescue volume without losing data in the disk.

- **Strip Size**

This parameter sets the size of the stripe written to each disk in a RAID 0, 1, 10(1E), 5, 6, 50 or 60 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 smaller stripe size.

Note:

RAID level 3 can't modify the cache strip size.

- **Cache Mode**

The SAS RAID controller supports "Write Through" and "Write Back" cache.

- **Tagged Command Queuing**

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

WEB BROWSER-BASED CONFIGURATION

● SAS Port/LUN Base/LUN

SAS Port: Two 4-lanes SAS ports can be applied to the RAID subsystem. The RAID subsystem supports Port 0,1 and 0&1 cluster option.

LUN base: Each SAS device attached to the SAS host adapter must be assigned a unique SAS ID number. A SAS port can connect up to 122 (0 to 121) devices. The RAID subsystem is as a large SAS device. We should assign an LUN base from a list of SAS LUNs.

SAS LUN: Each LUN Base can support up to 8 SAS LUNs. Most SAS port host adapter treats each SAS LUN like a SAS disk.

● Fibre Port/LUN Base/LUN

Fibre Port: Two 2Gbps Fibre channel can be applied to the internal RAID subsystem. Choose the Fibre Host#1. A **Select Fibre Channel** dialog box appears, select the channel number and press **Enter** key to confirm it.

LUN Base: Each fibre device attached to the Fibre card, as well as the card itself, must be assigned a unique fibre ID number. A Fibre channel can connect up to 128(0 to 127) devices. The RAID subsystem is as a large Fibre device. We should assign an LUN base from a list of Fibre LUNs.

Fibre LUN: Each Fibre LUN base can support up to 8 LUNs. Most Fibre Channel host adapter treats each LUN like a Fibre disk.

● iSCSI Target Node/LUN

Target Node: A iSCSI RAID controller can connect up to 16 target nodes. The iSCSI RAID subsystem is as a large SAS/SATA device. We should assign a Node from a list of Target Node.

iSCSI LUN: Each Target Node can support up to 8 LUNs. Most iSCSI host adapter treats each LUN like a SAS/SATA disk.

● Volume To Be Created

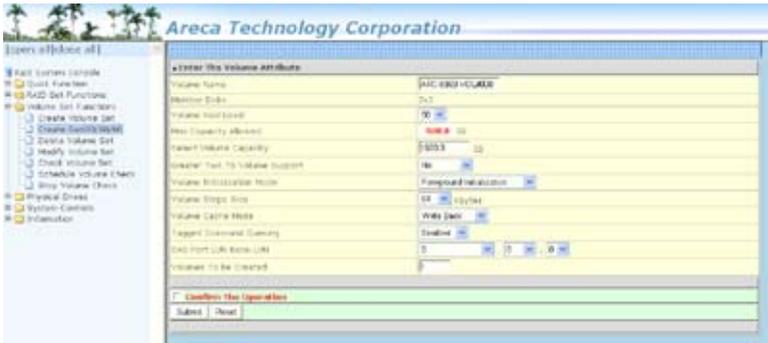
The controller can support up to 128 volume sets. This option is defined volume number using the same volume set attribute here.

WEB BROWSER-BASED CONFIGURATION

6.6.2 Create Raid30/50/60 (Volume Set 30/50/60)

To create 30/50/60 volume set from RAID set group, move the cursor bar to the main menu and click on the "Create Raid30/50/60" link. The "Select The Raid Set To Create Volume On It" screen will show all RAID set number. Tick on the RAID set numbers (same disk No per RAID set) that you want to create and then click on the "Submit" button.

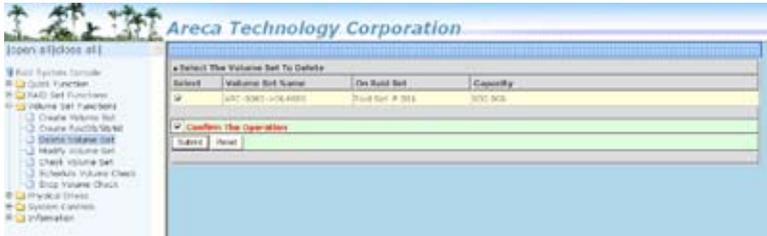
The new create volume set attribute allows user to select the Volume Name, RAID Level, Capacity, Greater Two TB Volume Support, Initialization Mode, Strip Size, Cache Mode, Tagged Command Queuing, SAS Port/LUN Base/LUN and Volumes To Be Created. Please refer to above section for details description of each item.



6.6.3 Delete Volume Set

To delete a volume from RAID set, move the cursor bar to the main menu and click on the "Delete Volume Set" link. The "Select The Raid Set To Delete" screen will show all RAID set numbers. Click a RAID set number and the "Confirm The Operation" check box and then click the "Submit" button to show all volume set items in the selected RAID set. Click a volume set number and the "Confirm The Operation" check box and then click the "Submit" button to delete the volume set.

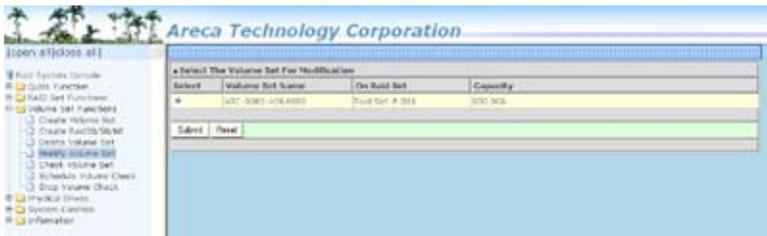
WEB BROWSER-BASED CONFIGURATION



6.6.4 Modify Volume Set

To modify a volume set from a RAID set:

- (1). Click on the "Modify Volume Set" link.
- (2). Click the volume set check box from the list that you wish to modify. Click the "Submit" button. The following screen appears. Use this option to modify the volume set configuration. To modify volume set attributes, move the cursor bar to the volume set attribute menu and click it. The "Enter The Volume Attribute" screen appears. Move the cursor to an attribute item and then click the attribute to modify the value. After you complete the modification, click the "Confirm The Operation" check box and click the "Submit" button to complete the action. The user can only modify the last volume set capacity.



6.6.4.1 Volume Growth

Use "Expand RAID Set" function to add disk to a RAID set. The additional capacity can be used to enlarge the last volume set size or to create another volume set. The "Modify Volume Set" function can support the "Volume Modification" function. To expand the last volume set capacity, move the cursor bar to the "Capacity" item and entry the capacity size. When finished the above action, press the **ESC** key and select the **Yes** option to complete the action. The last volume set starts to expand its capacity.

WEB BROWSER-BASED CONFIGURATION

Note:

1. If the volume is RAID level 30, 50, or 60, you can not change the volume to another RAID level. If the volume is RAID level 0, 1, 10(1E), 3, 5, or 6, you can not change the volume to RAID level 30, 50, or 60.
2. RAID level 30 50 and 60 can support up to eight sub-volumes, but it can not support expansion and migration.

6.6.5 Check Volume Set

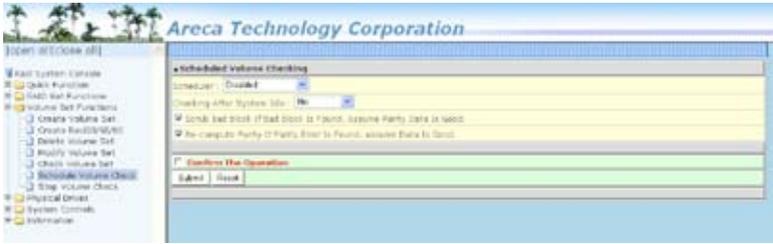
To check a volume set from a RAID set:

- (1). Click on the "Check Volume Set" link.
- (2). Click 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 of 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 "RAID Set Hierarchy" in the main menu.

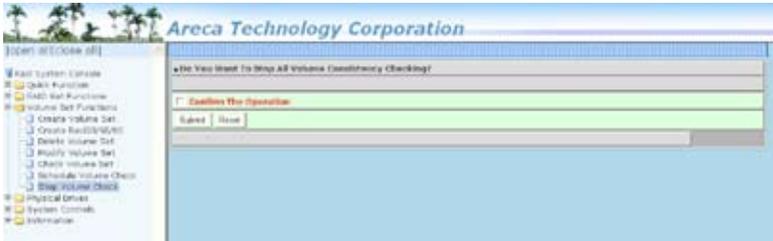
6.6.6 Schedule Volume Check

This function can setup a schedule so consistency checks are run automatically at regularly scheduled intervals. If there is a discrepancy found, it will log the error on the system event log. The controller will base on the user selection scrub bad block or re-compute parity to recovery the data. The recommended interval for checking consistency in raid drives can set on "Scheduler" option. User can specify parameters to "Scheduler" to change the scheduled run time. The "Checking After System Idle" is defined the default time to start the automated consistency check scheduling.



6.6.7 Stop Volume Check

Use this option to stop the “Check Volume Set” function.

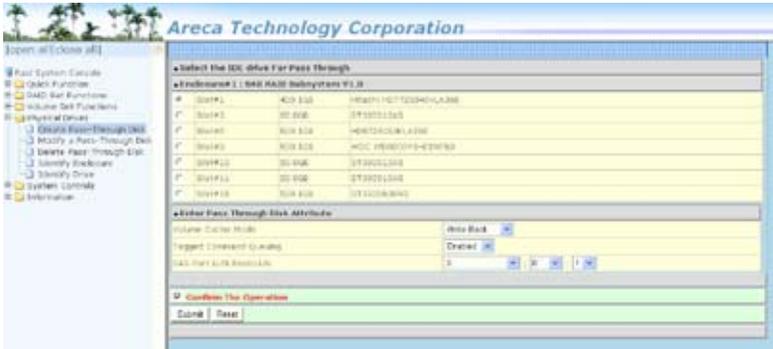


6.7 Physical Drive

Choose this option to select a physical disk from the main menu and then perform the operations listed below.

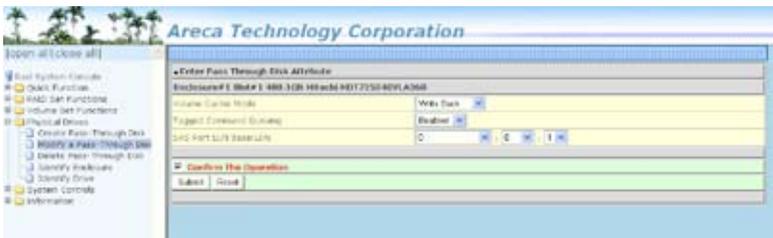
6.7.1 Create Pass-Through Disk

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. A pass-through disk is not controlled by the SAS RAID controller firmware, it can not 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. The user can also select the Cache Mode, Tagged Command Queuing, SAS Port/LUN Base/LUN for this pass-through disk.



6.7.2 Modify a Pass-Through Disk

Use this option to modify the pass-through disk attribute. The user can modify the Cache Mode, Tagged Command Queuing, and SAS Port/LUN Base/LUN on an existing pass-through disk. To modify the pass-through drive attribute from the pass-through drive pool, move the mouse cursor bar and click on the "Modify a Pass-Through" link. The "Select The Pass Through Disk For Modification" screen appears mark the check box for the pass-through disk from the pass-through drive pool and click on the "Submit" button to select drive. When the "Enter Pass-Through Disk Attribute" screen appears, modify the drive attribute values, as you want. After you complete the selection, mark the check box for "Confirm The Operation" and click on the "Submit" button to complete the selection action.



WEB BROWSER-BASED CONFIGURATION

6.7.3 Delete Pass-Through Disk

To delete a pass-through drive from the pass-through drive pool, move the mouse cursor bar to the main menus and click the “Delete Pass Through” link. After you complete the selection, mark the check box for “Confirm The Operation” and click the “Submit” button to complete the delete action.



6.7.4 Identify Enclosure

To prevent removing the wrong enclosure, the selected Areca expander enclosure all disks fault LED indicator will light for physically locating the selected enclosure when the “Identify Enclosure” is selected. This function will also light the enclosure LED indicator, if it is existed.



6.7.5 Identify Drive

To prevent removing the wrong drive, the selected disk fault LED indicator will light for physically locating the selected disk when the “Identify Selected Device” is selected.

WEB BROWSER-BASED CONFIGURATION

● JBOD/RAID Configuration

JBOD is an acronym for "Just a Bunch Of Disk". A group of hard disks in a RAID box are not set up as any type of RAID configuration. All drives are available to the operating system as an individual disk. JBOD does not provide data redundancy. User needs to delete the RAID set, when you want to change the option from the RAID to the JBOD function.

● SATA NCQ Support

The controller supports both SAS and SATA disk drives. The SATA NCQ 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. The SAS RAID controller allows the user to select the SATA NCQ support: "Enabled" or "Disabled".

● HDD Read Ahead Cache

Allow Read Ahead (Default: Enabled)—When Enabled, the drive's read ahead cache algorithm is used, providing maximum performance under most circumstances.

● Volume Data Read Ahead

The Read data ahead parameter specifies the controller firmware algorithms which process the Read Ahead data blocks from the disk. The Read Ahead parameter is normal by default. To modify the value, you must set it from the command line using the Read Ahead option. The default normal option satisfies the performance requirements for a typical volume. The disabled value implies no read ahead. The most efficient value for the controllers depends on your application. Aggressive read ahead is optimal for sequential access but it degrades random access.

● HDD Queue Depth

This parameter is adjusted the queue depth capacity of NCQ (SATA HDD) or Tagged Command Queuing (SAS) which transmits multiple commands to a single target without waiting for the initial command to complete.

WEB BROWSER-BASED CONFIGURATION

● **Stagger Power on Control**

In a PC system with only one or two drives, the power can supply enough power to spin up both drives simultaneously. But in systems with more than two drives, the startup current from spinning up the drives all at once can overload the power supply, causing damage to the power supply, disk drives and other system components. This damage can be avoided by allowing the host to stagger the spin-up of the drives. The SAS/SATA drives have support stagger spin-up capabilities to boost reliability. Stagger spin-up is a very useful feature for managing multiple disk drives in a storage subsystem. It gives the host the ability to spin up the disk drives sequentially or in groups, allowing the drives to come ready at the optimum time without straining the system power supply. Staggering drive spin-up in a multiple drive environment also avoids the extra cost of a power supply designed to meet short-term startup power demand as well as steady state conditions.

Areca RAID controller has included the option for customer to select the disk drives sequentially stagger power up value. The values can be selected from 0.4s to 6s per step which powers up one drive.

● **Spin Down Idle HDD (Minutes)**

This function can automatically spin down the drive if it hasn't been accessed for a certain amount of time. This value is used by the drive to determine how long to wait (with no disk activity, before turning off the spindle motor to save power.)

● **Disk Write Cache Mode**

A user can set the "Disk Write Cache Mode": Auto, Enabled, or Disabled.

● **Disk Capacity Truncation Mode**

Areca RAID controllers 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. The controller provides three truncation modes in the system configuration: **Multiples Of 10G**, **Multiples Of 1G**, and **Disabled**.

WEB BROWSER-BASED CONFIGURATION

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. Multiples Of 10G truncates the number under tens. This makes 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. Multiples Of 1G truncates the fractional part. This makes capacity for both of these drives so that one could replace the other.

No Truncation: It does not truncate the capacity.

6.8.2 Ethernet Configuration

Use this feature to set the controller Ethernet port configuration. A customer doesn't need to create a reserved space on the arrays before the Ethernet port and HTTP service are working. The firm-ware-embedded Web Browser-based RAID manager can access it from any standard internet browser or from any host computer either directly connected or via a LAN or WAN with no software or patches required.

DHCP (Dynamic Host Configuration Protocol) is a protocol that lets network administrators manage centrally and automate the assignment of IP (Internet Protocol) configurations on a computer network. When using the internet's set of protocols (TCP/IP), in order for a computer system to communicate to another computer system, it needs a unique IP address. Without DHCP, the IP address must be entered manually at each computer system. DHCP lets a network administrator supervise and distribute IP addresses from a central point. The purpose of DHCP is to provide the automatic (dynamic) allocation of IP client configurations for a specific time period (called a lease period) and to eliminate the work necessary to administer a large IP network.

To configure the RAID controller Ethernet port, move the cursor bar to the main menu and click on the "System Controls" link. The "System Controls" menu will show all items. Move the cursor

WEB BROWSER-BASED CONFIGURATION

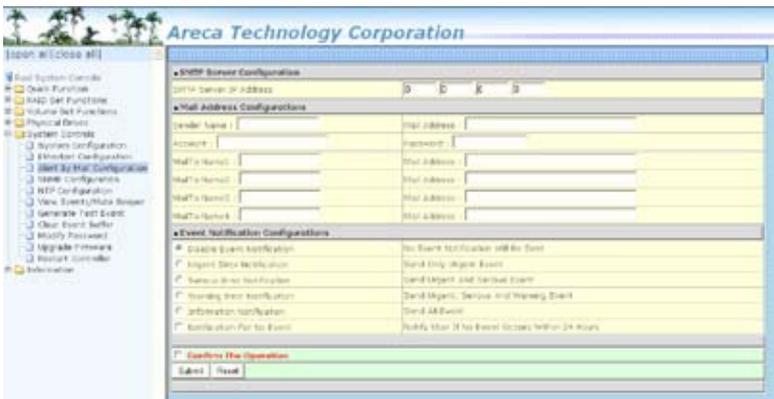
bar to the "Ethernet Configuration" item, then press **Enter** key to select the desired function.



6.8.3 Alert By Mail Configuration

To configure the RAID controller e-mail function, move the cursor bar to the main menu and click on the "System Controls" link. The "System Controls" menu will show all items. Move the cursor bar to the "Alert By Mail Configuration" item, then select the desired function. This function can only be set via web-based configuration.

The firmware contains a SMTP manager monitoring all system events. Single or multiple user notifications can be sent via "Plain English" e-mails with no software required.

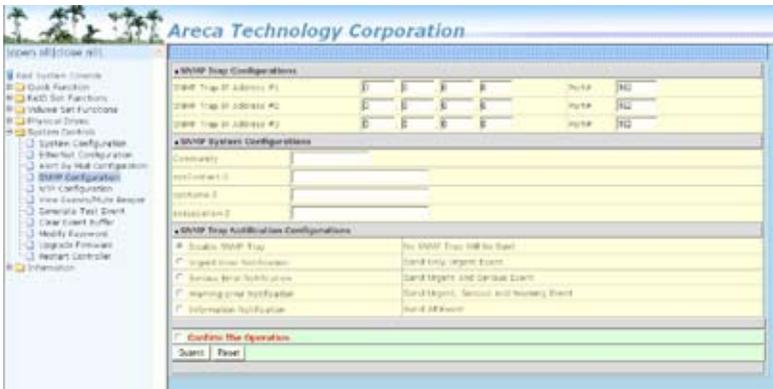


WEB BROWSER-BASED CONFIGURATION

6.8.4 SNMP Configuration

To configure the raid controller SNMP function, move the cursor bar to the main menu and click on the "System Controls" link. The "System Controls" menu will show all items. Move the cursor bar to the "SNMP Configuration" item, then press **Enter** key to select the desired function. This function can only set by the web-based configuration.

The firmware contains SNMP Agent manager monitors all system events and user can use the SNMP function from the web setting with no Agent software required. Please refer to Appendix C SNMP operation & Definition for more detail information about the SNMP trap and definition.



- **SNMP Trap Configurations**

Enter the SNMP Trap IP Address.

- **SNMP System Configurations**

About community, Community name acts as a password to screen accesses to the SNMP agent of a particular network device. Type in the community names of the SNMP agent. Before access is granted to a request station, this station must incorporate a valid community name into its request; otherwise, the SNMP agent will deny access to the system.

Most network devices use "public" as default of their community names. This value is case-sensitive.

WEB BROWSER-BASED CONFIGURATION

- **SNMP Trap Notification Configurations**

Please refer to Appendix D of Event Notification Table.

6.8.5 NTP Configuration

The Network Time Protocol (NTP) is used to synchronize the time of a computer client or server to another server or reference time source, such as a radio or satellite receiver or modem. It provides accuracies typically within a millisecond on LANs and up to a few tens of milliseconds on WANs relative to Coordinated Universal Time (UTC) via a Global Positioning Service (GPS) receiver, for example:



- **NTP Server Address**

The most important factor in providing accurate, reliable time is the selection of NTP servers to be used in the configuration file. Typical NTP configurations utilize multiple redundant servers and diverse network paths in order to achieve high accuracy and reliability. Our NTP configuration supports two existing public NTP synchronization subnets.

- **Time Zone**

Time Zone conveniently runs in the system tray and allows you to easily view the date and time in various locations around the world. You can also quickly and easily add your own personal locations to customize time zone the way you want.

- **Automatic Daylight Saving**

Automatic Daylight Saving will normally attempt to automatically adjust the system clock for daylight saving changes based on the computer time zone. This tweak allows you to disable the automatic adjustment.

WEB BROWSER-BASED CONFIGURATION

6.8.7 Generate Test Event

Use this feature to generate events for testing purposes. Such as test mail or SNMP trap settings.



6.8.8 Clear Events Buffer

Use this feature to clear the entire events buffer information.



6.8.9 Modify Password

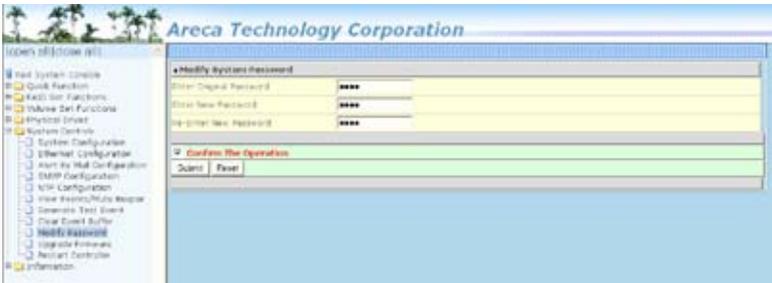
To set or change the SAS RAID controller password, select "System Controls" from the menu and click on the "Modify Password" link. The "Modify System Password" screen appears.

The manufacture default password is set to 0000.

The password option allows user to set or clear the SAS RAID controller's password protection feature. Once the password has been set, the user can only monitor and configure the SAS RAID controller by providing the correct password. The password is used to protect the SAS RAID controller from unauthorized entry. The controller will check the password only when entering the main menu from the initial screen. The SAS RAID controller

WEB BROWSER-BASED CONFIGURATION

will automatically go back to the initial screen when it does not receive any command in 5 minutes. Do not use spaces when you enter the password, If spaces are used, it will lock out the user. To disable the password, leave the fields blank. Once the user confirms the operation and clicks the "Submit" button, the existing password will be cleared. Then, no password checking will occur when entering the main menu from the starting screen.



6.8.10 Update Firmware

Please refer to the appendix A Upgrading Flash ROM Update Process.



6.8.11 Restart Controller

Please refer to the appendix A Upgrading Flash ROM Update Process.

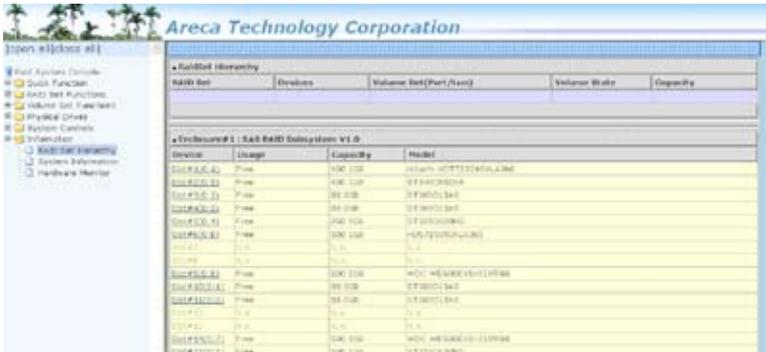
WEB BROWSER-BASED CONFIGURATION



6.9 Information

6.9.1 Raid Set Hierarchy

Use this feature to view the ARC-8060 series SAS RAID controller current RAID set, current volume set and physical disk information. The volume state and capacity are also shown in this screen.



6.9.2 System Information

To view the ARC-8060 series SAS RAID controller's system information, move the mouse cursor to the main menu and click on the "System Information" link. The ARC-8060 series SAS RAID controller "RAID Subsystem Information" screen appears.

Use this feature to view the SAS RAID controller's system information. The controller name, controller firmware version, Boot ROM version, SAS firmware version, serial number, main processor, CPU data/instruction cache size, system memory size/speed and current IP address appear in below screen.

Appendix A

Upgrading Flash Firmware Programming Utility

Since the RAID 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 or Lan 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:

ARC-NNNNXXXX.BIN Firmware Binary (where NNNN refers to the model name and "XXXX" refers to the function name:BOOT, FIRM and MBR0)

ARC-NNNNBOOT.BIN:→ RAID controller hardware initialization in the ARC-8060 series.

ARC-NNNNFIRM.BIN:→ RAID kernal program

ARC-NNNNMBR0.BIN:→ Master Boot Record for supporting Dual Flash Image in the ARC-8060 RAID controller.

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 box controller by using an ANSI/VT-100 compatible terminal emulation program or HTTP web browser management. You must complete the appropriate installation procedure before proceeding with this firmware upgrade. Please refer to chapter 4.3, "VT100 terminal (Using the controller's serial port)" for details on establishing the connection. Whichever terminal emulation program is used must support the ZMODEM file transfer protocol.

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Upgrade 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 Firm-

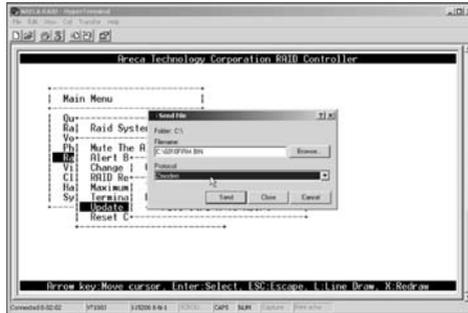


ware" dialog box appears.



3. Go to the tool bar and select Transfer. Open Send File.
4. Select "ZMODEM modem" under Protocol. ZMODEM as the file

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



6. Click "Send", to 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".

APPENDIX



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:

1. The user doesn't need to reconfigure all of the settings after the firmware upgrade is complete, because all of the settings will keep us the vaules before upgrade.
2. Please update all binary code (BOOT, FIRM and MBR0) before you reboot the ARC-8060 series RAID controller. Otherwise, a mixed firmware package may hang the ARC-8060 series RAID controller.

Upgrade Firmware Through Web Browser Manager (LAN Port)

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

1. To upgrade the RAID box firmware, move the mouse cursor to "Upgrade Firmware" link. The "Upgrade The Raid System Firmware" screen appears.
2. Click "Browse". Look in the location where the firmware upgrade file is located. Select the file name: "ARC-8360FIRM.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"

Note:

1. The user doesn't need to reconfigure all of the settings after the firmware upgrade is complete, because all of the settings will keep us the vaules before upgrade.
2. Please update all binary code (BOOT, FIRM and MBR0) before you reboot the ARC-8060 series. Otherwise, a mixed firmware package may hang the ARC-8060 series RAID controller.

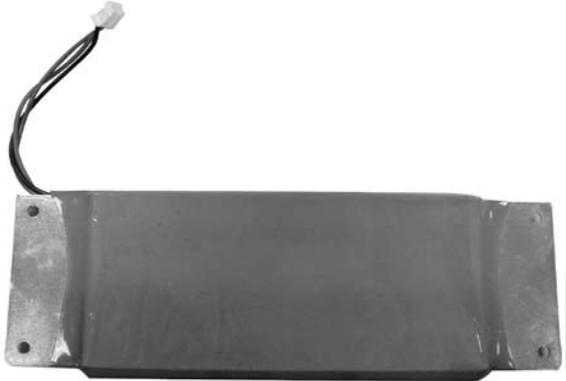
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Appendix B

Battery Backup Module (ARC-6080-BAT)

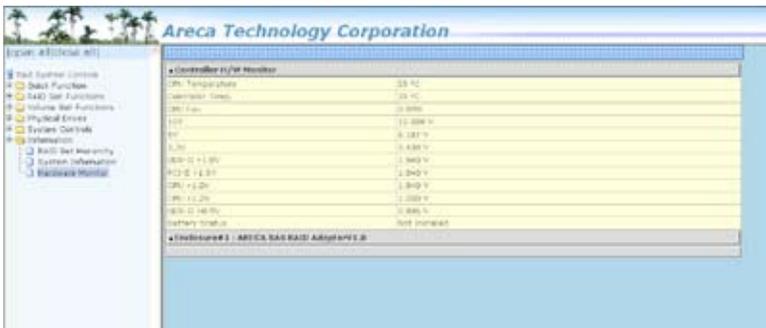
The ARC-8060 series SAS RAID controller operates using cache memory. The Battery Backup Module is an add-on module that provides power to the SAS RAID controller cache memory in the event of a power failure. The BBM monitors the write back cache on the SAS RAID controller, and provides power to the cache memory if it contains data not yet written to the hard drives when power failure occurs.

BBM Outlines



Status of BBM

The BBM status will be shown on the web browser of "Hardware Monitor Information" screen.



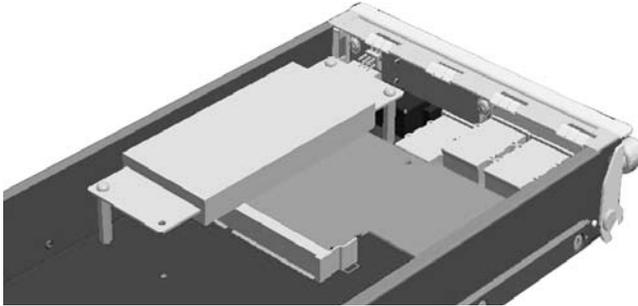


Figure 1-1, ARC-8060 Series SAS RAID Controllers Connect to Battery

Installation

1. Make sure all power to the RAID box is disconnected.
2. Connect the BBM cable to the J3 3-pin box header battery connector on the controller near the LAN connector.
3. Integrators provides pre-drilled holes in their cabinet for securing the BBM using its three mounting positions (NH2, NH3 and NH8).

Battery Backup Capacity

Battery backup capacity is defined as the maximum duration of a power failure for which data in the cache memory can be maintained by the battery. The BBM's backup capacity varied with the memory chips that installed on the SAS RAID controller.

Operation

1. Battery conditioning is automatic. There are no manual procedures for battery conditioning or preconditioning to be performed by the user.
2. In order to make sure of all the capacity is available for your battery cells, allow the battery cell to be fully charged when installed for the first time. The first time charge of a battery cell takes about 24 hours to complete.

APPENDIX

Battery Functionality Test Procedure

1. Write amount of data into controller volume, about 5GB or bigger.
2. Waiting for few seconds, power failed system by remove the power cable
3. Check the battery status, battery beeps every few seconds.
4. Power on system, and press Tab/F6 to login controller.
5. Check the controller event log, make sure the event shows controller boot up with power recovered.

Changing the Battery Backup Module

At some point, the LI-ION battery will no longer accept a charge properly. LI-ION battery life expectancy is anywhere from approximately 1 to 5 years.

1. Shutdown the operating system properly. Make sure that cache memory has been flushed.
2. Remove the RAID box canister top cover
3. Release the screws and disconnect the BBM cable from J3 on the SAS RAID controller.
4. Connect a new battery pack to J3 on the SAS RAID controller and secure the screws.
5. Install the RAID box canister top cover
6. Disable the write-back function from the McBIOS or McRAID storage manager if cache option does not set on the "Auto".

BBM Specifications

Mechanical

- Module Dimension (W x H x D)
48.5 x 9 x 146 mm

Environmental

- Operating Temperature
Temperature: -25° C to +75° C
Humidity: 45-85%, non-condensing
- Storage Temperature
Temperature: -40° C to 85° C
Humidity: 45-85%, non-condensing

- Electrical
Input Voltage
+3.8VDC

- On Board Battery Capacity
3000mAH (3*1000mAH)

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Appendix B

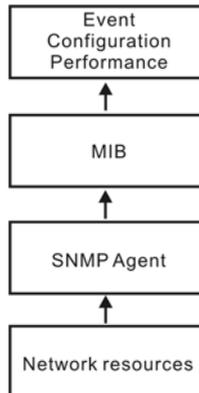
SNMP Operation & Definition

Overview

The Internal RAID subsystem firmware-embedded Simple Network Management Protocol (SNMP) agent for the connect array. An SNMP-based management application (also known as an SNMP manager) can monitor the disk array. An example of An SNMP management application is Hewlett-Packard's Open View. The firmware-embedded SNMP agent can be used to augment the RAID controller if you are already running a SNMP management application at your site.

SNMP Definition

SNMP, an IP-based protocol, has a set of commands for getting the status of target devices. The SNMP management platform is called the SNMP manager, and the managed devices have the SNMP agent loaded. Management data is organized in a hierarchical data structure called the management Information Base (MIB). These MIBs are defined and sanctioned by various industry associations. The objective is for all vendors to create products in compliance with these MIBs so that inter-vendor interoperability can be achieved. If a vendor wishes to include additional device information that is not specified in a standard MIB, then that is usually done through MIB extensions.



SNMP Installation

The installation of the SNMP manager is accomplished in several phases:

- Installing the Manager software on the client
- Placing a copy of the management information base (MIB) in a directory which is accessible to the management application
- Compiling the MIB description file with the management application

MIB Compilation and Definition File creation

Before the manager application accesses the RAID controller, user needs to integrate the MIB into the management application's database of events and status indicator codes. This process is known as compiling the MIB into the application. This process is highly vendor-specific and should be well-covered in the User's Guide of your SNMP application. Ensure the compilation process successfully integrates the contents of the ARECARAID.MIB file into the traps database.

Location for MIB

Depending upon the SNMP management application used, the MIB must be placed in a specific directory on the network management station running the management application. The MIB file must be manually copied to this directory. For example:

SNMP Management Application	MIB Location
HP OpenView	\OV\MIBS
Netware NMS	\NMS\SNMPMIBS\CURRENT

Your management application may have a different target directory. Consult the management application's user manual for the correct location.

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Appendix C

Event Notification Configurations

The controller classifies disk array events into four levels depending on their severity. These include level 1: Urgent, level 2: Serious, level 3: Warning and level 4: Information. The level 4 covers notification events such as initialization of the controller and initiation of the rebuilding process; Level 2 covers notification events which once have happen; Level 3 includes events which require the issuance of warning messages; Level 1 is the highest level, and covers events the need immediate attention (and action) from the administrator. The following lists sample events for each level:

A. Device Event

Event	Level	Meaning	Action
Device Inserted	Warning	HDD inserted	
Device Removed	Warning	HDD removed	
Reading Error	Warning	HDD reading error	Keep Watching HDD status, may be it caused by noise or HDD unstable.
Writing Error	Warning	HDD writing error	Keep Watching HDD status, may be it caused by noise or HDD unstable.
ATA Ecc Error	Warning	HDD ECC error	Keep Watching HDD status, may be it caused by noise or HDD unstable.
Change ATA Mode	Warning	HDD change ATA mode	Check HDD connection
Time Out Error	Warning	HDD time out	Keep Watching HDD status, may be it caused by noise or HDD unstable.
Device Failed	Urgent	HDD failure	Replace HDD
PCI Parity Error	Serious	PCI parity error	If only happen once, it may be caused by noise. If always happen, please check power supply or contact to us.
Device Failed(SMART)	Urgent	HDD SMART failure	Replace HDD

PassThrough Disk Created	Inform	Pass Through Disk created	
PassThrough Disk Modified	Inform	Pass Through Disk modified	
PassThrough Disk Deleted	Inform	Pass Through Disk deleted	

B. Volume Event

Event	Level	Meaning	Action
Start Initialize	Warning	Volume initialization has started	
Start Rebuilding	Warning	Volume rebuilding has started	
Start Migrating	Warning	Volume migration has started	
Start Checking	Warning	Volume parity checking has started	
Complete Init	Warning	Volume initialization completed	
Complete Rebuild	Warning	Volume rebuilding completed	
Complete Migrate	Warning	Volume migration completed	
Complete Check	Warning	Volume parity checking completed	
Create Volume	Warning	New volume created	
Delete Volume	Warning	Volume deleted	
Modify Volume	Warning	Volume modified	
Volume Degraded	Urgent	Volume degraded	Replace HDD
Volume Failed	Urgent	Volume failure	
Failed Volume Revived	Urgent	Failed volume revived	
Abort Initialization	Warning	Initialization been abort	
Abort Rebuilding	Warning	Rebuilding aborted	
Abort Migration	Warning	Migration aborted	
Abort Checking	Warning	Parity check aborted	
Stop Initialization	Warning	Initialization stopped	
Stop Rebuilding	Warning	Rebuilding stopped	
Stop Migration	Warning	Migration stopped	
Stop Checking	Warning	Parity check stopped	

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C. RAID Set Event

Event	Level	Meaning	Action
Create RaidSet	Warning	New RAID set created	
Delete RaidSet	Warning	Raidset deleted	
Expand RaidSet	Warning	Raidset expanded	
Rebuild RaidSet	Warning	Raidset rebuilding	
RaidSet Degraded	Urgent	Raidset degraded	Replace HDD

D. Hardware Monitor Event

Event	Level	Meaning	Action
DRAM 1-Bit ECC	Urgent	DRAM 1-Bit ECC error	Check DRAM
DRAM Fatal Error	Urgent	DRAM fatal error encountered	Check the DRAM module and replace with new one if required.
Controller Over Temperature	Urgent	Abnormally high temperature detected on controller (over 60 degree)	Check air flow and cooling fan of the enclosure, and contact us.
Hdd Over Temperature	Urgent	Abnormally high temperature detected on Hdd (over 55 degree)	Check air flow and cooling fan of the enclosure.
Fan Failed	Urgent	Cooling Fan # failure or speed below 1700RPM	Check cooling fan of the enclosure and replace with a new one if required.
Controller Temp. Recovered	Serious	Controller temperature back to normal level	
Hdd Temp. Recovered			
Raid Powered On	Warning	RAID power on	
Test Event	Urgent	Test event	
Power On With Battery Backup	Warning	RAID power on with battery backed up	
Incomplete RAID Discovered	Serious	Some RAID set member disks missing before power on	Check disk information to find out which channel missing.
HTTP Log In	Serious	a HTTP login detected	

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Telnet Log	Serious	a Telnet login detected	
InVT100 Log In	Serious	a VT100 login detected	
API Log In	Serious	a API login detected	
Lost Rebuilding/ MigrationLBA	Urgent	Some rebuilding/ migration raidset member disks missing before power on.	Reinserted the missing member disk back, controller will continued the incompleated rebuilding/migration.

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Appendix D

RAID Concept

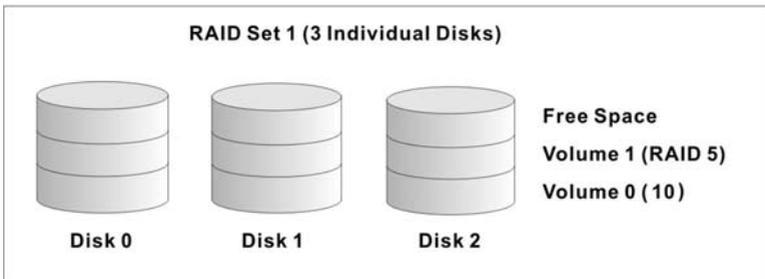
RAID Set

A Raid Set is a group of disk containing one or more volume sets. It has the following features in the RAID controller. 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 disk 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.

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 disk capacity available in a RAID Set. Multiple Volume Sets can exist on a group of disks in a 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.



Easy of Use Features

• **Instant Availability/Background**

Initialization RAID 0 and RAID 1 volume set can be used immediately after the creation. But the RAID 3 and 5 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.

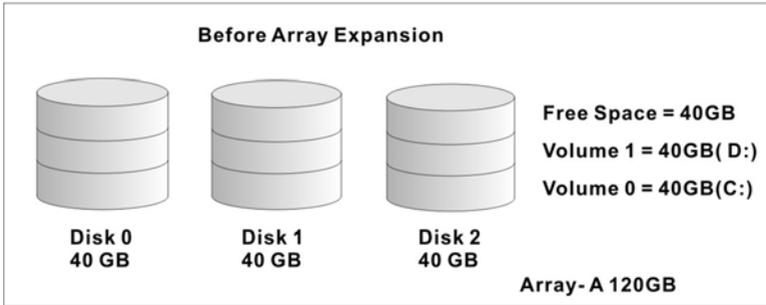
• **Array Roaming**

The RAID controller stores configuration information 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.

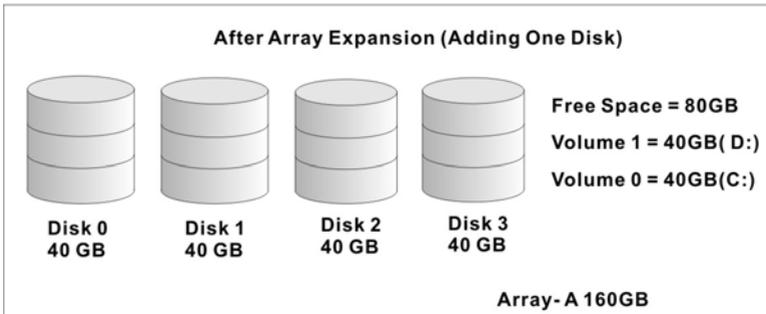
• **Online Capacity Expansion**

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 reconfigured 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.

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The RAID 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.



● 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 controller. 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.

High availability

- **Creating Hot Spares**

A hot spare drive is an unused online available drive, which is ready for replacing the failure disk drive. In a RAID level 1, 10(1E), 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 controller detects a 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 controller 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. Basically, the newly installed drive will be reconfigured an online free disk. But, the newest installed drive automatically assigns as a hot spare, if any hot spare disk was used to rebuild and without new installed drive replaced it.

Important:

The hot spare must have at least the same capacity as the drive it replaces.

- **Hot-Swap Disk Drive Support**

The RAID controller has built the protection circuit to support the replacement of IDE/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 solutions at prices much less than the cost of conventional SCSI hard disk RAID controllers. We provide this feature for controllers to provide the advanced fault tolerant RAID protection and "on-line" drive replacement.

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● Hot-Swap Disk Rebuild

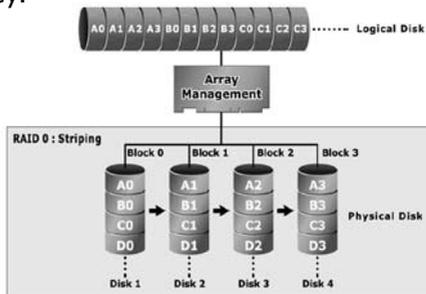
A Hot-Swap function can be used to rebuild disk drives in arrays with data redundancy such as RAID level 1, 10, 3, 5 and 6. If a hot spare is not available, the failed disk drive must be replaced with a new disk drive so that the data on the failed drive can be rebuilt. If a hot spare is available, the rebuild starts automatically when a drive fails. The RAID controller automatically and transparently rebuilds failed drives in the background with user-definable rebuild rates. The RAID controller 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.

Understanding RAID

RAID is an acronym for Redundant Array of Independent Disks. It is an array of multiple independent hard disk drives that provide high performance and fault tolerance. The RAID controller implements several levels of the Berkeley RAID technology. An appropriate RAID level is selected when the volume sets are defined or created. This decision is based on disk capacity, data availability (fault tolerance or redundancy), and disk performance. The following is the RAID level, which support in the RAID controller. The RAID controller makes the RAID implementation and the disks' physical configuration transparent to the host operating system. This means that the host operating system drivers and software utilities are not affected, regardless of the RAID level selected. Correct installation of the disk array and the controller requires a proper understanding of RAID technology and the concepts.

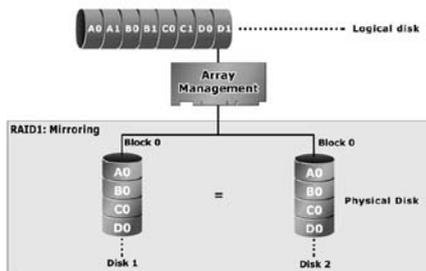
● RAID 0

RAID 0, also referred to as striping, writes stripping of data across multiple disk drives instead of just one disk drive. RAID 0 does not provide any data redundancy, but does offer the best high-speed data throughput. RAID 0 breaks up data into smaller blocks and then writes a block to each drive in the array. Disk striping enhances performance because multiple drives are accessed simultaneously; but the reliability of RAID Level 0 is less than any of its member disk drives due to its lack of redundancy.



● RAID 1

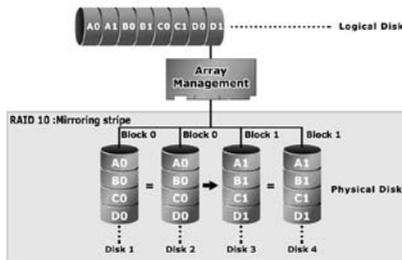
RAID 1 also known as "disk mirroring", data written to one disk drive is simultaneously written to another disk drive. Read performance may be enhanced if the array controller can parallel accesses both members of a mirrored pair. During writes, there will be a minor performance penalty when compared to writing to a single disk. If one drive fails, all data (and software applications) are preserved on the other drive. RAID 1 offers extremely high data reliability, but at the cost of doubling the required data storage capacity.



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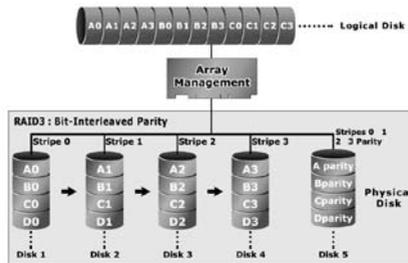
● RAID 10(1E)

RAID 10(1E) is a combination of RAID 0 and RAID 1, combining striping with disk mirroring. RAID Level 10(1E) combines the fast performance of Level 0 with the data redundancy of Level 1. In this configuration, data is distributed across several disk drives, similar to Level 0, which are a stripe across a number of mirrored sets for data protection. RAID 10(1E) provides the highest read/write performance of any of the Hybrid RAID levels, but at the cost of doubling the required data storage capacity.



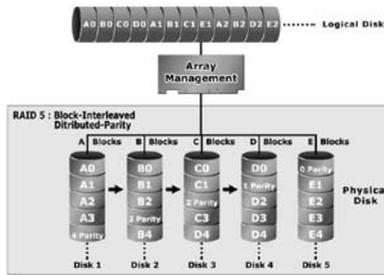
● RAID 3

RAID 3 provides disk striping and complete data redundancy through a dedicated parity drive. RAID 3 breaks up data into smaller blocks, calculates parity by performing an exclusive-or on the blocks, and then writes the blocks to all but one drive in the array. The parity data created during the exclusive-or is then written to the last drive in the array. If a single drive fails, data is still available by computing the exclusive-or of the contents corresponding strips of the surviving member disk. RAID 3 is best for applications that require very fast data-transfer rates or long data blocks.



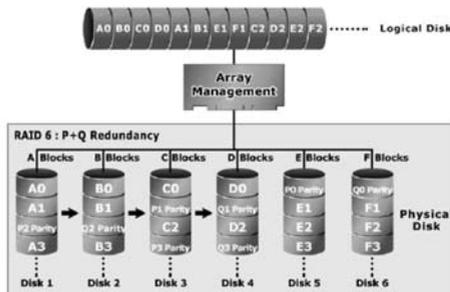
● RAID 5

RAID 5 is sometimes called striping with parity at byte level. In RAID 5, the parity information is written to all of the drives in the controllers rather than concentrated on a dedicated parity disk. If one drive in the system fails, the parity information can be used to reconstruct the data from that drive. All drives in the array system can be used to seek operation at the same time, greatly increasing the performance of the RAID system. This relieves the write bottle-neck that characterizes RAID 4, and is the primary reason that RAID 5 is more often implemented in RAID arrays.



● RAID 6

RAID 6 provides highest reliability, but not widely used. Similar to RAID 5, but does two different parity computations or the same computation on overlapping subsets of the data. The RAID 6 can offer fault tolerance greater than RAID 1 or RAID 5 but only consumes the capacity of 2 disk drives for distributed parity data. RAID 6 is an extension of RAID 5 that uses a second independent distributed parity scheme. Data is striped on a block level across a set of drives, and then a second set of parity is calculated and written across all of the drives.



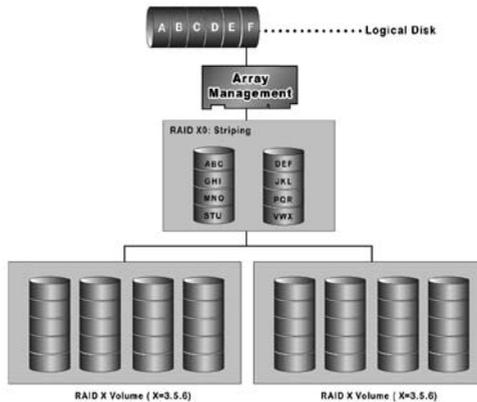
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● RAID x0

RAID level-x0 refers to RAID level 30, 50 and 60. RAID x0 is a combination multiple RAID x volume sets with RAID 0 (striping). Striping helps to increase capacity and performance without adding disks to each RAID x array. The operating system uses the spanned volume in the same way as a regular volume. Up to one drive in each sub-volume (RAID 3 or 5) may fail without loss of data. Up to two drives in each sub-volume (RAID 6) may fail without loss of data.

RAID level x0 allows more physical drives in an array. The benefits of doing so are larger volume sets, increased performance, and increased reliability.

The following illustration is an example of a RAID level x0 logical drive.



Important:

RAID level 30, 50 and 60 can support up to eight sub-Volumes (RAID set). If the volume is RAID level 30, 50, or 60, you cannot change the volume to another RAID level. If the volume is RAID level 0, 1, 10, 3, 5, or 6, you cannot change the volume to RAID level 30, 50, or 60.

● JBOD

(Just a Bunch Of Disks) A group of hard disks in a RAID box are not set up as any type of RAID configuration. All drives are available to the operating system as an individual disk. JBOD does not provide data redundancy.

● Single Disk (Pass-Through Disk)

Pass through disk refers to a drive that is not controlled by the RAID firmware and thus can not be a part of a RAID volume. The drive is available to the operating system as an individual disk.

Summary of RAID Levels

RAID subsystem supports RAID Level 0, 1, 10(1E), 3, 5, 6, 30, 50 and 60. The following table provides a summary of RAID levels.

Features and Performance					
RAID Level	Description	Disks requirement (Cost)	Data Reliability	Data Transfer Rate	I/O Request Rates
0	Also known as striping Data distributed across multiple drives in the array. There is no data protection	N	No data Protection	Very High	Very High for Both Reads and Writes
1	Also known as mirroring All data replicated on N Separated disks. N is almost always 2. This is a high availability Solution, but due to the 100% duplication, it is also a costly solution.	2	Lower than RAID 6; Higher than RAID 3,5	Reads are higher Than a single disk; Writes similar to a single disk	Reads are twice faster than a single disk; Write are similar to a single disk.
10(1E)	Also known Block-Interleaved Parity. Data and parity information is subdivided and distributed across all disk. Parity must be the equal to the smallest disk capacity in the array. Parity information normally stored on a dedicated parity disk.	N (N>2)	Lower than RAID 6; Higher than RAID 3,5	Transfer rates more similar to RAID 1 than RAID 0	Reads are twice faster than a single disk; Writes are similar to a single disk.

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3	Also known Bit-Interleaved Parity. Data and parity information is subdivided and distributed across all disk. Parity must be the equal to the smallest disk capacity in the array. Parity information normally stored on a dedicated parity disk.	N+1	Lower than RAID 1, (10), 6; Higher than a single drive	Reads are similar to RAID 0; Writes are slower than a single disk	Reads are similar twice faster than a single disk; Writes are similar to a single disk.
5	Also known Block-Interleaved Distributed Parity. Data and parity information is subdivided and distributed across all disk. Parity must be the equal to the smallest disk capacity in the array. Parity information normally stored on a dedicated parity disk.	N+1	Lower than RAID 1, (10), 6; Higher than a single drive	Reads are similar to RAID 0; Writes are slower than a single disk	Reads are similar to RAID 0; Writes are slower than a single disk.
6	RAID 6 provides highest reliability, but not widely used. Similar to RAID 5, but does two different parity computations or the same computation on overlapping subsets of the data. The RAID 6 can offer fault tolerance greater than RAID 1 or RAID 5 but only consumes the capacity of 2 disk drives for distributed parity data.	N+2	highest reliability	Reads are similar to RAID 0; Writes are slower than RAID 5	Reads are similar to RAID 0; Writes are slower than a RAID 5
30	RAID 30 is a combination multiple RAID 3 volume sets with RAID 0 (striping)	6	Up to one disk failure in each sub-volume		
50	RAID 50 is a combination multiple RAID 5 volume sets with RAID 0 (striping)	6	Up to one disk failure in each sub-volume		
60	RAID 60 is a combination multiple RAID 6 volume sets with RAID 0 (striping)	8	Up to two disk failure in each sub-volume		

Appendix E

Technical Support

Areca Technical Support provides several options for Areca users to access information and updates. We encourage you to use one of our electric services, which provide product information updates for the most efficient service and support. If you decide to contact us, please have the information such as Product model and serial number, BIOS and driver version, and a description of the problem. Areca provides online answers to your technical questions. Please go **<http://www.areca.com.tw/contactsareca/html/inquiry.htm>** and fill in your problems. We will help you to solve it.