RAID Subsystem

ARC-6060 Series

User's Manual

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WARRANTY

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1. Introduction

Overview
The ARC-6060 series external RAID controller features a Dual LVD SCSI or 2Gb Fibre host attachment and SATA device attachment. The controller has a base module with sixteen SATA (PCB 1.1) or SATA ll (PCB 2.0) channels for disk drives. Installing a dual Ultra 160/320 SCSI host daughter board onto the base module allows you to support 16 channels SCSI-RAID-SATA function. Installing a 2Gb Fibre host daughter board onto the base module allows you to support 16 channels Fibre-to-SATA function. The RAID subsystem is a high-performance SATA drive bus disk array Controller. When properly configured, the RAID subsystem can provide non-stop service with a high degree of fault tolerance through the use of RAID technology and advanced array management features. The RAID controller connects to the host system through an SCSI interface.

The array controller provides reliable data protection for servers and offers a new level polynomial technology to implement the RAID 6 function .The controller raises the standard to higher performance levels with several enhancements including a new memory architecture (PC200 DDR) and new RAID engine. The array allows easy scalability from JBOD to any RAID level. It can be configured to RAID levels 0, 1 (10), 3, 5, 6. The RAID 6 system model allows two HDD failures without impact on the existing data and failed drive. Data can be reconstructed from the remaining data and parity drives. Configuration and environmental information is accessible either via the control panel or Serial Port or 10/100 Ethernet LAN port. The controller unit is most cost-effective IDE disk array subsystems with completely integrated high-performance and data-protection capabilities, which meet or exceed the highest industry standards

A host computer interfaces with the Ultra 160 or Ultra 320 SCSI bus through an on-board SCSI interface chip or a SCSI/Fibre host bus adapter. The host computer and its SCSI/Fibre adapter comprise the "Initiator" side of the SCSI/Fibre bus; any peripheral devices (such as an array) are the "Targets." To the initiators, the controller appears as a single SCSI/Fibre device (a high-capacity hard drive). It is host-independent and almost any combination of server and operating system can be used.

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1.1 System Architecture

```
                    ┌─────────┐
                    │  Host   │
                    └─────────┘
                         │       Ultra320 (SCSI Host)
                         │       2 Gb (Fibre Host)
                         ▼
              ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
                RAID SubSystem
              │  Controller board  │
              └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
                         │       1.5 Gbps (PCB 1.1)
                         │       3.0 Gbps (PCb2.0 or later)
                         ▼
            ┌───────────────────────┐
            │  SATA /SATA ll Drives │
            │      (Max 16)         │
            └───────────────────────┘
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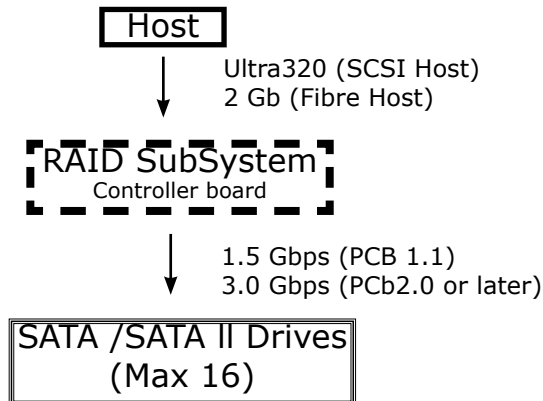
1.1.1Ultra 160/320 Host Interface

The SCSI-to-SATA controller board's host interface appears to the host system as an Ultra 160 or Ultra 320 target device. The Ultra 160 can support transfer rates up to 160MB/S per channel. The Ultra 320 can support transfer rates up to 320MB/S per channel.

1.1.2 2Gb Host Interface

The Fibre-to-SATA controller board's host interface appears to the host system as an 2Gb Fibre target device.

1.1.3 Serial ATA Drive Interface

The controller board communicates directly with the array's 16 SATA drives via two 8 channels SATA interface. When the host is directly controlling the drives, the RAID subsystem controller board translates all communications between the HOST SCSI and SATA devices. The RAID subsystem uses the SATA controller chip on each SATA channel to allow the controller to simultaneously communicate with the host system, and read or write data on several drives. Up to 16 disk drives can be connected to each RAID controller.

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1.2 RAID subsystem Controller Board

The SCSI-RAID-IDE controller acts as a translator between the Ultra 160 or 320 SCSI bus and the SATA drives and handles all communications and data transfers to and from the array's 16 SATA disk drives. When communicating with the host, the SCSI-RAID-IDE controller board functions as an Ultra 160 or Ultra 320 target device. When communicating with the 16 SATA drives in the array, the controller board functions as both an SATA controller and interface between SCSI and SATA protocols. The controller board communicates with the array's drives via two SATA controllers one for 8 channels. A polynomial engine supports a Reed-Solomon parity generator/checker to support RAID 6 function.

1.2.1 Cache Memory Subsystem

The controller new high-performance architecture comes from its super-scalar RISC processor, a 66MHz/64-bit PCI (Ultra 160 Host), a 100MHz/64-bit PCI-X (Ultra 320 Host), a new polynomial RAID 6 engine and 64-bit memory architecture. The data flow at high performance PCI or PCI-X bus and 64-bit 200Mhz ECC DDR SDRAM makes its high data throughput more than existing RAID controller.

The controller can be configured with up to 1 gigabytes of DDR SDRAM cache, depending on the type of memory modules being used. A minimum of 64MB DRAM is required. The system supports Write-Through and Write-Back cache.

In Write-Through Cache, the controller sends a data transfer completion signal to the host operating system when the data have written to the ATA Drive. This caching method is considered more secure, but a Write-Through cache has a lower performance than Write-Back cache. In Write-Back Cache, the controller sends a data transfer completion signal to the host operating system when the controller cache has received all the data in a transaction. If a power failure occurs before the data have written to the disk drives, data in the cache memory will be lost. Therefore, it is recommended that a backup power source (For Example UPS) be used when enabling the write back caching mode option.

1.2.2 User Interface

Manual configuration and monitoring can be done through the LCD front control panel (option). The firmware also contains an embedded management program that can support the RS-232C (Serial Console) port and 10/100 Ethernet LAN port. The controller can use any of the interfaces to simplify the setup and management of their associated disk drives. User can through this serial port to implement Bootable CD VT-100, VT-100 Terminal and HTTP Proxy browser-based management utility. The controller has embedded the web browser-based RAID manager in the firmware. User can remote manage the RAID system without adding any user specific software (platform independent) via standard web browsers directly connected to the 10/100 Ethernet RJ45 LAN port.

1.2.3 Controller Firmware

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. RAID 1 can provide greater fault tolerance, but needs double disk drives and is too costly for most users to implement on large volume sets. Users want the protection of RAID 1 or better with an implementation cost similar to RAID 5. The RAID 6 can offer fault tolerance greater that RAID 1 or RAID 5 but only consumes the capacity of 2 disk drives for distributed parity data.

The RAID controller provides RAID levels 0, 1 (10), 3, 5, 6 and JBOD RAID configurations. It can be managed either through the LCD control panel, RS232 port or Ethernet port. Its high data availability and protection derives from the following capabilities: Online Capacity Expansion, Dynamic Volume Expansion, Array Roaming, Online RAID Level / Stripe Size Migration, Global Online Spare, Automatic Drive Failure Detection, Automatic Failed Drive Rebuilding, Disk Hot Swap, and Online Background Rebuilding, Disk Hot Swap and Instant Availability/Background Initialization.

When the controller detects a hard drive failure in a RAID 1(10), 3, 5 and 6 logical drives, the disk array will automatic rebuild using hot-spare drive. Data is reconstructed into the hot-spare drive during normal operation without having to take the array off-line. The hot-swap function allows users to remove the failed drive, install

a new drive, and automatic rebuild the data on the new drive, all without interrupting system operations.

The RAID subsystem firmware is stored on the controller flash ROM and is executed by the Intel 80321 I/O processor. The firmware can also be updated through the RS-232 port without the need to replace any hardware chips. During the controller firmware upgrade flash process, it is possible for a problem to occur resulting in corruption of the controller firmware. With our Redundant Flash image feature the controller will revert back to the last known version of firmware and continue operating. This reduces the risk of system failure due to firmware crash.

The NVRAM store the data on the current configuration of the controller and its attached disk drives, and lists of pending write operation issued to any drives. These data are checksum protected so that after a power failure, the controller will recall the configuration and consistency for all check outstanding writes on region.

1.3 RAID Concept

1.3.1 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.

1.3.2 Volume Set

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

RAID Set 1 (3 Individual Disks)

Free Space
Volume 1 (RAID 5)
Volume 0 (RAID 0+1)

Disk 0   Disk 1   Disk 2
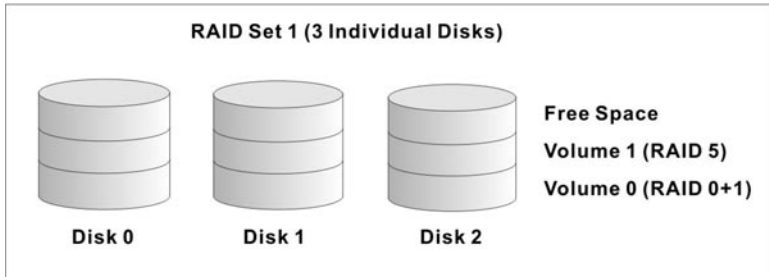
1.3.3 Easy of Use Features

1.3.3.1 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.

1.3.3.2 Array Roaming

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

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1.3.3.3 Online Capacity Expansion

Online Capacity Expansion makes it possible to add one or more physical drive to a volume set, while the server is in operation, eliminating the need to store and restore after 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.

Before Array Expansion

Free Space = 40GB
Volume 1 = 40GB(D:)
Volume 0 = 40GB(C:)

Disk 0   Disk 1   Disk 2
40 GB   40 GB   40 GB

Array- A 120GB
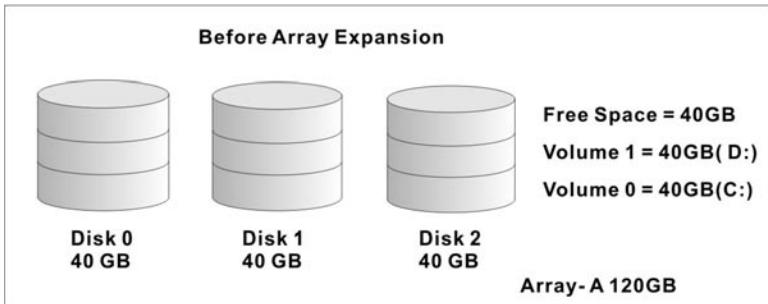
The RAID controller redistributes the original volume set over the original and newly added disks, using the same fault-tolerance configuration. The unused capacity on the expand raid set can then be used to create an additional volume sets, with a different fault tolerance setting if user need to change.

After Array Expansion (Adding One Disk)

Free Space = 80GB
Volume 1 = 40GB(D:)
Volume 0 = 40GB(C:)

Disk 0   Disk 1   Disk 2   Disk 3
40 GB   40 GB   40 GB   40 GB

Array- A 160GB
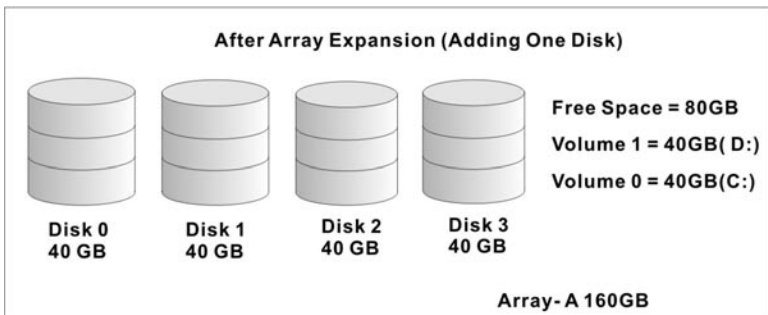
1.3.4 Online RAID Level and Stripe Size Migration

User can migrate both the RAID level and stripe size of an existing volume set, while the server is online and the volume set is in use. Online RAID level/stripe size migration can prove helpful during performance tuning activities as well as in the event that additional physical disks are added to the RAID 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.

1.4 High availability

1.4.1 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, 0+1, 3, or 5 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.

> **Important:**
>
> The hot spare must have at least the same capacity as the drive it replaces.

1.4.2 Hot-Swap Disk Drive Support

The RAID controller has built the protection circuit to support the replacement of IDE/SATA ll hard disk drives without having to shut down or reboot the system. The removable hard drive tray can de-

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liver "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 "online" drive replacement.

1.4.3 Hot-Swap Disk Rebuild

A Hot-Swap function can be used to rebuild disk drives in arrays with data redundancy such as RAID level 1(0+1), 3, and 5. 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.

1.5 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.

1.5.1 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.
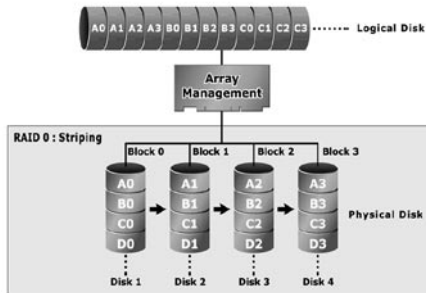
1.5.2 RAID 1

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.
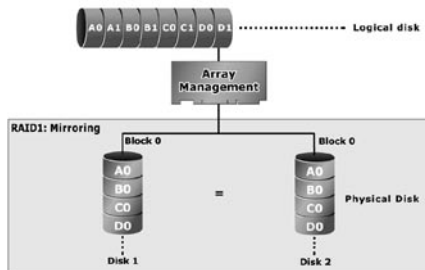
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1.5.3 RAID 10

RAID 10 is a combination of RAID 0 and RAID 1, combing stripping with disk mirroring. RAID Level 10 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 then duplicated to another set of drive for data protection. RAID 10 provides the highest read/write performance of any of the Hybrid RAID levels, but at the cost of doubling the required data storage capacity.
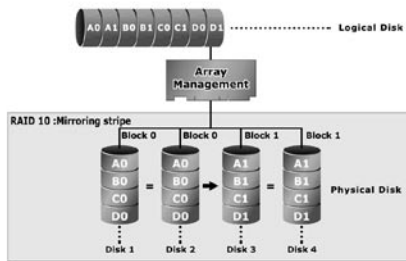
1.5.4 RAID 3

RAID 3 provides disk striping and complete data redundancy though 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.
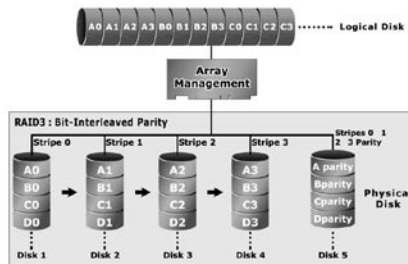
1.5.5 RAID 5

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 bottleneck that characterizes RAID 4, and is the primary reason that RAID 5 is more often implemented in RAID arrays.
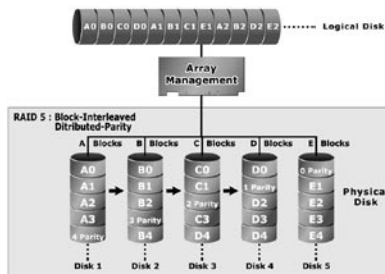
1.5.6 RAID 6

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 that 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.
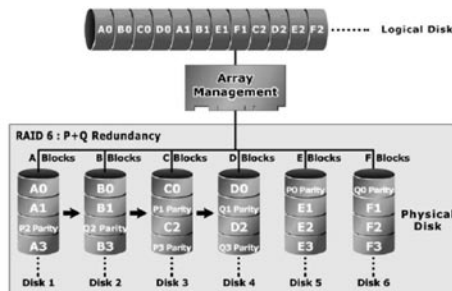
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Summary of RAID Levels

SATA RAID controller supports RAID Levels 0, 1, (10), 3, 5 and 6. Table below provides a summary of RAID levels.

Features and Performance					
RAID Level	Description	Disks re-quirement (Cost)	Data Reliability	Data Transfer Rate	I/O Request Rates
0	Also known as stripping 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	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.
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 that 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

2. Hardware Installation

This section describes the procedures for installing ARC-5010/6010/6020 series.

2.1 Overview

This chapter describes how to install the SCSI-RAID-SATA RAID controller and connect SATA drives to make it ready to use. The following contains step-by-step instructions to successfully install your new RAID controller canister in your computer system.

2.2 RAID Subsystem Requirements

This is essentially the same form factor as a 5¼-inch half-height hard disk drive. It is designed to fit into one 5¼-inch half-height drive bays located in a server chassis or storage case. Standard mounting holes are located on both sides of the controller canister. These mounting holes accept commonly available No. 6-32 coarse-thread screws.

2.3 Locations of the Parts

The controller housed in a 5¼-inch half-height canister with a removable LCD module and a host channel controller. The controller is provided for customers who want to use the exiting SATA enclosure.
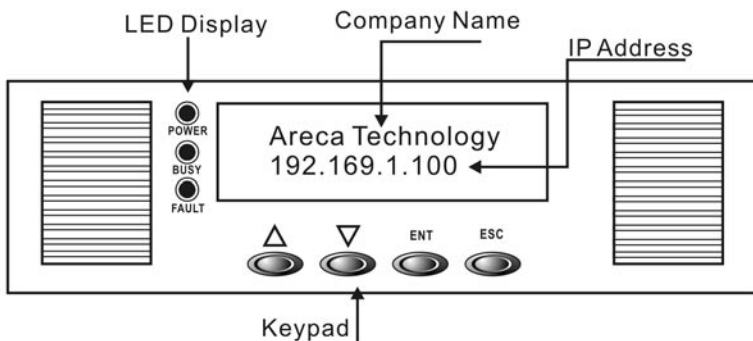
HARDWARE INSTALLATION

LED	Function
POWER	Lighted LED indicates power on
BUSY	Blinking LED indicates data is being transferred.
FAULT	Lighted LED indicates a warring message appears

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)

Controller Components:

- Controller Base Board

SCSI-to-SATA
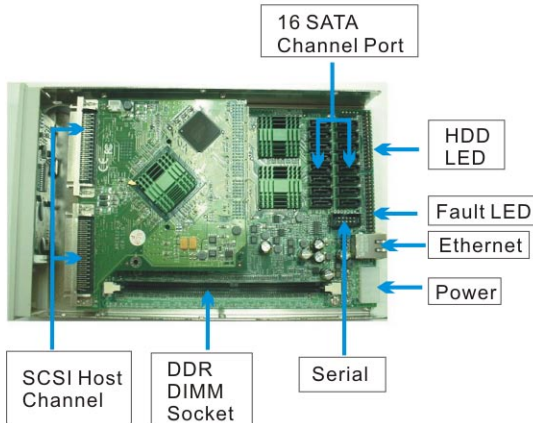
Accessories:

- Serial communications null-modem cable
- Ethernet Cable (Cable not included in kit)
- 39" Serial ATA Cable
- HDD LED Cable (Cable not included in kit)
- Fault LED Cable (Cable not included in kit)

Fibre-to-SATA
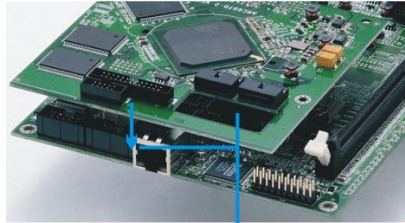
Fibre Channel
Transfer Board
Connector

● Fibre Daughboard

The controller board can use two types transfer board. One only supports purely two SFP connectors.
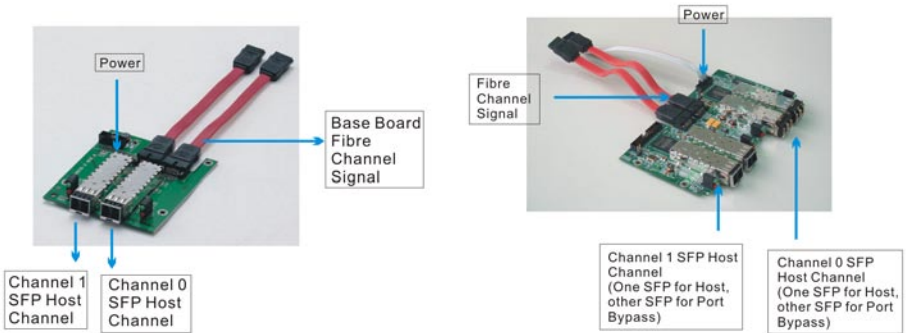
Two 2Gpbs Fibre Channel host channels on the controller board are routed through an four SFP transfer module. By eliminating the cost of purchasing a Hub, we implement a port-bypass circuit in the transfer board, this function lower the total cost of owner-ship for setting up a SAN. The four SFP use two ports to connect the external host computers and two can connect to another Fibre-to-SATA RAID controller for expansion purpose.

HARDWARE INSTALLATION

1.4 Step Action

Step 1 Unpack

Unpack and install the hardware in a static-free environment. The RAID controller box is packed inside an anti-static bag between two sponge sheets. Remove it and inspect it for damage. If the RAID controller box appears damaged, or if any items of the contents listed below are missing or damaged, please contact your dealer or distributor immediately.

Checklist

The RAID controller box kit may have included the following items in the ship package:

- RAID controller box
- Mounting hardware required by the RAID controller box (attachment rails, screws, etc.)
- SATA cables to interconnect the RAID controller and SATA drives or enclosure
- Fibre ChannelTransfer Board Cable to connect to the Host board
- SCSI cable to interconnect RAID controller and system SCSI host (option)
- Fibre cable to interconnect RAID controller and system Fibre host (option)
- User manual CD
- Serial communications null-modem cable

Step 2 Remove the Controller Canister Top Cover

Locate and unscrew the four fasteners on the sides of controller.

Step 3 Remove Host Channel Board

Pull the 'Host Channel Board" above the controller main board, to the up side.

Step 4 Install Controller Memory

To install the DDR SDRAM DIMM:

1. Remove host board before installing DDR DIMM. Grab the edges of your host board and pull up carefully to remove it from the base board.
2. Position the DIMM module toward the socket with the notches in the module aligned with the keys on the socket.
3. Insert the module vertically into the socket. The tabs will hold the DIMM in place.

Note:

(a). The controller requires a minimum of 64 MB DDR SDRAM DIMM with ECC support installed in the DIMM socket in order for it to operate.
(b). Use 184-pin unbuffer DDR SDRAM DIMM module. DDR SDRAM DIMM module that meets Intel DDR200 standard is recommended.
(c). The controller can support 64MB, 128MB, 256MB, 512MB and 1GB modules with *8 or *16 DDR chip.

Step 5 Installing Host Channel Board

Locate the Host Channel sockets (JH3 &JH4 receptacle connectors) on controller main board. Install your host channel by orienting and plugging its headers into the upgrade sockets. Position and press down firmly until the Host Channel fits into place.

Step 6 Connecting RAID controller to HOST SCSI Channel (SCSI-to-SATA)

Two 68-pin wide SCSI connectors are provided on the back of the RAID subsystem for connecting the array to SCSI HOST Adapter. Installation of the RAID subsystem is very similar to the installation of a standard SCSI drive Refer to your system and/or SCSI host adapter manual for additional installation procedures that may apply to your system or host adapter. By installing HOST SCSI Channel and RAID subsystem using the 68-pin LVD SCSI cables included in your kits.
Follow these steps to connect HOST SCSI Channel and RAID subsystem:

a. Plug the Ultra 160 LVD cable supplied with the SCSI card kit to the SCSI adapter internal connector and the last device connector

to the RAID subsystem SCSI-IN connector.
b. Add the Ultra 160 LVD cable supplied with the RAID subsystem kit to its SCSI- OUT connector and place an LVD SCSI active terminator on the other end of this connector.

Note: SCSI Termination

All SCSI buses require termination on both ends of the bus to prevent signal degradation. Most SCSI card supplies the termination on the origination end of the SCSI bus.

Step 6-1 Connecting RAID controller to HOST Fibre Channel (Fibre-to-SATA)

Two SATA connectors are provided on the back of the Fibre Channel Host Board for connecting the array to Transfer Board.. By installing HOST Fibre Channel and RAID subsystem using the SFP optical cables.
Follow these steps to connect HOST Fibre Channel and RAID subsystem:

Step 7 Install the Controller Canister Top Cover

Locate and screw the four fasteners on the sides of controller.

Step 8 Power Down the System

Turn off the host computer and disconnect the power cords.

Step 9 Mounting RAID controller in Server/Enclosure

Remove the cover and front bezel from the computer case. The RAID controller requires one 5.25" half-height drive bay.

Step 10 Connecting RAID controller Power

The power input and connection of the controller is exactly the same as
those for hard disk drives. Connect one free power cables to the power connector on the rear side of the RAID controller.

Step 11 Connecting RAID controller's RS232C

HARDWARE INSTALLATION

The RAID controller can be configured via a PC running a VT-100 terminal
emulation program, or a VT-100 compatible terminal. The provided internal cable converts the RS-232C signals from the 10-pin header into the one 9-pin D-Sub male connectors. The 9-pin D-Sub male connectors can connect to the outside of your enclosure.

Step 12 Connecting RAID controller's Ethernet Port

Connect Ethernet port to the outside of the enclosure using the included Ethernet cable and then to a hub. The receptacle side of this cable can be installed on enclosure backpane.

Step 13 Connecting SATA Cable

The ARC-6060 supports 16 serial ATA on the main board. User uses standard SATA cable to connect the RAID controller and SATA drives or enclosure backplane.

Step 14 Loading Drive to the Drive Tray

The RAID subsystem supports 16 channel SATA channels. Each channel can run up to 150MB/S.

Step 15 Turn on the host computer Power

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

Step 16 Configure RAID Subsystems

You can configure RAID controller either through the LCD Configuration utility, RS232C or Ethernet out of band management utility. The RAID controller supports VT-100 terminal or CD-ROM bootable VT-100 utility and HTTP Proxy web-browser management through the RS-232C port. Please reference the Chapter 4, Chapter 5 and Chapter 6 for the configuration.

CONFIGURATION METHOD

3. Configuration Methods

3.1 Overview

After the hardware installation, the SATA disk drives connected to the 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
 • Bootable CD VT100 utility connected through the controller's serial port
 • VT100 terminal connected through the controller's serial port
 • Using HTTP Proxy through the controller's serial port to access web browser-based RAID manager in Windows and Linux system.
 • Firmware-embedded TCP/IP & web browser-based RAID manager via the controller's 10/100 Ethernet 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 RAID subsystem allows only one method to access menus at a time.

3.2 Using local front panel touch-control keypad

The front panel keypad and liquid crystal display (LCD) is the primary user interface for the RAID subsystem. 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 subsystem 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

This technical manual provides, in quick reference form, procedures that use the built-in LCD panel to configure and operate the controller.

A touch-control keypad and a liquid crystal display (LCD) mounted on the front panel of the RAID subsystem 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 subsystem controller and for all SATA disk array subsystems to which 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 is as following:
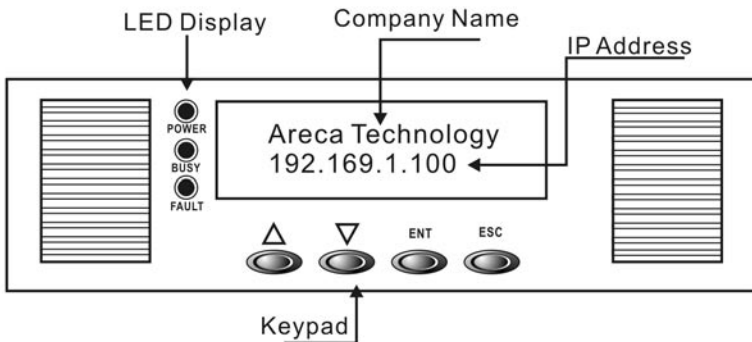
Function Key Definitions
The four function keys at the button of the front panel perform the following functions:

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)

There are a variety of failure conditions that cause the RAID subsystem monitoring LED to light. Table1-1 provides a summary of the front panel LED and Enclosure LED.

CONFIGURATION METHOD

Panel LED	Normal Status	Problem Indication
Power LED	Bright Green	This LED does not light up after power switched on
Host Access LED	Blink green during host computer accessing the RAID subsystem.	LED never flickers
Disk Activity LED	This LED blinks during hard drive read and write activity	LED not light up

For additional information on using the LCD panel and keypad to configure the RAID controller see 'LCD Configuration" on Chapter 6. controller.

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

The serial port on the controller's back panel can be used in VT100 mode. The provided interface cable converts the RS232 signal of the 10-pin header connector on the RAID subsystem into a 9-pin D-Sub male 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.

3.3.1 RAID Subsystem RS-232C Port Pin Assignment

To ensure proper communications between the RAID subsystem 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

CONFIGURATION METHOD

The controller 10-pin header assignments are defined as below.

Action			
Pin	Description	Pin	Description
1	N/C	6	TXD
2	TXD	7	CTS
3	RXD	8	RTS
4	DSR	9	N/C
5	GND	10	N/C

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

3.3.2 Start-up VT100 Screen

By connecting a VT100 compatible terminal, or a PC operating in an equivalent terminal emulation mode, all RAID subsystem 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)

CONFIGURATION METHOD

Step 2. Open **HYPERTRM.EXE** and Enter a name for your Terminal. Click **OK**.

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.
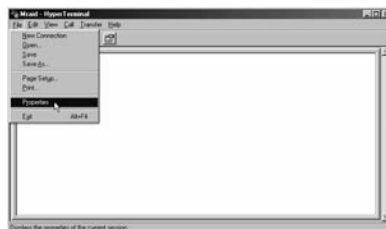
Step 5. Open the Settings Tab.
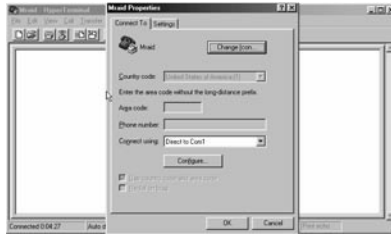
Step 6. Open the Settings Tab. Function, arrow and ctrl keys act as: Terminal Keys, Backspace key sends: **Crtl+H**, Emulation: VT100, Telnet terminal: VT100, Back scroll buffer lines: 500. Click **OK**.

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.

3.4 Bootable CD VT100 utility (Using the controller's serial port)

RAID subsystem now offers an alternative means of communication for the internal RAID Subsystem - Bootable CD VT-100 emulation program. The traditional RS-232C way configures the controller via a dedicated VT-100 terminal or system starting up running the Hyper Terminal utilities. With the Bootable CD VT-100 emulation has more flexibility. User can access the built-in configuration without needing VT-100 terminal or system starting up running the Hyper Terminal. The Bootable CD VT-100 emulation program is an X86-based system utility used to configure RAID volumes prior to OS installation without needing a front panel touch-control keypad.

CONFIGURATION METHOD

The RAID subsystem CD-ROM provides information on OS-independent Bootable CD VT-100 setting utilities. The RAID subsystem CD-ROM is self-booting, assuming you're your system supports booting from the CD-ROM drive. This feature is useful because the utilities discussed below are run directly from the CD-ROM.A Bootable CD VT100 compatible terminal is used to access to the built-in configuration and administration utility that resides in the controller's firmware.

3.4.1 Bootable CD VT100 terminal emulation setting value requirement

To ensure proper communications between the RAID subsystem and the Bootable CD Terminal Emulation, Please connect the RAID subsystem series RS-232 serial port, to any COM port on a host computer and configure the Bootable CD VT100 terminal emulation settings to the values shown below:

Terminal requirment	
Baud Rate	115,200
Data bits	8
Stop	1

3.4.2 Start-up ROM-DOS VT100 Screen

Change the main board BIOS setup so that your system boots from the CD-ROM. Insert the RAID subsystem CD-ROM into the system CD-ROM drive and power on the system. The ROM-DOS Startup Menu appears and follows the step to setup the ROM-DOS VT-100 terminal emulation parameter.

```
F5-Communications  F6-Video  F7-keyboard  F8-VT emulation  F9-File  F10-Exit
```
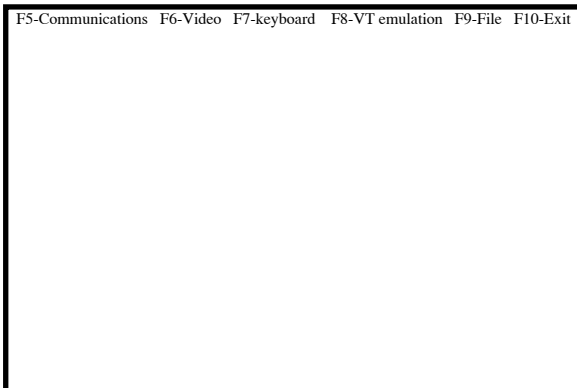
CONFIGURATION METHOD

If you copy the file to floppy and boot from Floppy, then you can use the <**F9-File**>
Function to save the new setting to the floppy disk.

Step 1. Configure the port parameter settings. COM port: 1, Baud rate: "**115200**", Data bits: "**8**", Parity:"**None**", Stop bits: "**1**".

```
Communication Setup Mode,      Use  the function keys to toggle settings


F1>  COM port  =        1
F2>  Baud rate  = 115200
F3>  Parity  =       NONE
F4>  Data bits   =       8
F5>  Stop bits   =       1




  ESC>  or F10>   Exit Communications Setup
```
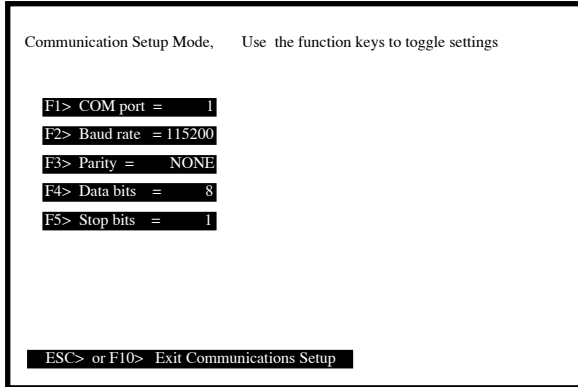
Step 2. Press the "**ESC**" key to go back to the previous screen.

Step 3. After you have finished the VT100 Terminal setup, you may press " **Ctrl** "+ "**D**" keys to link the Disk Array and Terminal together.

```
    Main Menu
    Quick Volume/Raid Setup
    Raid Set Function
    Volume Set Function
    Physical Drives
    Raid System Function
    View System Events
    Clear Event Buffer
    Hardware Monitor
    System information



ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw
```
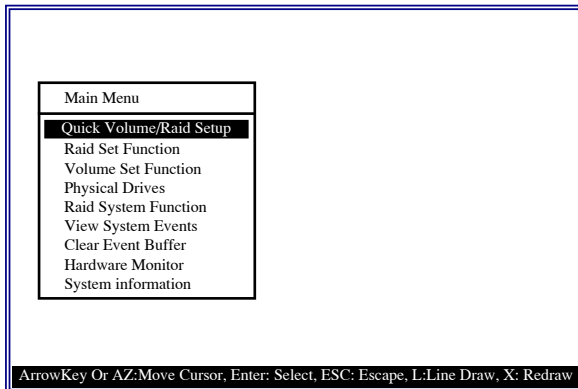
Press" **X** " keys to display the disk array Monitor Utility screen on your VT100 emulation Terminal.

CONFIGURATION METHOD

3.5 Web browser-based RAID manager

Firmware-embedded web browser RAID manager is an HTTP –based application, which utilizes the browser installed on your operating system. Web browser-based RAID manager can be used to manage all the raid function via RS-232C port after starts up the operating system. Please reference the section 3.3 to connect the controller's serial port.

The controller also embeds the TCP/IP protocol in the controller's firmware. User can use the Ethernet LAN port to configure the controller without adding any application and device drive. User can plug and play the web browser RAID manager in the remote station. The provided LAN interface cable connects the RAID controller's LAN port into a LAN port from your local network. Use only shield cable to avoid radiated emission that may cause interruptions.

The Storage Console current configuration screen displays the current configuration of your RAID subsystem. Detail procedures please reference the Chapter 6 Web Browser-based configuration method.
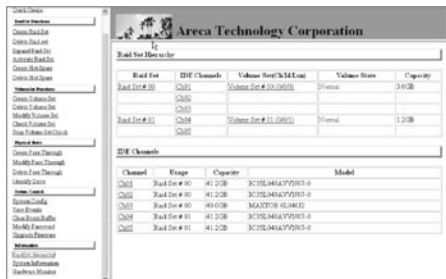
3.5.1 Web browser-based RAID manager via HTTP Proxy (Using the controller's serial port)

User needs to install Areca Http Proxy Server software to the RAID controller server system. Areca Http Proxy Server software is an S/W utility, which allows user through web browser to create and modify RAID set, volume set, and monitor RAID subsystem status.

3.5.1.1 Start-up Web Browser-based RAID Management for Local Administration

Areca now offers an alternative means of communication for the RAID Subsystem - Web Browser-based RAID Management program.. The Web Browser-based RAID Manager program is an HTML-based application, which utilizes the browser (IE, Netscape and Mozilla etc) installed on your monitor station.

3.5.1.1.1 For Windows

Screen in this section are taken from a Windows/XP installation. If you are running other Windows, your installing screen may look different, but the areca http proxy server installation is essentially the same.
   1. Insert the RAID subsystem CD in the CD-ROM drive.
   2. Run the setup.exe file that resides at: <CD-ROM>\http\windows\setup.exe on the CD-ROM.
   3. Click on the Setup file then the Welcome screen appears.

Follow the on-screen prompts to complete Areca Http Proxy Server software installation.
A program bar appears that measures the progress of the areca Archttp setup. When this screen complete, you have completed the Areca Http Proxy Server software setup.

   4. After a successful installation, the Setup Complete dialog box of the installation program is displayed.
         Click the Finish button to complete the installation.

CONFIGURATION METHOD

5. Click on the Start Button in the Windows 2000/XP task bar and then click Program, select the Areca and run "Areca Http Proxy Server". The Archttp dialog box appears. If user doesn't want to launch the web browser, goes to step 9.

The Parameters for the General Setting:
(1). TCP Port value = 1 ~ 65535.
(2). RAID Connected to value = 1 ~ 10 where 1 for COM1, 2 for COM2 and so on...
(3). BaudRate value = {2400, 4800, 9600, 19200, 38400, 57600, 115200}

NOTE: RAID subsystem controller default setting baud rate is 115200.

6. To start the ArcHttp Proxy Server web-browser management, click the Start Button

The Enter Network Password dialog screen appears, type the User Name and Password. The RAID subsystem controller default User Name is "**admin**" and the Password is "**0000**". After completing entering user name and password, press Enter to start-up the Areca Http Proxy Server.
Note: It is strongly recommended to modify the password after the first login.

7. The Storage Console current configuration screen displays the current configuration of your RAID subsystem.
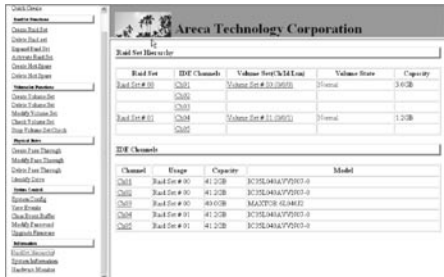
8. If you don't default start-up the web browser, clear "the Launch Web Browser when server started!!" setting. To start the ArcHttp Proxy Server web-browser management, click the Start button.

CONFIGURATION METHOD

9. User may execute the Areca Http Proxy Server by entering http://[IP Address] in your web browser.

3.5.1.1.2 For Linux

The following is the Linux installation procedure in the local server.

1. Insert the RAID subsystem CD in the CD-ROM drive.
2. Usage: ArcHttp TCP_PORT COM_PORT BAUDRATE
Parameters: TCP_PORT value = 1 ~ 65535
COM_PORT value = 1 ~ 10 where 1 for COM1, 2 for COM2 and so on...
BAUDRATE value = {2400, 4800, 9600, 19200, 38400, 57600, 115200}

For Example:
Start the ArcHttp Proxy Server for TCP_PORT = 6666, COM_PORT = 1 and BAUDRATE = 115200, user can type "ArcHttp 6666 1 115200" on command line and enter to execute it.

2. Execute the Areca Http Proxy Server by entering http://[IP Address] in the Netscape browser provided with Linux. Note that Linux prompts you to login to the machine with an ID of root. The RAID subsystem controller default User Name (ID) is "admin" and the Password is "0000"
Note: It is strongly recommended to modify the password after the first login.

3.5.1.2 Start-up Web Browser-based RAID Management for Remote Administration

To configure internal RAID subsystem on a remote machine, you need to know its IP Address. You must first start up your local Areca Http Proxy Server. (Please reference this chapter section 6.1.2.1). Launch your Areca Http Proxy Server by entering http://[IP Address] in the remote web browser.
Note that you must be logged in as administrator with local admin rights on the remote machine to remotely configure it. The RAID subsystem controller default User Name is "admin" and the Password is "0000".

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

To ensure proper communications between the RAID subsystem and Web browser-based RAID management, Please connect the RAID system Ethernet LAN port to any LAN switch port.
The controller has embedded the TCP/IP & Web Browser-based RAID manager in the firmware. User can remote manage the RAID system without adding any user specific software (platform independent) via standard web browsers directly connected to the 10/100 Ethernet RJ45 LAN port.
To configure External RAID subsystem 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.
Note that you must be logged in as administrator with local admin rights on the remote machine to remotely configure it. The RAID subsystem controller default User Name is "admin" and the Password is "0000".

3.6 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 Ethernet LAN port.

CONFIGURATION METHOD

Main Menu
- Quick Volume/Raid Setup
- Raid Set Function
  - Create Raid Set
  - Delete Raid Set
  - Expand Raid Set
  - Create Hot Spare
  - Delete Hot Spare
  - Raid Set Information
- Volume Set Function
  - Create Volume Set
  - Delete Volume Set
  - Modify Volume Set
  - Check Volume Set Consistency
  - Stop Volume Set Consistency
  - Display Volume Info.
- Physical Drives
  - View Drive Information
  - Create Pass-Through Disk
  - Modify Pass-Through Disk
  - Delete Pass-Through Disk
  - Identify Selected Drive
- Raid System Function
  - Mute The Alert Beeper
  - Alert Beep Setting
  - Change Password
  - Raid Rebuilding Priority
  - Maximum ATA Mode
  - Terminal Port Configuration
  - Update Firmware
  - Reset Controller
- U320 SCSI Target Configuration
  - Ch0 QAS
- Ethernet Configuration
  - DHCP Function
  - Local IP Address
  - Ethernet Address
- Show System Events
- Clear All Event Buffers
- Hardware Monitor
- System Information

Note:

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

4. LCD Configuration Menu

The RAID subsystem LCD configuration utility is a character-based utility that you can run after powering the unit. Use LCD Configuration 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 and
- Designate drives as hot spares.

The LCD display front panel function keys are the primary user interface for the RAID subsystem. Except for the "Firmware update", all configurations can be performed through this interface.
Function Key Definitions
The four function keys at the button of the front panel 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

The main menu appears on the LCD screen, as shown below:
Use the up and down arrow buttons to move left and right and highlight a menu item. Press **Enter** to select the highlighted item. Press the **UP/DOWN** to browse the selection. Press **ESC** to return to the previous screen.

LCD CONFIGURATION MENU

4.2 LCD Configuration Utility Main Menu Options

Select an option and the related information or submenu items display beneath it. The submenus for each item are explained on the section 4.8.3. 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
Show System Events	Record all system events in the buffer
Clear All Event Buffer	Clear all event buffer information
Hardware Monitor Information	Show all system environment status
Show System informatiaon	View the controller information

4.3 Configuring Raid Sets and Volume Sets

You can configure raid sets and volume sets with LCD configuration utility using Quick Volume And Raid Set Setup, Raid Set Functions/ Volume Set Functions configuration method. Each configuration method requires a different level of user input. The general flow of operations for raid set and volume set configuration is:

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

4.4 Designating Drives as Hot Spares

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

4.5 Using Quick Volume and Raid Set Setup

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:

Parameter	Setting
Volume Name	Volume Set#00
SCSI Channel/SCSI ID/SCSI LUN	0/0/0
Cache Mode	Write Back
Tag Queuing	Yes
Max Sync Rate	Depend your host adapter setting

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

LCD CONFIGURATION MENU

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	Recommend use drives have 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. The numbers of physical drives in a specific array determine the RAID levels that can be implemented with the array. 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 6 requires at least 4 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. Highlight *RAID level* for the volume set and press **Enter** key to confirm.
3	Set the capacity size for the current volume set. After Highlight RAID level and press **Enter** key. The selected capacity for the current volume set is displayed. Using the **UP** and **DOWN** arrow key to create the current volume set capacity size and press **Enter** key to confirm. The available stripe sizes for the current volume set are displayed.
4	Select Stripe size This parameter specifies the size of the stripes written to each disk in a RAID 0, 1(10), 5or 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 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. Using the **UP/DOWN** to select stripe size and press **ENT** to confirm it.

5	When you are finished defining the volume set, press **Enter** 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). 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 Fast Initialization, the initialization proceeds must be completed before the volume set ready for system accesses.
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

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 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. 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 **Enter** key to set the Hot Spare.
2	Choose Raid Set Function from the main menu. Select the Create Raid Set and press Enter key.
3	Select a Drive For Raid Set window is displayed showing the IDE drive connected to the current controller.

LCD CONFIGURATION MENU

4	Press **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. 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 6 requires at least 4 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 **ESC** to confirm the Select Drive IDE Channel function.
6	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 7.
7	Choose Volume Set Functions from the main menu. Select the Create Raid Volume Set and press **ENT**.
8	Choose one raid set from the Select Raid Set screen. Press **ENT** to confirm it.
9	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: The Raid Level, The Stripe Size, The SCSI HOST/SCSI ID/SCSI LUN/, The Cache Mode, The Tagged Queuing, The SCSI Max Rate, and The Volume Name (number). All value can be changing by the user. Press the UP/ DOWN to select the attributes. Press the ENT to modify each attribute of the default value. Using the UP/DOWN to select attribute value and press the ENT to accept the default value

10	After user completes modifying the attribute, press the ESC to enter the Select Capacity for the volume set. Using the **UP/DOWN** to set the volume set capacity and press **ENT** to confirm it.
11	When you are finished defining the volume set, press **ENT** to confirm the Create function.
12	Press **ENT** to define fast initialization and **ESC** to normal 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 7 to 12 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 internal RAID subsystem from unauthorized entry. The controller will check the password only when entering the Main menu from the initial screen. The RAID subsystem will automatically go back to the initial screen when it does not receive any command in twenty seconds. The RAID subsystem password is default setting at 0000 by the manufacture.

4.7.1 Quick Volume/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:
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.
Detail procedure references to this chapter section 4.5.
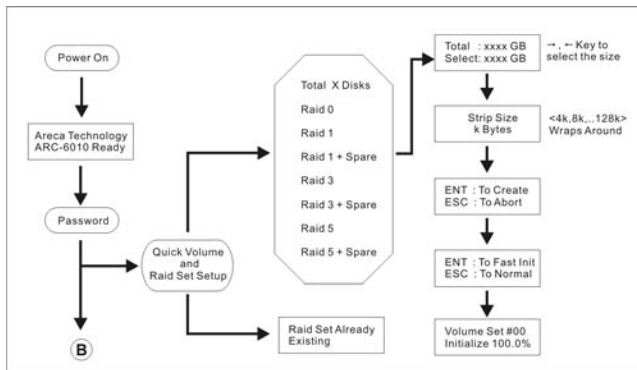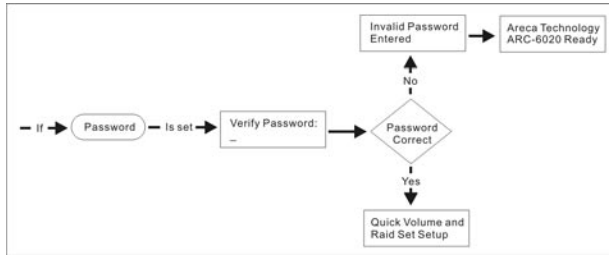
4.7.2 Raid Set Function

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 Function 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 **Enter** to enter the Main menu. Press **UP/DOWN** to select the Raid Set Functions option and then press **Enter** to enter further submenus. All raid set submenus will be displayed.

Figure 4.7.2-1
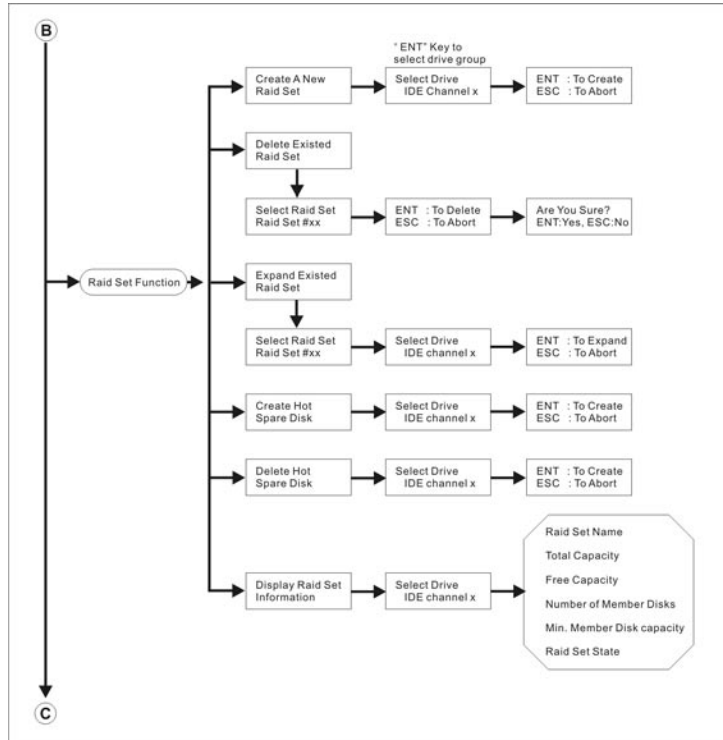
4.7.2.1 Create A New Raid Set

Detail procedure references to this chapter section 4.6.

4.7.2.2 Delete Existed Raid Set

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

4.7.2.3 Expand Existed 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** to choose the Expand Existed Raid Set option. Using **UP/DOWN** to select the raid set number that user want to expand and then press **Enter** to accept the raid set number. If there is an available disk, then the Select Drive IDE Channel x appears. Using **UP/DOWN** to select the target disk and then press **Enter** to select it. Press **Enter** 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.

> **Note:**
>
> 1. Once the Expand Raid Set process has started, user cannot stop it. The process must be completed.
> 2. If a disk drive fails during raid set expansion and a hot spare is available, an auto rebuild operation will occur after the raid set expansion completes.

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

4.7.2.4 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 RAID subsystem is power on. User can use the Activate Incomplete RaidSet option to active the raid set. After user complete the function, the Raid State will change to Degraded Mode.

4.7.2.5 Create Hot Spare Disk

Please reference this chapter section 4.4: Designating Drives as Hot Spares.

4.7.2.6 Delete Hot Spare Disk

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

4.7.2.7 Display Raid Set Information

Using **UP/DOWN** to choose the Display Raid Set Information option and press **Enter**. Using **UP/DOWN** to select the raid set number that user want to display. The raid set information will be displayed.
Using **UP/DOWN** to scroll the raid set information, it shows Raid Set Name, Total Capacity, Free Capacity, Number of Member Disks, Min. Member Disk Capacity and Raid Set State.

4.7.3 Volume Set Function

A volume set is seen by the host system as a single logical device. It is organized in a RAID level 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 **Enter** to enter the main menu. Press **UP/DOWN** to select the Volume Set Functions option and then press **Enter** to enter further submenus. All volume set submenus will be displayed.

4.7.3.1 Create Raid Volume Set

To create a volume set, Please reference this chapter section 4.6: Using Raid Set and Volume Set Functions. The volume set attributes screen shows the volume set default configuration value that is currently being configured.

LCD CONFIGURATION MENU

1. The attributes for ARC-6060 are Raid Level, Stripe Size, Cache Mode, SCSI HOST, SCSI ID, SCSI LUN, Tagged Queuing, SCSI Max Rate, and Volume Name (number). See Figure 4.7.3.1

All value can be changing by the user. Press the UP/DOWN to select attribute. Press the **Enter** to modify the default value. Using the **UP/DOWN** to select attribute value and press the **Enter** to accept the default value. The following is the attributes descriptions. Please reference this chapter section 4.6 Using Raid Set and Volume Set Functions to complete the create volume set function.

Figure 4.7.3.1

4.7.3.1.1 Capacity

The maximum volume size is default in the first setting. Enter the appropriate volume size to fit your application. The capacity can also increase or decrease by the **UP** and **DOWN** arrow key. Each volume set has a selected capacity which is less than or equal to the total capacity of the raid set on which it resides.
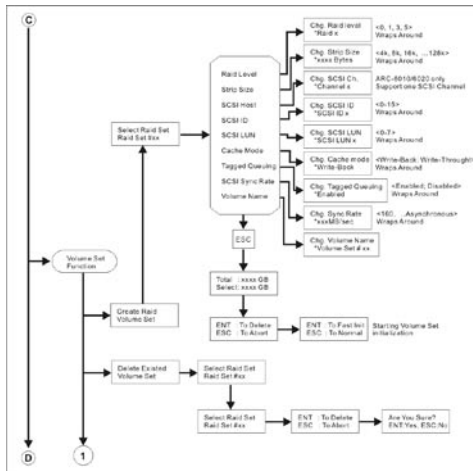
4.7.3.1.2 Raid Level

ARC-6060 can support raid level 0,1(10),3, 5 and 6.

4.7.3.1.3 Strip Size

This parameter sets the size of the segment written to each disk in a RAID 0, 1, 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.

4.7.3.1.4 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.

4.7.3.1.5 SCSI Channel

SCSI Channel : ARC6060 supports dual Ultra 160 or Ultra 320 SCSI channel.
Fibre Host # : Two 2Gbps Fibre channel can be applied to the internal RAID subsystem. Choose the Fibre Host# option 0, 1 and 0&1 cluster.

4.7.3.1.6 SCSI ID/Fibre LUN Base

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

4.7.3.1.7 SCSI LUN/LUN

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

4.7.3.1.8 Cache Mode

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

4.7.3.1.9 Tag Queuing

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

4.7.3.1.10 Max Sync Rate

The RAID subsystem supports 160MB/sec as the highest data transfer rate.

4.7.3.2 Delete Volume Set

Press **UP/DOWN** to choose the Delete Existed Volume Set option. Using **UP/DOWN** to select the raid set number that user want to delete and press **Enter**. Scrolling the **UP/DOWN** to select the volume set number that user want to delete and press **Enter**. The Confirmation screen appears, and then press **Enter** to accept the delete volume set function. The double confirmation screen appears, then press **Yes** to make sure of the delete volume set function.

Figure 4.7.3.2

4.7.3.3 Modify Volume Set

Use this option to modify volume set configuration. To modify volume set attributes from raid set system function, press UP/DOWN to choose the Modify Volume Set Attribute option. Using **UP/DOWN** to select the raid set number that user want to modify and press **Enter**. Scrolling the **UP/DOWN** to select the volume set number that user want to modify and press **Enter**. Press **Enter** 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, SCSI HOST, SCSI ID, SCSI LUN, Tagged Queuing, SCSI Max Rate, and Volume Name (number). All value can be modifying by the user. Press the **UP/DOWN** to select attribute. Press the **Enter** to modify the default value. Using the **UP/DOWN** to select attribute value and press the **Enter** to accept the selection value. Choose this option to display the properties of the selected Volume Set.

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 when one RAID level to another, a Volume set strip size changes or when a disk is added to a raid set.

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** to choose the Check Volume Set Consistency option. Using **UP/DOWN** to select the raid set number that user want to check and press **Enter**. Scrolling the **UP/DOWN** to select the volume set number that user want to check and press **Enter**. The Confirmation screen appears, press **Enter** 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** to choose the Stop Volume Set Consistency Check option and then press **Enter** to stop the check volume set consistency.

4.7.3.6 Display Volume Set Information

This option is display volume set information. To display volume set information from Volume set system function, press **UP/DOWN** to choose the Display Volume Set Information option. Using **UP/DOWN** to select the raid set number that user wants to show and press **Enter**. Scrolling the **UP/DOWN** to select the volume set number that user want to display and press **Enter**. The volume set attributes screen shows the volume set setting configuration value that was currently being configured. The attributes are Raid Level, Stripe Size, Cache Mode, SCSI HOST, SCSI ID, SCSI LUN, Tagged Queuing, SCSI Max Rate, and Volume Name (number). All value cannot be modifying by this option.

4.7.4 Physical Drive

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 **Enter** to enter the main menu. Press **UP/DOWN** to select the Physical Drive Functions option and then press **Enter** to enter further submenus. All physical drive submenus will be displayed.

Figure 4.7.4
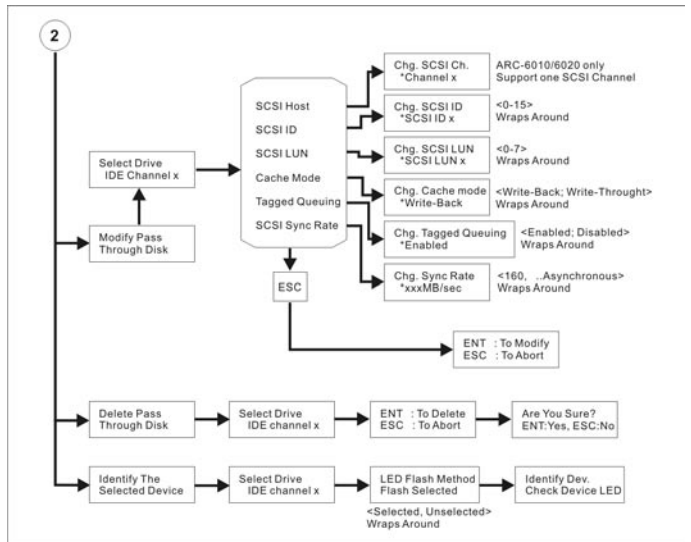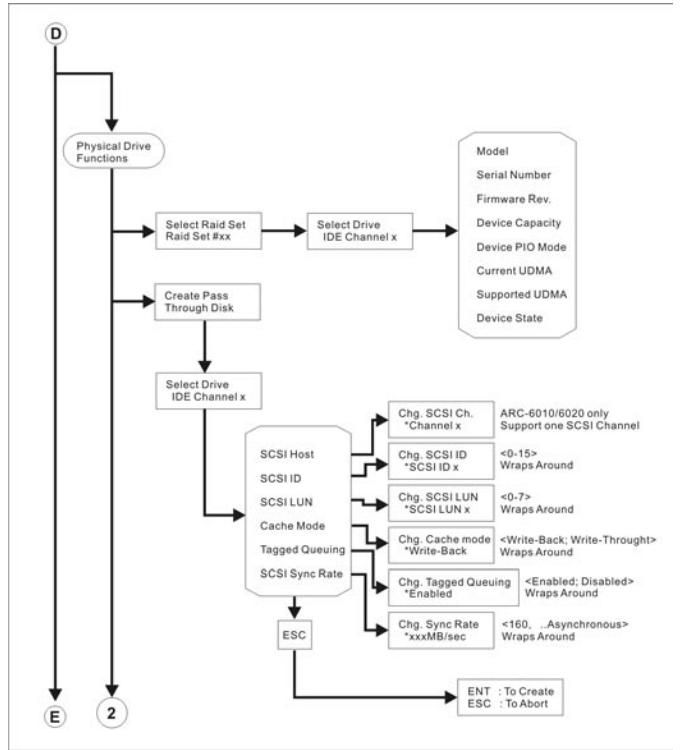
LCD CONFIGURATION MENU

4.7.4.1 Display Drive Information

Using **UP/DOWN** to choose the View Drive Information option and press **Enter**. Using **UP/DOWN** to select the drive IDE number that user want to display. The drive information will be displayed. The drive information screen shows the Model Name, Serial Number, Firmware Rev., Device Capacity, Device PIO Mode, Current UDMA, Supported UDMA, and Device State.

4.7.4.2 Create Pass-Through Disk

Disk is no controlled by the RAID subsystem 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 RAID subsystem firmware.
Using **UP/DOWN** to choose the Create Pass-Through Disk option and press **ENT**. Using **UP/DOWN** to select the drive IDE number that user want to create. The drive attributes will be displayed. The drive attributes show the Cache Model, SCSI Host, SCSI ID, SCSI LUN, Tagged Queuing, and SCSI Sync Rate. All values can be changing by the user. Press the **UP/DOWN** to select attribute and then press the **ENT** to modify the default value. Using the **UP/ DOWN** to select attribute value and press the **ENT** to accept the selection value.

4.7.4.3 Modify Pass-Through Disk

Use this option to modify the Pass-Through Disk attributes. To modify Pass-Through Disk attributes from Pass-Through Disk pool, press **UP/ DOWN** to choose the Modify Pass-Through Drive option, and then press **ENT** key. The Select Drive Function menu will show all Pass-Through Drive number items. Using UP/ DOWN to select the Pass-Through Disk that user want to modify and press **ENT**. The attributes screen shows the Pass-Through Disk setting value that was currently being configured. The attributes are Cache Mode, SCSI HOST, SCSI ID, SCSI LUN, Tagged Queuing, and SCSI Max Rate.
All value can be modifying by the user. Press the **UP/ DOWN** arrow keys to select attribute. Press the **ENT** to modify the de-

fault value. Using the **UP/ DOWN** key to select attribute value and press the **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 drive from the pass-through drive pool, press **UP/DOWN** to choose the Delete Pass-Through Drive option, and then press **Enter**. The Select Drive Function menu will show all Pass-Through Drive number items. Using **UP/DOWN** to select the Pass-Through Disk that user want to delete and press **Enter**. The Delete Pass-Through confirmation screen will appear, presses **Enter** to delete it.

4.7.4.5 Identify Selected Drive

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

4.7.5 Raid System Function

To enter a Raid System Function, press **Enter** to enter the Main menu. Press **UP/DOWN** to select the Raid System Function option and then press **Enter** to enter further submenus. All raid system submenus will be displayed. Using UP/DOWN to select the submenus option and then press **Enter** to enter the selection function.
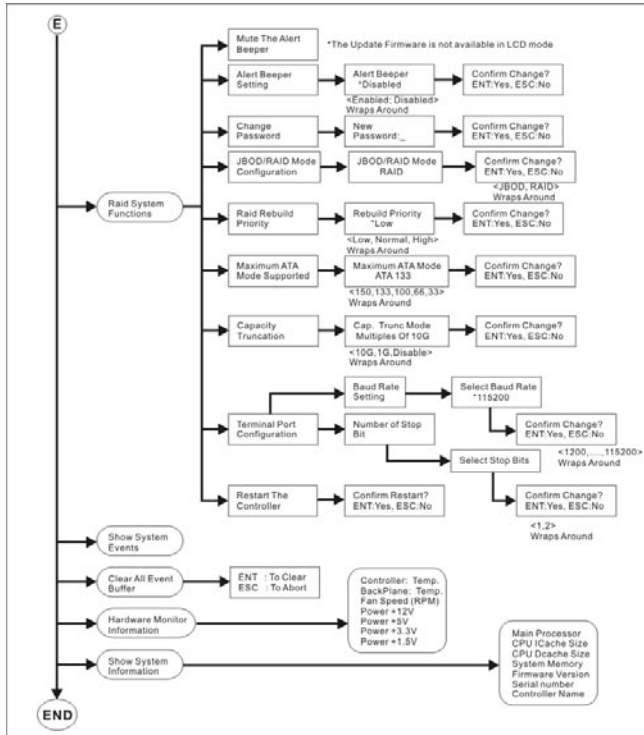
4.7.5.1 Mute The Alert Beeper

The Mute The Alert Beeper function item is used to control the RAID subsystem Beeper. Select the "**No**" and press Enter key in the dialog box 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 function item is used to Disabled or Enable the RAID subsystem controller alarm tone generator. Using the UP/DOWN to select alert beeper and then press the ENT to accept the selection. After completing the selection, the confirmation screen will be displayed and then press ENT to accept the function. Select the Disabled and press Enter key in the dialog box to turn the beeper off temporarily. The beeper will still activate on the next event.

4.7.5.3 Change Password

To set or change the RAID subsystem password, press the **UP/ DOWN** to select Change Password and then press the **Enter** to accept the selection. The New Password: screen appears and enter new password that user want to change. Using the **UP/ DOWN** to set the password value. After completing the modification, the confirmation screen will be displayed and then press **Enter** to accept the function. To disable the password, presses **Enter** 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.

4.7.5.4 JBOD/RAID Configuration

JBOD is an acronym for "Just a Bunch Of Disk". It represents a volume set that is created by the concatenation of partitions on the disks. It can only see the first two disks, when you select the JBOD option. User needs to delete the RAID set, when you want to change the option from the RAID to the JBOD function.

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 subsystem allows user to choose the rebuild priority (low, normal, high) to balance volume set access and rebuild tasks appropriately.
To set or change the RAID subsystem RAID Rebuild Priority, press the **UP/DOWN** to select RAID Rebuild Priority and press the **Enter** to accept the selection. The rebuild priority selection screen appears and uses the **UP/DOWN** to set the rebuild value. After completing the modification, the confirmation screen will be displayed and then press **Enter** to accept the function.

4.7.5.6 Maximum SATA Mode Supported

Within the subsystem, one Ultra 160 SCSI chip acts as a target and 16 SATA bus are connected to the drive. The 16 SATA drive channel can run up to 150MB/s.
To set or change the RAID subsystem maximum ATA mode,

press the **UP/ DOWN** to select Maximum ATA Mode and then press the **Enter** to accept the selection. The maximum ATA mode selection screen appears and uses the **UP/DOWN** to set the maximum ATA mode. After completing the modification, the confirmation screen will be displayed and then press Enter to accept the function.

4.7.5.7 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 **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. Areca drive Truncation mode **Multiples Of 10G** uses the same capacity for both of these drives so that one could replace the other.

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

No Truncation: It does not truncate the capacity.

4.7.5.8 Terminal Port Configuration

Parity value is fixed at None.
Handshaking value is fixed at None.
Speed setting values are 1200, 2400, 4800, 9600, 19200,38400, 57600, and 115200.
Stop Bits values are 1 bit and 2 bits.
To set or change the RAID subsystem COMA configuration, press the **UP/DOWN** to select COMA Configuration and then press the

ENT to accept the selection. The baud rate setting or number of stop bit screen appears and uses the **UP/DOWN** select the setting function. The respect selection screen appears and uses the **UP/DOWN** arrow to set the value. After completing the modification, the confirmation screen will be displayed and then press **Enter** to accept the function.

4.7.5.9 Restart Controller

Use the Reset Controller to reset the entire configuration from the RAID subsystem controller non-volatile memory. To reset the RAID subsystem, press the **UP/ DOWN** to select Reset Controller and then press the **Enter** to accept the selection. The confirmation screen will be displayed and then press **Enter** to accept the function.

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

4.7.6 Show System Events

To view the RAID subsystem events, press **Enter** to enter the Main menu. Press **UP/DOWN** key to select the Show System Events option, and then press **Enter**. The system events will be displayed. Press **UP/DOWN** to browse all the system events.

4.7.7 Clear all Event Buffers

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

4.7.8 Hardware Information

To view the RAID subsystem controller's hardware monitor information, press **Enter** to enter the main menu. Press **UP/DOWN** to select the Hardware Information option, and then press **Enter**. All hardware information will be displayed. Press **UP/DOWN** to

browse all the hardware information.

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

Item	Warning Condition
Controller Board Temperature	**> 60º**
Backplane Temperature	**> 55º**
Controller Fan Speed	**< 1900 RPM**
Power Supply +12V	**< 10.5V or > 13.5V**
Power Supply +5V	**< 4.7V or > 5.3V**
Power Supply +3.3V	**< 3.0V or > 3.6V**
CPU Core Voltage +1.5V	**< 1.35V or > 1.65V**

4.7.9 System Information

Choose this option to display Main processor, CPU Instruction cache and data cache size, firmware version, serial number, controller model name, and the cache memory size. To check the system information, press **Enter** to enter the main menu. Press **UP/DOWN** to select the Show System Information option, and then press **Enter**. All major controller system information will be displayed. Press **UP/DOWN** to browse all the system information.

5. VT-100 Utility Configuration

The RAID subsystem 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 and Volume Sets

You can configure raid sets and volume sets with VT-100 terminal function using Quick Volume/Raid Setup, or Raid Set/Volume Set Function configuration method. Each configuration method requires a different level of user input. The general flow of operations for raid set and volume set configuration is:

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

All unused disk drive that is not part of a raid set can be created as a Hot Spare. The Quick Volume/Raid Setup configuration will automatically add the spare disk drive with the raid level for user to select. For the Raid Set Function configuration, user can use the Create Hot Spare option to define the hot spare disk drive.
A Hot Spare disk drive can be created 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. Press the **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

In Quick Volume /Raid Setup Configuration, it collects all drives in the tray and include them in a raid set. The raid set you create is associated with exactly one volume set, and you can modify the default RAID level, stripe size, and capacity of the volume set. Designating Drives as Hot Spares will also show in the raid level selection option. The volume set default settings will be:

Parameter	Setting
Volume Name	Volume Set # 00
SCSI Channel/SCSI ID/SCSI LUN	0/0/0 (For ARC-6010/6020)
IDE Host Channel/IDE Drive Select	0/0-Master (For ARC-5010)
Cache Mode	Write Back
Tag Queuing	Yes

VT-100 UTILITY CONFIGURATION

Max Sync Rate	Depend on your hous adapter setting (For ARC-6010/6020)
IDE Xfer Mode	Depend on your host adapter setting (For ARC-5010)

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	Recommend use drives have 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. The numbers of physical drives in a specific array determine the RAID levels that can be implemented with the array. 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 6 requires at least 4 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. Highlight *RAID level* for the volume set and press **Enter** key to confirm.
3	Set the capacity size for the current volume set. After Highlight RAID level and press **Enter** key. The selected capacity for the current volume set is displayed. Using the **UP** and **DOWN** arrow key to create the current volume set capacity size and press **Enter** key to confirm. The available stripe sizes for the current volume set are displayed.

4	Using **UP** and **DOWN** arrow key to select the current volume set stripe size and press **Enter** key to confirm it. This parameter specifies the size of the stripes written to each disk in a RAID 0, 1, 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.
5	When you are finished defining the volume set, press **Enter** 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). 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 Fast Initialization, the initialization proceeds must be completed before the volume set ready for system accesses.
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 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 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 set with partial and full raid set.

VT-100 UTILITY CONFIGURATION

Step	Action
1	To setup the Hot Spare (option), choose **Raid Set Function** from the main menu. Select the **Create Hot Spare** and press **Enter** key to set the Hot Spare.
2	Choose Raid Set Function from the main menu. Select the Create Raid Set and press Enter key.
3	Select a Drive For Raid Set window is displayed showing the IDE drive connected to the current controller.
4	Press **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. 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 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
5	After adding physical drives to the current raid set as desired, press Yes 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 a raid set. The default raid set name will always appear as Raid Set. #. Press Enter to finish the name editing.
7	Press **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 **Volume Set Function** from the Main menu. Select the **Create Volume Set** and press **Enter** key.
9	Choose one raid set from the Create Volume From Raid Set window. Press Enter key to confirm it.

10	Foreground (Fast Completion) Press **Enter** key to define fast initialization or Selected the Background (Instant Available). 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 Fast Initialization, the initialization proceeds must be completed before the volume set ready for system accesses.
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.

Note:

User can use this method to examine the existing configuration. Modify volume set configuration method provides the same functions as create volume set configuration method. In volume set function, you can use the modify volume set function to modify the volume set parameters except the capacity size:

5.5 Main Menu

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

```
            Areca Technology Corporation RAID Controller

     ┌─────────────────────┐
     │ Main Menu           │
     ├─────────────────────┤
     │ Quick Volume/Raid Setup │
     │ Raid Set Function   │
     │ Volume Set Function │
     │ Physical Drives     │
     │ Raid System Function │           ┌──────────────────┐
     │ View System Events  │           │ Verify Password  │
     │ Clear Event Buffer  │           ├──────────────────┤
     │ Hardware Monitor    │           │ █                │
     │ System information  │           └──────────────────┘
     └─────────────────────┘

 Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw
```
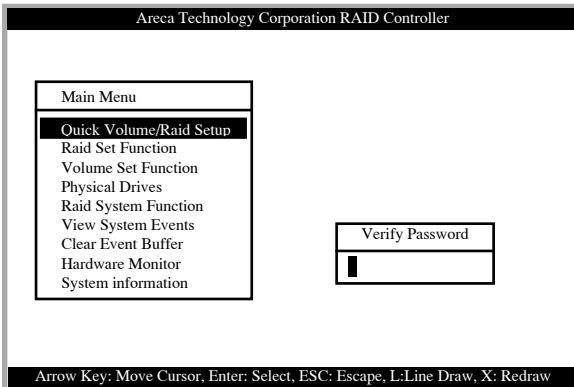
Note:

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

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
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 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 twenty seconds.

5.5.1 Quick Volume/RAID Setup

Quick Volume/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 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 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 Create Volume set function.

The total physical drives in a specific raid set determine the RAID levels that can be implemented with the raid set. Press the **Quick**

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Volume/RAID Setup from the main menu; all possible RAID levels screen will be displayed.
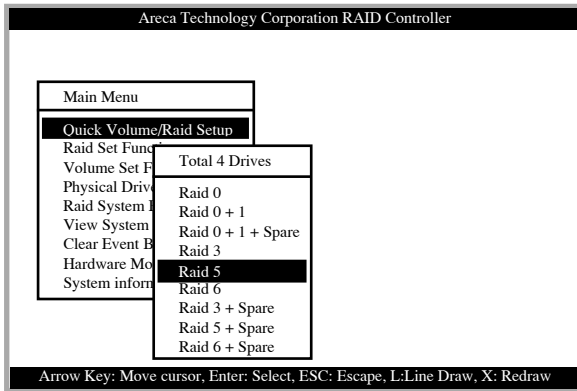
```
┌──────────────────────────────────────────────────────────┐
│         Areca Technology Corporation RAID Controller       │
│                                                            │
│  ┌──────────────────────┐                                  │
│  │ Main Menu            │                                  │
│  ├──────────────────────┤                                  │
│  │ Quick Volume/Raid Setup                                 │
│  │ Raid Set Func│ Total 4 Drives     │                     │
│  │ Volume Set F ├────────────────────┤                     │
│  │ Physical Driv│ Raid 0             │                     │
│  │ Raid System  │ Raid 0 + 1         │                     │
│  │ View System  │ Raid 0 + 1 + Spare │                     │
│  │ Clear Event B│ Raid 3             │                     │
│  │ Hardware Mo  │ Raid 5             │                     │
│  │ System inform│ Raid 6             │                     │
│  └──────────────│ Raid 3 + Spare     │                     │
│                 │ Raid 5 + Spare     │                     │
│                 │ Raid 6 + Spare     │                     │
│                 └────────────────────┘                     │
│  Arrow Key: Move cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└──────────────────────────────────────────────────────────┘
```

A single volume set is created and consumed 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 is displayed in the selected capacity. To enter a value less than the available capacity, type the value and press the **Enter** key to accept this value. If it only use part of the raid set capacity, you can use the **Create Volume Set** option to define another volume sets.

```
┌──────────────────────────────────────────────────────────┐
│         Areca Technology Corporation RAID Controller       │
│                                                            │
│  ┌──────────────────────┐   ┌────────────────────────────┐ │
│  │ Main Menu            │   │ Available Capacity : 160.1GB│ │
│  ├──────────────────────┤   ├────────────────────────────┤ │
│  │ Quick Volume/Raid Setup  │ Selected Capacity : 160.1GB│ │
│  │ Raid Set Fun│ Total 4 Drives    └────────────────────┘ │
│  │ Volume Set  ├───────────────────┤                       │
│  │ Physical Dri│ Raid 0            │                       │
│  │ Raid System │ Raid 0 + 1        │                       │
│  │ View System │ Raid 0 + 1 + Spare│                       │
│  │ Clear Event │ Raid 3            │                       │
│  │ Hardware M  │ Raid 5            │                       │
│  │ System infor│ Raid 6            │                       │
│  └─────────────│ Raid 3 + Spare    │                       │
│                │ Raid 5 + Spare    │                       │
│                │ Raid 6 + Spare    │                       │
│                └───────────────────┘                       │
│  Arrow Key: Move cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└──────────────────────────────────────────────────────────┘
```
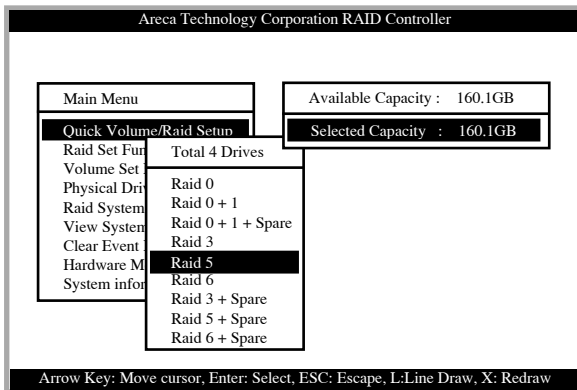
Stripe size This parameter sets the size of the stripe written to each disk in a RAID 0, 1, 5 or 6 logical drive. You can set the stripe size to 4 KB, 8 KB, 16 KB, 32 KB, 64 KB, or 128 KB. A larger stripe size produces better-read performance, especially

if your computer does mostly sequential reads. However, if you are sure that your computer does random reads more often, select a small stripe size.
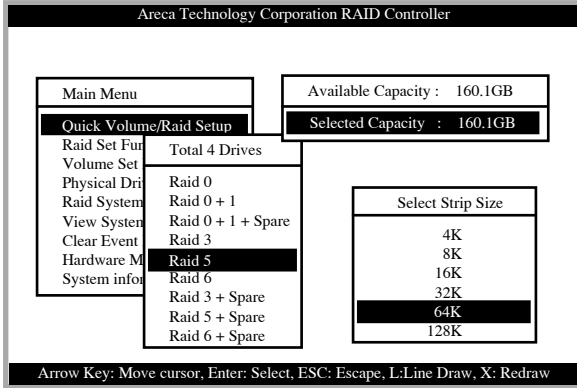
Press the **Yes** key in the Create Vol/Raid Set dialog box, the raid set and volume set will start to initialize it.
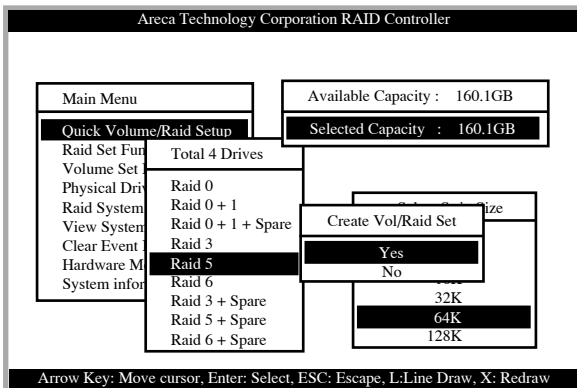
5.5.2 Raid Set Function

User manual configuration can complete control of the raid set setting, but it will take longer to complete than the Quick Volume/Raid Setup configuration. Select the Raid Set Function to manually configure the raid set for the first time or deletes existing raid set and reconfigures the raid set.

```
Areca Technology Corporation RAID Controller


 Main Menu
  Qu ┌─────────────────────────────┐
  Ra │    Raid Set Function        │
  Vo │  ┌────────────────────────┐ │
  Phy│  │ Create Raid Set        │ │
  Rai│  │ Delete Raid Set        │ │
  Vie│  │ Expand Raid Set        │ │
  Cle│  │ Activate Raid Set      │ │
  Ha │  │ Create Hot Spare       │ │
  Sys│  │ Delete Hot Spare       │ │
     │  │ Raid Set Information   │ │
     │  └────────────────────────┘ │


 Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw
```
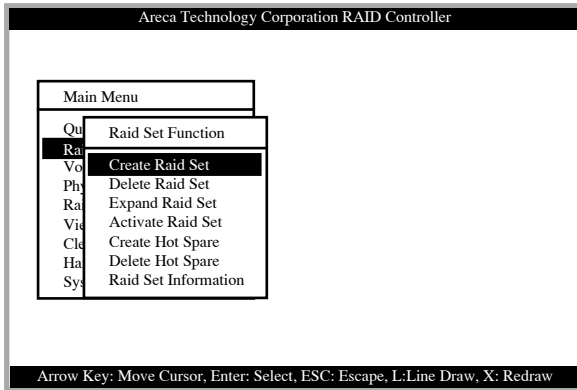
5.5.2.1 Create Raid Set

To define raid set, follow the procedure below:
  1. Select Raid Set Function from the main menu.
  2. Select Create Raid Set option from the Raid Set Function dialog box.
  3. A Select IDE Drive For Raid Set window is displayed showing the IDE drive 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, as many disk drives as user want to add in a single raid set.

To finish selecting IDE drives For Raid Set, press **Esc** key. A Create Raid Set confirmation screen appears, Press **Yes** key to confirm it.

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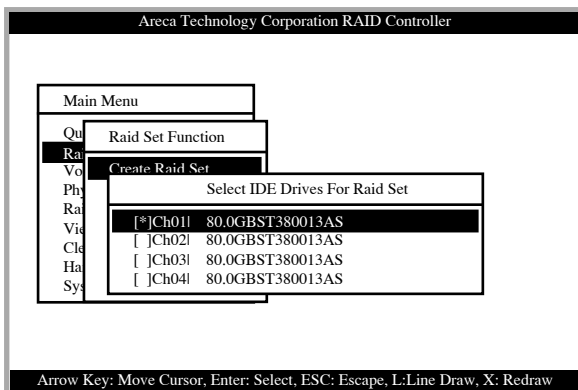
4. An Edit The Raid Set Name dialog box appears. Enter 1 to 15 alphanumeric characters to define a unique identifier for a raid set. The default raid set name will always appear as Raid Set. #.
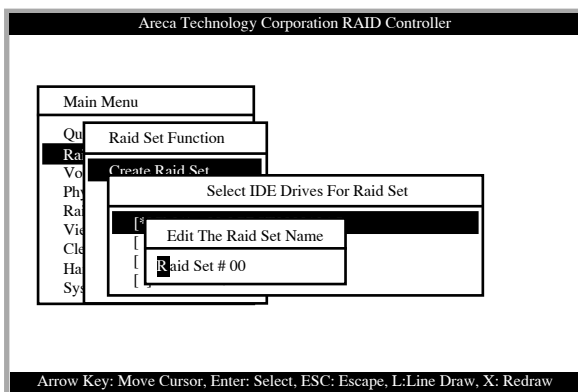
5.5.2.2 Delete Raid Set

To change a raid set, you should first delete it and re-create the raid set. To delete a raid set, select the raid set number that user want to delete in the Select Raid Set to Delete screen. The Delete Raid Set dialog box appears, then press **Yes** key to delete it.

```
┌─────────────────────────────────────────────────────────────┐
│          Areca Technology Corporation RAID Controller         │
│                                                               │
│  ┌──────────────┐                                             │
│  │ Main Menu    │                                             │
│  ├──────────────┤                                             │
│  │ Qu│ Raid Set Function │                                    │
│  │ Ra├───────────────────┤                                    │
│  │ Vo│ Create Raid Set   │                                    │
│  │ Ph│ Dele├───────────────────────────┐                     │
│  │ Ra│ Expa│ Select Raid Set To Delete │                     │
│  │ Vie│ Activ├─────────────────┬──────────────────┐           │
│  │ Cle│ Crea│ Raid Set  #  00 │ Are you Sure?    │           │
│  │ Ha│ Delete Hot Spare│ Raid Set # 01 ├──────────────────┤   │
│  │ Sys│ Raid Set Information │          │ Yes              │   │
│  └──────────────────────────┘          │ No               │   │
│                                         └──────────────────┘   │
│                                                               │
├───────────────────────────────────────────────────────────────┤
│ Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└─────────────────────────────────────────────────────────────┘
```
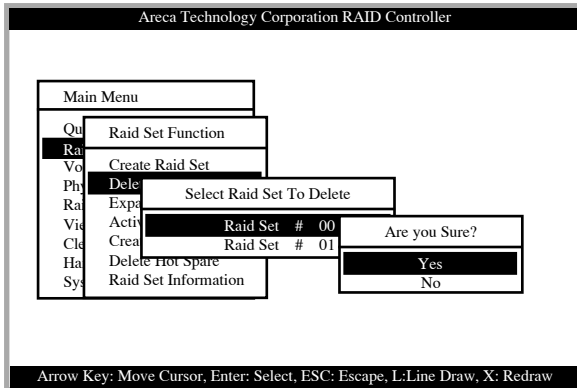
5.5.2.3 Expand Raid Set

Instead of deleting a raid set and recreating it with additional disk drives, the Expand Raid Set function allows the users to add disk drive to the raid set that was created.

```
┌─────────────────────────────────────────────────────────────┐
│          Areca Technology Corporation RAID Controller         │
│                                                               │
│  ┌──────────────┐                                             │
│  │ Main Menu    │                                             │
│  ├──────────────┤                                             │
│  │ Qu│ Raid Set Function │                                    │
│  │ Ra├───────────────────┤                                    │
│  │ Vo│ Create Raid Set   │                                    │
│  │ Ph│ De├───────────────────────────────────┐               │
│  │ Ra│ Ex│ Select IDE Drives For Raid Set Expansion │         │
│  │ Vie│ Ac├────────────────┬──────────────────────┐          │
│  │ Cle│ Cr│ [*]Ch03| 80.0GBST3│ Are you Sure?    │          │
│  │ Ha│ Delete Hot Spare│ [ ]Ch04| 80.0GBST3├───────────┤     │
│  │ Sys│ Raid Set Information │   │ Yes              │         │
│  └──────────────────────────┘   │ No               │         │
│                                  └──────────────────┘         │
│                                                               │
├───────────────────────────────────────────────────────────────┤
│ Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└─────────────────────────────────────────────────────────────┘
```
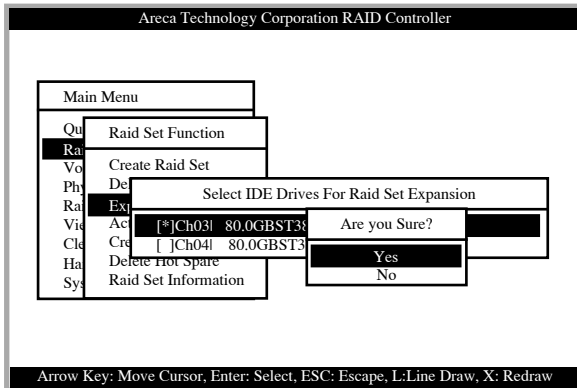
To expand a raid set:
Click on Expand Raid Set option. If there is an available disk, then the Select IDE Drives For Raid Set Expansion screen appears.
Select the target Raid Set by clicking on the appropriate radial button. Select the target disk by clicking on the appropriate check box.
Presses **Yes** key to start expand the 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 set's.

● **Migrating**

```
              Areca Technology Corporation RAID Controller

     Main Menu
    Qu┌──────────────────┐
    Ra│  Raid Set Function│
    Vo│ Create┌──────────────────────────────────────────┐
    Phy│ Delete│   The Raid Set Information                │
    Ra│ Expan │                                          │
    Vie│ Activa│ Raid Set Name       : Raid Set  # 00     │
    Cle│ Create│ Member Disks        : 4                  │
    Ha│ Delete│ Raid State          : Migrating          │
    Sy│ Raid S│ Total Capacity      : 160.1GB            │
        └──────│ Free Capacity       : 144.1GB            │
               │ Min Member Disk Size :  40.0GB           │
               │ Member Disk Channels :  1234             │
               └──────────────────────────────────────────┘

    Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw
```
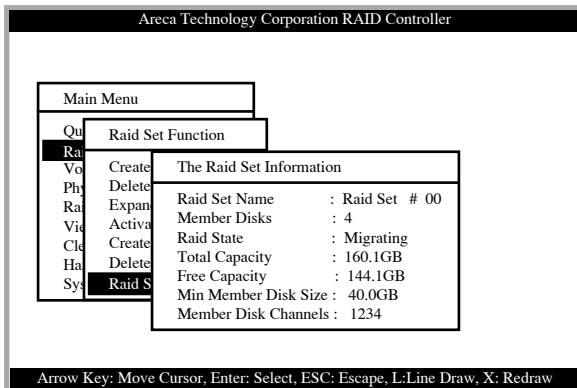
Migrating occurs when a disk is added to a Raid Set. Migration status is displayed in the raid status area of the Raid Set information when a disk is added to a raid set. Migrating status is also displayed in the associated volume status area of the Volume Set Information when a disk is added to a raid set.

5.5.2.4 Activate Incomplete Raid Set

The following screen is the Raid Set Information after one of its disk drive has removed in the power off state.
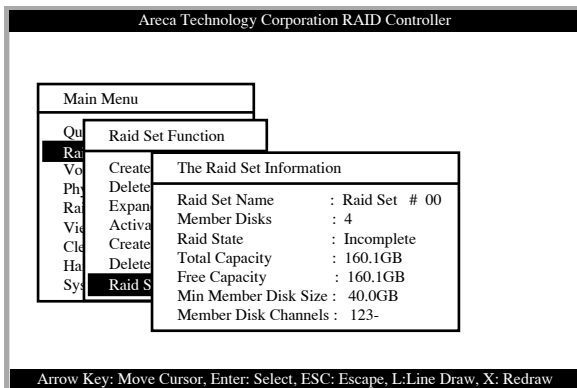
```
              Areca Technology Corporation RAID Controller

     Main Menu
    Qu┌──────────────────┐
    Ra│  Raid Set Function│
    Vo│ Create┌──────────────────────────────────────────┐
    Phy│ Delete│   The Raid Set Information                │
    Ra│ Expan │                                          │
    Vie│ Activa│ Raid Set Name       : Raid Set  # 00     │
    Cle│ Create│ Member Disks        : 4                  │
    Ha│ Delete│ Raid State          : Incomplete         │
    Sy│ Raid S│ Total Capacity      : 160.1GB            │
        └──────│ Free Capacity       : 160.1GB            │
               │ Min Member Disk Size :  40.0GB           │
               │ Member Disk Channels :  123-             │
               └──────────────────────────────────────────┘

    Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw
```

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 SATA RAID controller is power on. User can use the Activate Raid Set option to active the raid set.

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After user complete the function, the Raid State will change to Degraded Mode.

5.5.2.5 Create Hot Spare
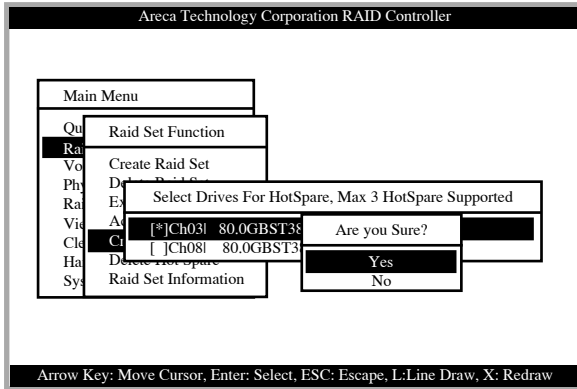
```
┌──────────────────────────────────────────────────────────────┐
│           Areca Technology Corporation RAID Controller          │
│                                                                  │
│  ┌──────────────────────┐                                       │
│  │ Main Menu            │                                       │
│  ├──────────────────────┤                                       │
│  │ Qu┌─────────────────────────┐                               │
│  │ Ra│ Raid Set Function       │                               │
│  │ Vo├─────────────────────────┤                               │
│  │ Phy│ Create Raid Set        │                               │
│  │ Ra│ De┌──────────────────────────────────────────┐         │
│  │ Vie│ Ex│ Select Drives For HotSpare, Max 3 HotSpare Supported │
│  │ Cle│ A┌──────────────────┬──────────────────┐     │         │
│  │ Ha│ Cr│ [*]Ch03| 80.0GBST38│ Are you Sure?    │     │         │
│  │ Sys│ Delete Hot Spare│ [ ]Ch08| 80.0GBST3├──────────────────┤     │         │
│  │    │ Raid Set Information│      Yes        │     │         │
│  │    └─────────────────────│      No         │     │         │
│  └────────────────────────────────────────────────────┘         │
│                                                                  │
│ Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└──────────────────────────────────────────────────────────────┘
```

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.
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.

5.5.2.6 Delete Hot Spare

Select the target Hot Spare disk to delete by clicking on the appropriate check box.
Press the **Enter** keys to select a disk drive, and press **Yes** in the Delete Hot Spare to delete the hot spare.

```
┌─────────────────────────────────────────────────────────┐
│            Areca Technology Corporation RAID Controller   │
│                                                           │
│  ┌──────────────────────┐                                 │
│  │ Main Menu            │                                 │
│  │ Qu┌─────────────────────┐                              │
│  │ Ra│ Raid Set Function   │                              │
│  │ Vo│ Create Raid Set     │                              │
│  │ Phy│ Delete Raid Set    │                              │
│  │ Ra│ Expand Raid Set     │                              │
│  │ Vie│ Ac┌───────────────────────────────────────┐      │
│  │ Cle│ Cr│ Select Drives HotSpare Drive To Be Deleted│  │
│  │ Ha│ De│ [*]Ch03│ 80.0GBST38┌────────────────┐     │   │
│  │ Sys│ Ra│ [ ]Ch05│ 80.0GBST3│ Are you Sure?  │     │   │
│  │    └──│          │          │  Yes           │     │   │
│  │       └──────────┴──────────│  No            │─────┘   │
│                                └────────────────┘         │
│                                                           │
│  Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└─────────────────────────────────────────────────────────┘
```
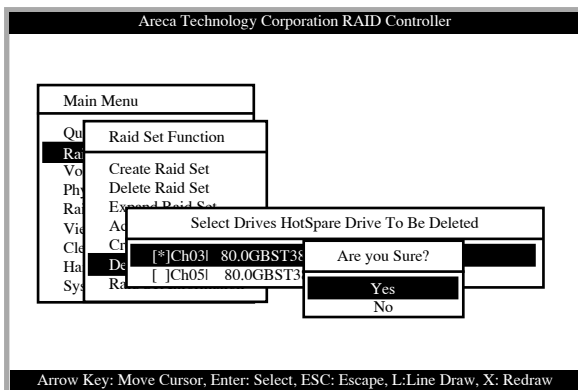
5.5.2.7 Raid Set Information

To display Raid Set information, move the cursor bar to the desired Raid Set number, then press **Enter** key. The Raid Set Information will show as above.
You can only view the information of this Raid Set.

```
┌─────────────────────────────────────────────────────────┐
│            Areca Technology Corporation RAID Controller   │
│                                                           │
│  ┌──────────────────────┐                                 │
│  │ Main Menu            │                                 │
│  │ Qu┌─────────────────────┐                              │
│  │ Ra│ Raid Set Function   │                              │
│  │ Vo│ Create┌────────────────────────────────────┐      │
│  │ Phy│ Delete│ The Raid Set Information           │      │
│  │ Ra│ Expan │                                     │      │
│  │ Vie│ Activa│ Raid Set Name      : Raid Set # 00 │     │
│  │ Cle│ Create│ Member Disks       : 4            │      │
│  │ Ha│ Delete │ Raid State         : Normal       │      │
│  │ Sys│ Raid S│ Total Capacity     : 160.1GB      │      │
│  │    └───────│ Free Capacity      : 160.1GB      │      │
│  │            │ Min Member Disk Size : 40.0GB     │      │
│  │            │ Member Disk Channels : 1234        │     │
│  │            └────────────────────────────────────┘     │
│                                                           │
│  Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└─────────────────────────────────────────────────────────┘
```

5.5.3 Volume Set Function

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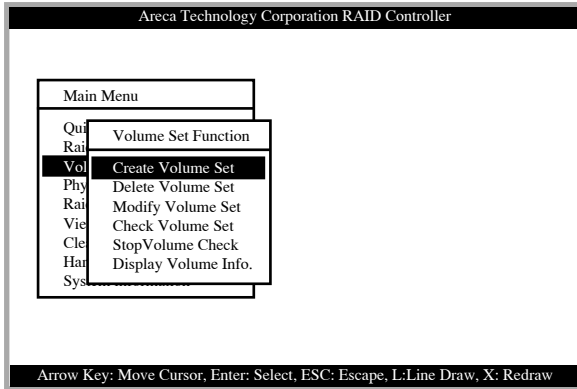
```
Areca Technology Corporation RAID Controller

   Main Menu
   Qui ┌─────────────────────────────┐
   Rai │     Volume Set Function     │
   Vol ├─────────────────────────────┤
   Phy │ ▐ Create Volume Set ▌       │
   Rai │   Delete Volume Set         │
   Vie │   Modify Volume Set         │
   Cle │   Check Volume Set          │
   Har │   StopVolume Check          │
   Sys │   Display Volume Info.      │
       └─────────────────────────────┘

Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw
```

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.

5.5.3.1 Create Volume Set

The following steps is the volume set features for ARC-6060:

1. Volume sets of different RAID levels may coexist on the same raid set.
2. Up to 16 volume sets in a raid set can be created by the RAID subsystem controller.
3. The maximum addressable size of the single volume set is 2 TB (32-bit mode).

To Create a volume set, follow the following 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 dialog box appears. This

screen displays the existing arranged raid sets. Select the raid set number and press **Enter** key. The Volume Creation is displayed in the screen.

```
┌─────────────────────────────────────────────────────────────┐
│         Areca Technology Corporation RAID Controller         │
│                                                              │
│                                                              │
│   ┌──────────────────────┐                                   │
│   │ Main Menu            │                                   │
│   │ Qui┌─────────────────────────┐                          │
│   │ Rai│ Volume Set Function     │                          │
│   │ Vol│ Create Volume Set       │                          │
│   │ Phy│ Delete Volume Set       │                          │
│   │ Rai│ Modify Volume Set       │                          │
│   │ Vie│ Check Volume Set        │                          │
│   │ Cle│ StopV┌──────────────────────────────────┐          │
│   │ Har│ Displa│ Create Volume From Raid Set      │          │
│   │ Sys│       │ Raid Set  #  00                  │          │
│   │    │       │ Raid Set  #  01                  │          │
│   │    │       └──────────────────────────────────┘          │
│                                                              │
│ Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└─────────────────────────────────────────────────────────────┘
```
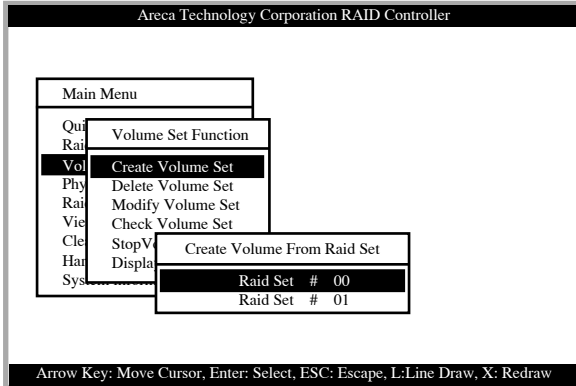
4. A window with a summary of the current volume set's settings. The "**Volume Creation**" option allows user to select the Volume name, capacity, RAID level, strip size, SCSI ID/ LUN, Cache mode and tag queuing. User can modify the default values in this screen; the modification procedures are at 5.5.3.1.1.1 to 5.5.3.1.1.10 section.

```
┌─────────────────────────────────────────────────────────────┐
│         Areca Technology Corporation RAID Controller         │
│                                                              │
│   ┌──────────────────────┐                                   │
│   │ Main Menu            │                                   │
│   │ Qui┌───────────┐                                         │
│   │ Rai│ Volume    │ Volume Creation                         │
│   │ Vol│ Create V  │                                         │
│   │ Phy│ Delete    │ Volume Name   : Volume Set  # 00        │
│   │ Rai│ Modify    │ Capacity      : 160.1GB                 │
│   │ Vie│ Check     │ Raid Level    : 5                       │
│   │ Cle│ StopVo    │ Stripe Size   : 64K                     │
│   │ Har│ Display   │ SCSI  Channel : 0                       │
│   │ Sys│           │ SCSI  ID      : 0                       │
│   │    │           │ SCSI  LUN     : 0                       │
│   │    │           │ Cache Mode    : Write Back              │
│   │    │           │ Tag Queuing   : Enabled                 │
│   │    │           │ Max Sync Rate : 160 MB/sec              │
│ Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└─────────────────────────────────────────────────────────────┘
```

5. After completing the modification of the volume set, press Esc key to confirm it. A Fast Initialization screen is presented.
 • Select **Yes** Key to start the Fast Initialization of the selected volume set.
 • Select **No** Key to start the Normal Initialization of the selected volume set.

```
┌─────────────────────────────────────────────────────────────────┐
│            Areca Technology Corporation RAID Controller            │
│                                                                    │
│  ┌──────────────────┐                                              │
│  │ Main Menu        │                                              │
│  ├──────────────────┤                                              │
│  │ Qui┌──────────┐                                                 │
│  │ Rai│ Volume   ┌─────────────────────┐                          │
│  │ Vol│ Create   │ Volume Creation     │                          │
│  │ Phy│ Delete   │ Volume Name : Volume Set  # 00                 │
│  │ Rai│ Modify   │ Capacity    : 16┌──────────────────┐           │
│  │ Vie│ Check    │ Raid Level  : 5 │ Fast Initialization          │
│  │ Cle│ StopVo   │ Stripe Size : 64├──────────────────┤           │
│  │ Har│ Display  │ SCSI Channel: 0  │      Yes         │          │
│  │ Sys│          │ SCSI ID     : 0  │      No          │          │
│  └────┘          │ SCSI LUN    : 0  └──────────────────┘          │
│                  │ Cache Mode  : Write Back                       │
│                  │ Tag Queuing : Enabled                          │
│                  │ Max Sync Rate : 160 MB/sec                     │
│  Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└─────────────────────────────────────────────────────────────────┘
```
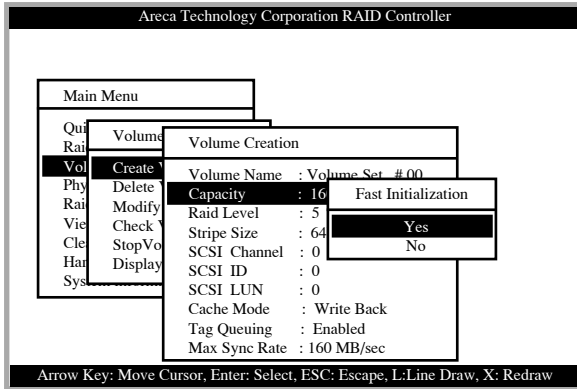
6. Repeat steps 3 to 5 to create additional volume sets.
7. The initialization percentage of volume set will be displayed at the button line.

5.5.3.1.1.1 Volume Name

```
┌─────────────────────────────────────────────────────────────────┐
│            Areca Technology Corporation RAID Controller            │
│                                                                    │
│  ┌──────────────────┐                                              │
│  │ Main Menu        │                                              │
│  ├──────────────────┤                                              │
│  │ Qui┌──────────┐                                                 │
│  │ Rai│ Volume   ┌─────────────────────┐                          │
│  │ Vol│ Create   │ Volume Creation     │                          │
│  │ Phy│ Delete   │ Volume Name  : Volume Set  # 00                │
│  │ Rai│ Modify   │ Capacity     : 160.1GB                         │
│  │ Vie│ Check    │ Raid Level   : 5                               │
│  │ Cle│ StopVo   │ Stripe Size  : 64K                             │
│  │ Har│ Display  │ SCSI Channel : 0   ┌──────────────────┐        │
│  │ Sys│          │ SCSI ID      : 0   │ Edit The Volume Name      │
│  └────┘          │ SCSI LUN     : 0   ├──────────────────┤        │
│                  │ Cache Mode   : Write Back olume Set # 00       │
│                  │ Tag Queuing  : Enabled                         │
│                  │ Max Sync Rate : 160 MB/sec                     │
│  Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└─────────────────────────────────────────────────────────────────┘
```

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.

5.5.3.1.1.2 Capacity

```
                Areca Technology Corporation RAID Controller


                                        Available Capacity :   160.1GB
    Main Menu
    Qui                                 Selected Capacity  :   160.1GB
    Rai     Volume
    Rai              Volume Creation
    Vol     Create
    Phy     Delete    Volume Name    : Volume Set  # 00
    Rai     Modify    Capacity       : 160.1GB
    Vie     Check     Raid Level     : 5
    Cle     StopVo    Stripe Size    : 64K
    Har     Display   SCSI  Channel  : 0
    Sys               SCSI  ID       : 0
                      SCSI  LUN      : 0
                      Cache Mode     : Write Back
                      Tag Queuing    : Enabled
                      Max Sync Rate  : 160 MB/sec

    Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw
```

The maximum volume size is default in the first setting. Enter the appropriate volume size to fit your application. The capacity can also increase or decrease by the **UP** and **DOWN** arrow key. Each volume set has a selected capacity which is less than or equal to the total capacity of the raid set on which it resides.

5.5.3.1.1.3 Raid Level
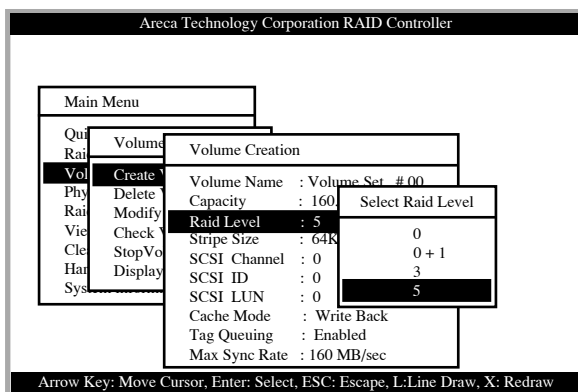
```
                Areca Technology Corporation RAID Controller



    Main Menu
    Qui
    Rai     Volume     Volume Creation
    Rai
    Vol     Create     Volume Name    : Volume Set  # 00
    Phy     Delete     Capacity       : 160.  Select Raid Level
    Rai     Modify     Raid Level     : 5
    Vie     Check      Stripe Size    : 64K        0
    Cle     StopVo     SCSI  Channel  : 0          0 + 1
    Har     Display    SCSI  ID       : 0          3
    Sys                SCSI  LUN      : 0          5
                       Cache Mode     : Write Back
                       Tag Queuing    : Enabled
                       Max Sync Rate  : 160 MB/sec

    Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw
```

Set the RAID level for the Volume Set. Highlight Raid Level and press <**Enter**>.
The available RAID levels for the current Volume Set are displayed. Select a RAID level and press **Enter** key to confirm.

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5.5.3.1.1.4 Strip Size
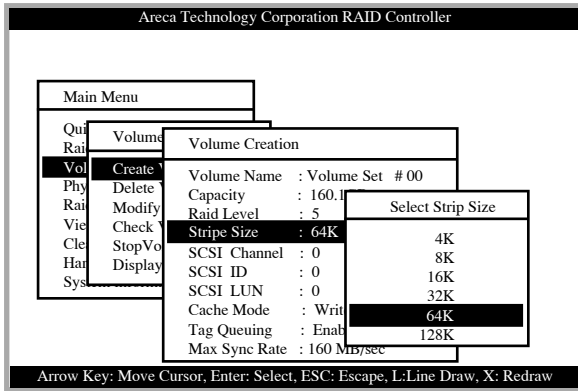
```
┌─────────────────────────────────────────────────────────────┐
│        Areca Technology Corporation RAID Controller          │
│                                                              │
│  ┌──────────────┐                                            │
│  │ Main Menu    │                                            │
│  ├──────────────┤                                            │
│  │ Qui┌────────┐┌──────────────────────┐                    │
│  │ Rai│ Volume ││  Volume Creation     │                    │
│  │ Vol├────────┤├──────────────────────┤                    │
│  │ Vol│ Create ││ Volume Name  : Volume Set  # 00           │
│  │ Phy│ Delete ││ Capacity     : 160.1                      │
│  │ Rai│ Modify ││ Raid Level   : 5      ┌──────────────────┐ │
│  │ Vie│ Check  ││ Stripe Size  : 64K    │ Select Strip Size│ │
│  │ Cle│ StopVo ││ SCSI Channel : 0      ├──────────────────┤ │
│  │ Har│ Display││ SCSI ID      : 0            4K            │
│  │ Sys└────────┘│ SCSI LUN     : 0            8K            │
│  └──────────────┤ Cache Mode   : Writ        16K           │
│                 │ Tag Queuing  : Enab        32K           │
│                 │ Max Sync Rate: 160 MB/sec  64K           │
│                 └──────────────────────┐    128K          │
│  Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└─────────────────────────────────────────────────────────────┘
```

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

5.5.3.1.1.5 SCSI Channel

```
┌─────────────────────────────────────────────────────────────┐
│        Areca Technology Corporation RAID Controller          │
│                                                              │
│  ┌──────────────┐                                            │
│  │ Main Menu    │                                            │
│  ├──────────────┤                                            │
│  │ Qui┌────────┐┌──────────────────────┐                    │
│  │ Rai│ Volume ││  Volume Creation     │                    │
│  │ Vol├────────┤├──────────────────────┤                    │
│  │ Vol│ Create ││ Volume Name  : Volume Set  # 00           │
│  │ Phy│ Delete ││ Capacity     : 160.1GB                    │
│  │ Rai│ Modify ││ Raid Level   : 5                          │
│  │ Vie│ Check  ││ Stripe Size  : 64K    ┌──────────────────┐ │
│  │ Cle│ StopVo ││ SCSI Channel : 0      │Select SCSI Channel│ │
│  │ Har│ Display││ SCSI ID      : 0      ├──────────────────┤ │
│  │ Sys└────────┘│ SCSI LUN     : 0      │        0         │ │
│  └──────────────┤ Cache Mode   : Write Back                 │
│                 │ Tag Queuing  : Enabled                    │
│                 │ Max Sync Rate: 160 MB/sec                 │
│  Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└─────────────────────────────────────────────────────────────┘
```

One SCSI channel can be appllied to the internal RAID subsystem. Choose the SCSI channel. A Select SCSI Channel dialog box appears, select the channel number and press **Enter** key to confirm it.
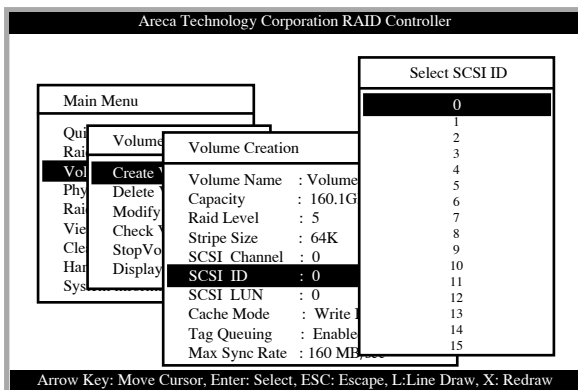
5.5.3.1.1.6 SCSI ID

```
┌─────────────────────────────────────────────────────────────┐
│         Areca Technology Corporation RAID Controller         │
│                                         ┌──────────────────┐ │
│                                         │  Select SCSI ID  │ │
│   ┌────────────────────┐                ├──────────────────┤ │
│   │ Main Menu          │                │        0         │ │
│   ├────────────────────┤                │        1         │ │
│   │ Qui┌──────────────────────────────┐ │        2         │ │
│   │ Rai│ Volume │ Volume Creation     │ │        3         │ │
│   │ Vol├────────┼─────────────────────┤ │        4         │ │
│   │ Phy│ Create │ Volume Name : Volume│ │        5         │ │
│   │ Rai│ Delete │ Capacity   : 160.1G │ │        6         │ │
│   │ Vie│ Modify │ Raid Level : 5      │ │        7         │ │
│   │ Cle│ Check  │ Stripe Size : 64K   │ │        8         │ │
│   │ Har│ StopVo │ SCSI Channel : 0    │ │        9         │ │
│   │ Sys│ Display│ SCSI ID    : 0      │ │       10         │ │
│   └────┤        │ SCSI LUN   : 0      │ │       11         │ │
│        │        │ Cache Mode : Write  │ │       12         │ │
│        │        │ Tag Queuing : Enable│ │       13         │ │
│        │        │ Max Sync Rate : 160MB│ │      14         │ │
│        │        │                     │ │       15         │ │
│ Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└─────────────────────────────────────────────────────────────┘
```

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

5.5.3.1.1.7 SCSI LUN

```
┌─────────────────────────────────────────────────────────────┐
│         Areca Technology Corporation RAID Controller         │
│                                                              │
│   ┌────────────────────┐                                     │
│   │ Main Menu          │                                     │
│   ├────────────────────┤                                     │
│   │ Qui┌──────────────────────────────┐                      │
│   │ Rai│ Volume │ Volume Creation     │                      │
│   │ Vol├────────┼─────────────────────┤ ┌──────────────────┐ │
│   │ Phy│ Create │ Volume Name : Vol   │ │ Select SCSI LUN  │ │
│   │ Rai│ Delete │ Capacity   : 160    │ ├──────────────────┤ │
│   │ Vie│ Modify │ Raid Level : 5      │ │        0         │ │
│   │ Cle│ Check  │ Stripe Size : 64K   │ │        1         │ │
│   │ Har│ StopVo │ SCSI Channel : 0    │ │        2         │ │
│   │ Sys│ Display│ SCSI ID    : 0      │ │        3         │ │
│   └────┤        │ SCSI LUN   : 0      │ │        4         │ │
│        │        │ Cache Mode : Wr     │ │        5         │ │
│        │        │ Tag Queuing : Enabled│ │       6         │ │
│        │        │ Max Sync Rate : 160 MB/sec │    7         │ │
│ Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└─────────────────────────────────────────────────────────────┘
```

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

5.5.3.1.1.8 Cache Mode

```
           Areca Technology Corporation RAID Controller

    Main Menu
  Qui
  Rai    Volume       Volume Creation
  Vol  Create        Volume Name  : Volume Set  # 00
  Phy  Delete        Capacity     : 160 GB
  Rai  Modify        Raid Level   : 5        Volume Cache Mode
  Vie  Check         Stripe Size  : 64K
  Cle  StopVo        SCSI Channel : 0         Write Through
  Har  Display       SCSI  ID     : 0          Write Back
  Sys                SCSI  LUN    : 0
                     Cache Mode   : Write Back
                     Tag Queuing  : Enabled
                     Max Sync Rate : 160 MB/sec
  Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw
```
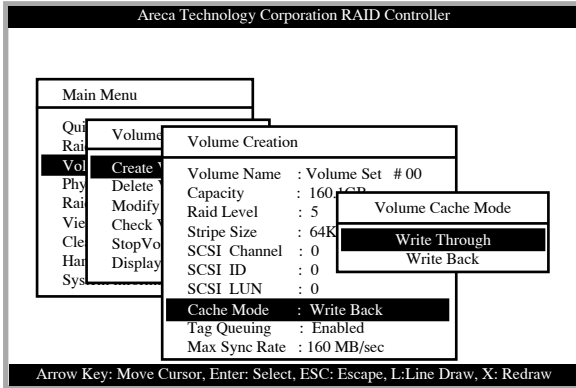
User can set the cache mode to: Write-Through Cache or Write-Back Cache.

5.5.3.1.1.9 Tag Queuing
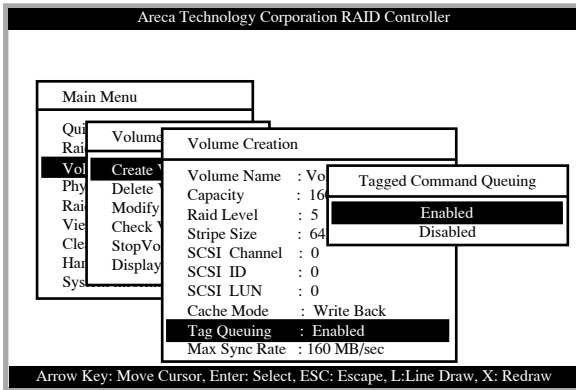
```
           Areca Technology Corporation RAID Controller

    Main Menu
  Qui    Volume       Volume Creation
  Rai
  Vol  Create        Volume Name  : Vo      Tagged Command Queuing
  Phy  Delete        Capacity     : 160
  Rai  Modify        Raid Level   : 5          Enabled
  Vie  Check         Stripe Size  : 64         Disabled
  Cle  StopVo        SCSI Channel : 0
  Har  Display       SCSI  ID     : 0
  Sys                SCSI  LUN    : 0
                     Cache Mode   : Write Back
                     Tag Queuing  : Enabled
                     Max Sync Rate : 160 MB/sec
  Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw
```

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

5.5.3.1.1.10 Max Sync Rate

```
Areca Technology Corporation RAID Controller

Main Menu
Qui
Rai      Volume       Volume Creation
Vol    Create V
Phy    Delete V     Volume Name   : Volur
Rai    Modify V     Capacity      : 160.1      Max Sync Xfer Rate
Vie    Check V      Raid Level    : 5
Cle    StopVo       Stripe Size   : 64K            Async
Har    Display      SCSI  Channel : 0            20 MB/Sec
Sys                 SCSI  ID      : 0            40 MB/Sec
                    SCSI  LUN     : 0            80 MB/Sec
                    Cache Mode    : Writ        160 MB/Sec
                    Tag Queuing   : Enabled
                    Max Sync Rate :  160 MB/sec

Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw
```
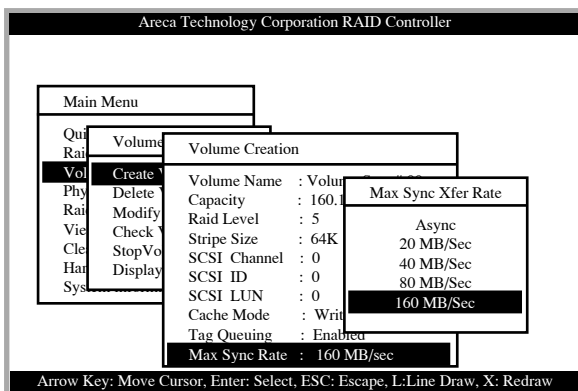
The RAID subsystem supports 160 MB/sec as the highest data transfer rate.

5.5.3.2 Delete Volume Set

To delete Volume set from raid set system function, move the cursor bar to the Volume Set Functions menu and select the Delete Volume Set item, then press **Enter** key. The Volume Set Functions menu will show all Raid Set # item. Move the cursor bar to an RAID Set number, then press **Enter** key to show all Volume Set # in the raid set. Move cursor to the deleted Volume Set number, press **Enter** key to delete it.

```
Areca Technology Corporation RAID Controller

Main Menu
Qui
Rai      Volume Set Func     Select Volume To Delete
Vol    Create
Phy    Delete       Delet        Volume Set  #  00
Rai    Modify
Vie    Check               Raid Set  #   00    Delete Volume Set
Cle    StopVolume Check    Raid Set  #   0
Har    Display Volume Info.                          Yes
Sys                                                  No

Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw
```

5.5.3.3 Modify Volume Set

```
          Areca Technology Corporation RAID Controller

   ┌─ Main Menu ──────────┐
   │ Qui┌──────────────────┐ ┌─ Select Volume to Modify ─┐
   │ Rai│ Volume Set Functi│ │                           │
   │ Vol│ Create           │ │     Raid Set  #   00      │
   │ Phy│ Delete ┌─ Modify ─┐│     Raid Set  #   01      │
   │ Rai│ Modify │ Raid Set  #  00 │
   │ Vie│ Check  │ Raid Set  #  01 │
   │ Cle│ StopVolume Check │
   │ Har│ Display Volume Info. │
   │ Sys└──────────────────┘

   Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw
```

Use this option to modify volume set configuration. To modify
Volume Set values from Raid Set system function, move the cur-
sor bar to the Volume Set Functions menu and select the Modify
Volume Set item, then press **Enter** key. The Volume Set Func-
tions menu will show all Raid Set number items. Move the cursor
bar to an Raid Set number item, then press **Enter** key to show
all Volume Set item Select the Volume Set from the list you
which to change, press **Enter** key to modify it.

5.3.3.1 Volume Expansion

Use this raid set expands to expand a raid set, when a disk is
added to your system. The expand capacity can use to enlarge
the volume set size or create another volume set. The modify
volume set function can support the volume set expansion
function. To expand volume set capacity value from raid set
system function, move the cursor bar to the volume set Volume
capacity item and entry the capacity size. Tick on the Confirm
The Operation and click on the Submit button to complete the
action. The volume set start to expand.

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```
┌─────────────────────────────────────────────────────────────┐
│          Areca Technology Corporation RAID Controller        │
│                                                              │
│                                                              │
│  ┌──────────────┐                                            │
│  │ Main Menu    │   ┌──────────────────────────────────┐    │
│  │──────────────│   │     Select Volume to Modify       │    │
│  │ Qui┌─────────┴─┐ │ Volume Modification               │    │
│  │ Rai│ Volume S  │ │──────────────────────────────────│    │
│  │ Vol│───────────│ │ Volume Name  : Volume Set # 00   │    │
│  │ Phy│ Create    │ │ Capacity     : 160.1GB           │    │
│  │ Rai│ Delete    │ │ Raid Level   : 5                 │    │
│  │ Vie│ Modify    │ │ Stripe Size  : 64K               │    │
│  │ Cle│ Check     │ │ SCSI Channel : 0                 │    │
│  │ Har│ StopVolum │ │ SCSI ID      : 0                 │    │
│  │ Sys│ Display V │ │ SCSI LUN     : 0                 │    │
│  │    └───────────┘ │ Cache Mode   : Write Back        │    │
│  │                  │ Tag Queuing  : Enabled           │    │
│  └──────────────┘   │ Max Sync Rate : 160 MB/sec       │    │
│                     └──────────────────────────────────┘    │
│  Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└─────────────────────────────────────────────────────────────┘
```

As shown in the above can be modified at this screen. Choose this option to display the properties of the selected Volume set.

5.5.3.3.3 Volume Set Migration

```
┌─────────────────────────────────────────────────────────────┐
│          Areca Technology Corporation RAID Controller        │
│                                                              │
│                                                              │
│  ┌──────────────┐                                            │
│  │ Main Menu    │   ┌──────────────────────────────────┐    │
│  │──────────────│   │   The Volume Set Information      │    │
│  │ Qui┌─────────┴─┐ │──────────────────────────────────│    │
│  │ Rai│ Volume    │ │ Volume Name   : Volume Set # 00  │    │
│  │ Vol│───────────│ │ Raid Set Name : Raid Set # 00    │    │
│  │ Phy│ Create    │ │ Volume Capacity : 160.1GB        │    │
│  │ Rai│ Delete    │ │ Volume State  : Migrating        │    │
│  │ Vie│ Modify    │ │ SCSI Ch/Id/Lun : 0/0/0           │    │
│  │ Cle│ Check     │ │ Stripe Size   : 64K              │    │
│  │ Har│ StopVo    │ │ Raid Level    : 5                │    │
│  │ Sys│ Display   │ │ Member Disks  : 3                │    │
│  │    └───────────┘ │ Cache Attribute : Write Back     │    │
│  │                  │ Tag Queuing   : Enabled          │    │
│  └──────────────┘   │ Max SCSI Speed : 160 MB/sec      │    │
│                     │ Current Speed  : Async           │    │
│                     └──────────────────────────────────┘    │
│  Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└─────────────────────────────────────────────────────────────┘
```

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

5.5.3.4 Check Volume Set

```
          Areca Technology Corporation RAID Controller

   Main Menu
   Qui ┌──────────────────┐┌──────────────────────┐
   Rai │ Volume Set Func  ││  Select Volume To Check │
   Vol │ Create  ┌────────┤├──────────────────────┤
   Phy │ Delete  │ Check  ││   Volume Set  #  00    │
   Rai │ Modify  └────────┤├───────────┬────────────┐
   Vie │ Check  ┌─────────┤│ Raid Set # 00│ Check Volume Set│
   Cle │ StopVolume Check ││ Raid Set # 0 ├────────────┤
   Har │ Display Volume Info.│          │    Yes     │
   Sys └──────────────────┘          │    No      │
                                     └────────────┘

   Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw
```

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 di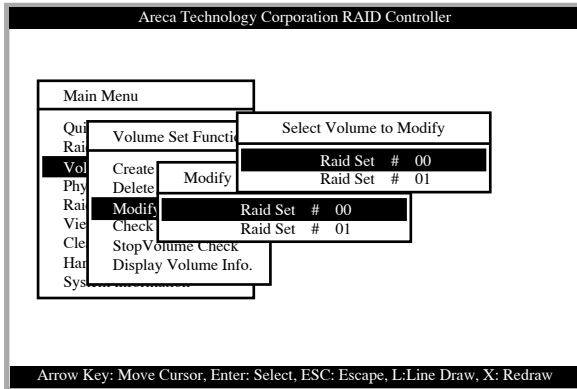sk drives and comparing the results to the contents of the dedicated parity disk drive. To check Volume Set from Raid Set system function, move the cursor bar to the Volume Set Functions menu and select the Check Volume Set item, then press **Enter** key. The Volume Set Functions menu will show all Raid Set number items. Move the cursor bar to an Raid Set number item, then press **Enter** key to show all Volume Set item Select the Volume Set from the list you which to check, press **Enter** key to select it. After completing the selection, the confirmation screen appears, presses **Yes** to start check.

5.5.3.5 Stop Volume Set Check

Use this option to stop all the Check Volume Set function.

5.5.3.6 Display Volume Set Info.

```
┌─────────────────────────────────────────────────────────────┐
│         Areca Technology Corporation RAID Controller         │
│                                                              │
│  ┌────────────────────┐                                      │
│  │ Main Menu          │                                      │
│  ├────────────────────┤                                      │
│  │ Qui┌────────────────────┐┌──────────────────────┐        │
│  │ Rai│ Volume Set Func    ││  Select Volume To Display │    │
│  │ Vol├────────────────────┤├──────────────────────┤        │
│  │ Phy│ Create   ┌─────────┤│  Volume Set  #  00   │        │
│  │ Rai│ Delete   │ Displa   ├──────────────────────┤        │
│  │ Vie│ Modify   ├──────────┤ Raid Set  #  00 │              │
│  │ Cle│ Check    │ Raid Set  #  01 │                         │
│  │ Har│ StopVolume Check     └──────────┘                    │
│  │ Sys│ Display Volume Info. │                               │
│  └────└──────────────────────┘                               │
│                                                              │
│  Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└─────────────────────────────────────────────────────────────┘
```
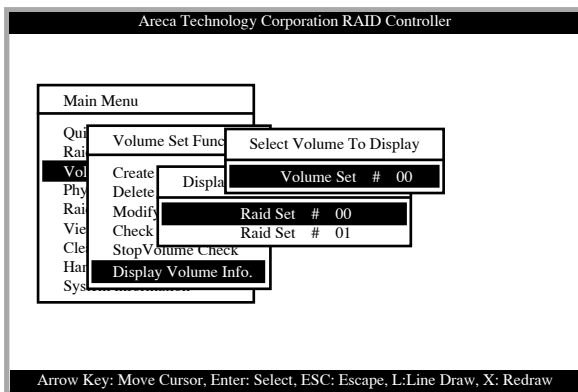
To display Volume Set information, move the cursor bar to the desired Volume Set number, then press **Enter** key. The Volume Set Information will show as following. You can only view the information of this Volume Set.

```
┌─────────────────────────────────────────────────────────────┐
│         Areca Technology Corporation RAID Controller         │
│                                                              │
│  ┌────────────────┐  ┌───────────────────────────────────┐   │
│  │ Main Menu      │  │ The Volume Set Information         │   │
│  ├────────────────┤  ├───────────────────────────────────┤   │
│  │ Qui│ Volume    │  │ Volume Name    : Volume Set  # 00  │   │
│  │ Rai│           │  │ Raid Set Name  : Raid Set  # 00    │   │
│  │ Vol│ Create    │  │ Volume Capacity : 160.1GB          │   │
│  │ Phy│ Delete    │  │ Volume State   : Normal            │   │
│  │ Rai│ Modify    │  │ SCSI Ch/Id/Lun  : 0/0/0            │   │
│  │ Vie│ Check     │  │ Raid Level     : 5                 │   │
│  │ Cle│ StopVo    │  │ Stripe Size    : 64K               │   │
│  │ Har│ Display   │  │ Member Disks   : 3                 │   │
│  │ Sys│           │  │ Cache Attribute : Write Back       │   │
│  └────┘           │  │ Tag Queuing    : Enabled           │   │
│                      │ Max SCSI Speed : 160 MB/sec         │   │
│                      │ Current Speed  : Async              │   │
│  Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└─────────────────────────────────────────────────────────────┘
```

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5.5.4 Physical Drives
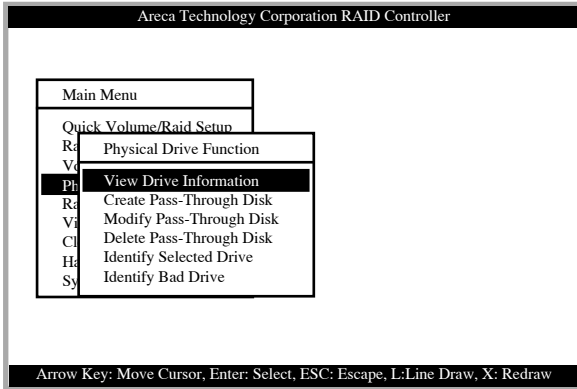
```
          Areca Technology Corporation RAID Controller

   ┌─────────────────┐
   │ Main Menu        │
   ├─────────────────┤
   │ Quick Volume/Raid Setup
   │ Ra  ┌──────────────────────────────┐
   │ Vo  │ Physical Drive Function       │
   │ Ph  ├──────────────────────────────┤
   │ Ph  │ View Drive Information         │
   │ Ra  │ Create Pass-Through Disk       │
   │ Va  │ Modify Pass-Through Disk       │
   │ Cl  │ Delete Pass-Through Disk       │
   │ Ha  │ Identify Selected Drive        │
   │ Sy  │ Identify Bad Drive             │
   └──── └──────────────────────────────┘

    Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw
```

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

5.5.4.1 View Drive Information

```
          Areca Technology Corporation RAID Controller

   ┌─────────────────┐
   │ Main Menu        │
   ├─────────────────┤
   │ Quick Volume/Raid Setup
   │ Ra  ┌──────────────────────────┐
   │ Vo  │ Physical Drive Function   │
   │ Ph  ├──────────────────────────┤
   │ Ph  │ View  ┌ Ch01 MAXTOR 6L04 ──────────────────┐
   │ Ra  │ Crea  │                                      │
   │ Va  │ Mod   │ Model Name     : MAXTOR 6L040J2     │
   │ Cl  │ Dele  │ Serial Number  : 662132645525       │
   │ Ha  │ Iden  │ Firmware Rev.  : A93.0500           │
   │ Sy  │ Iden  │ Disk Capacity  : 40.0GB             │
   └──── └────── │ PIO Mode       : Mode 4             │
                 │ Current UDMA   : ATA133             │
                 │ Support UDMA   : ATA133             │
                 │ Device State   : RaisSet Member     │
                 └──────────────────────────────────────┘
    Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw
```
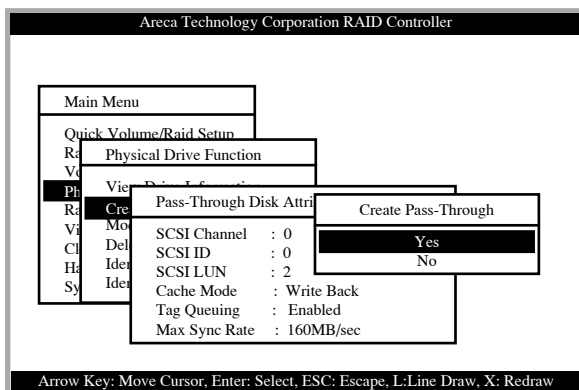
When you choose this option, the physical disks in the SATA
RAID controller are listed. Move the cursor to the desired drive
and press **Enter**. The following appears:

5.5.4.2 Create Pass-Through Disk

```
┌──────────────────────────────────────────────────────────┐
│        Areca Technology Corporation RAID Controller        │
├──────────────────────────────────────────────────────────┤
│                                                            │
│   ┌─────────────┐                                          │
│   │ Main Menu   │                                          │
│   │ Quick Volume/Raid Setup                                │
│   │ Ra┌───────────────────────┐                            │
│   │ V │  Physical Drive Function │                          │
│   │ Ph│ Vie  D   I f                                        │
│   │ Ra│ Cre┌──────────────────────┐ ┌──────────────────┐  │
│   │ Vi│ Mo │ Pass-Through Disk Attri│ │ Create Pass-Through│ │
│   │ Cl│ Del│                       │ ├──────────────────┤  │
│   │ Ha│ Ider│ SCSI Channel  : 0     │ │      Yes         │  │
│   │ Sy│ Ider│ SCSI ID       : 0     │ │      No          │  │
│        │    │ SCSI LUN      : 2     │ └──────────────────┘  │
│        │    │ Cache Mode    : Write Back                    │
│        │    │ Tag Queuing   : Enabled                       │
│        │    │ Max Sync Rate : 160MB/sec                     │
│        │    └──────────────────────┘                        │
├──────────────────────────────────────────────────────────┤
│ Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└──────────────────────────────────────────────────────────┘
```
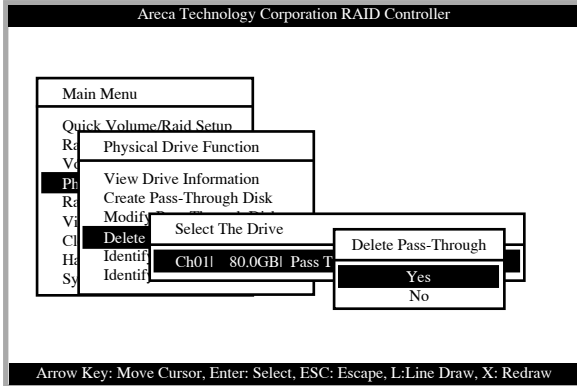
Diskdrive is not controlled by the RAID subsystem firmware and thus cannot be a part of a Volume Set. The disk is available to the operating system as an individual disk. It is typically used on a system where the operating system is on a disk not controlled by the RAID subsystem firmware. The SCSI Channel, SCSI ID, SCSI LUN, Cache Mode, Tag Queuing, and Max Sync Rate items detail descriptioini can reference the Create Volume Set for ARC-6060 section.

5.5.4.3 Modify Pass-Through Disk

Use this option to modify the Pass-Through Disk Attribute. To modify Pass-Through Disk parameters values from Pass-Through Disk pool, move the cursor bar to the Physical Drive Function menu and select the Modify Pass-Through Drive option and then press **Enter** key. The Physical Drive Function menu will show all Raid Pass-Through Drive number option. Move the cursor bar to a desired item, then press **Enter** key to show all Pass-Through Disk Attribute. Select the parameter from the list you which to change, press **Enter** key to modify it.
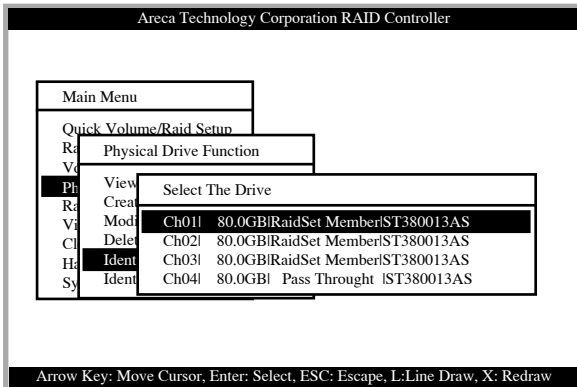
5.5.4.4 Delete Pass-Through Disk

```
         Areca Technology Corporation RAID Controller

    ┌─────────────────┐
    │ Main Menu       │
    │ Quick Volume/Raid Setup
    │ Ra┌────────────────────────┐
    │ Vo│ Physical Drive Function│
    │ Ph│                        │
    │ Ra│ View Drive Information  │
    │ Va│ Create Pass-Through Disk│
    │ Cl│ Modif┌──────────────────┐
    │ Ha│ Delete│ Select The Drive │──┌──────────────────┐
    │ Sy│ Identif│                 │  │ Delete Pass-Through│
    │   │ Identif│ Ch01|  80.0GB| Pass T│                  │
    │   └────────│                 │  │      Yes          │
    │            └──────────────────┘ │      No           │
    │                                 └──────────────────┘

    Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw
```

To delete Pass-through drive from the Pass-through drive pool, move the cursor bar to the Physical Drive Function menu and select the Delete pass-through drive item, then press **Enter** key. The Delete Pass-Through confirmation screen will appear and press **Yes** key to delete it.
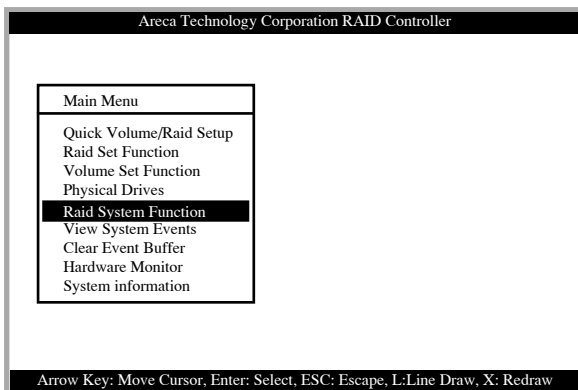
5.5.4.5 Identify Selected Drive

```
         Areca Technology Corporation RAID Controller

    ┌─────────────────┐
    │ Main Menu       │
    │ Quick Volume/Raid Setup
    │ Ra┌────────────────────────┐
    │ Vo│ Physical Drive Function│
    │ Ph│ View                   │
    │ Ra│ Creat┌──────────────────────────────────────────┐
    │ Va│ Modif│ Select The Drive                          │
    │ Cl│ Delet│                                           │
    │ Ha│ Ident│ Ch01|  80.0GB|RaidSet Member|ST380013AS  │
    │ Sy│ Ident│ Ch02|  80.0GB|RaidSet Member|ST380013AS  │
    │   │      │ Ch03|  80.0GB|RaidSet Member|ST380013AS  │
    │   │      │ Ch04|  80.0GB| Pass Throught |ST380013AS  │
    │   └──────└──────────────────────────────────────────┘

    Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw
```

To prevent removing the wrong drive, the selected disk HDD LED Indicator will light for physically locating the selected disk when the Identify Selected Device is selected.
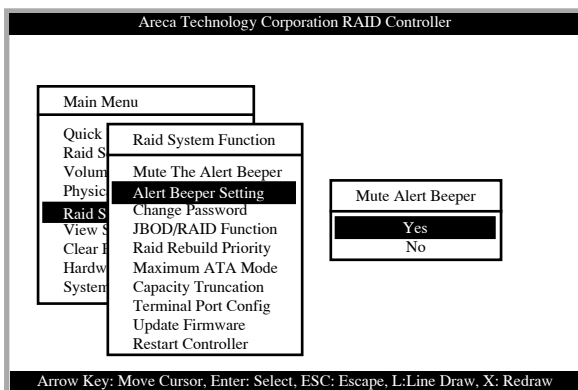
5.5.5 Raid System Function


```
        Areca Technology Corporation RAID Controller


    ┌─ Main Menu ──────────┐
    │ Quick Volume/Raid Setup │
    │ Raid Set Function       │
    │ Volume Set Function     │
    │ Physical Drives         │
    │ Raid System Function    │
    │ View System Events      │
    │ Clear Event Buffer      │
    │ Hardware Monitor        │
    │ System information      │
    └─────────────────────────┘


  Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw
```

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 all 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


```
        Areca Technology Corporation RAID Controller


    ┌─ Main Menu ──────────┐
    │ Quick ┌─ Raid System Function ──┐
    │ Raid S│                          │
    │ Volum │ Mute The Alert Beeper    │
    │ Physic│ Alert Beeper Setting     │  ┌─ Mute Alert Beeper ─┐
    │ Raid S│ Change Password          │  │                     │
    │ View S│ JBOD/RAID Function       │  │        Yes          │
    │ Clear │ Raid Rebuild Priority    │  │        No           │
    │ Hardw │ Maximum ATA Mode         │  └─────────────────────┘
    │ System│ Capacity Truncation      │
    │       │ Terminal Port Config     │
    │       │ Update Firmware          │
    │       │ Restart Controller       │
    │       └──────────────────────────┘

  Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw
```

The Mute The Alert Beeper function item is used to control the SATA RAID controller Beeper. Select the **No** and press **Enter** key in the dialog box to turn the beeper off temporarily. The beeper will still activate on the next event.

5.5.5.2 Alert Beeper Setting
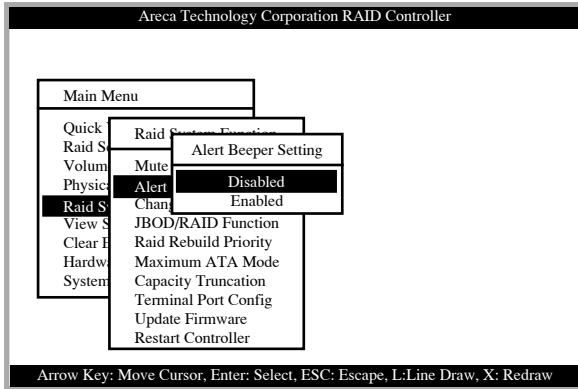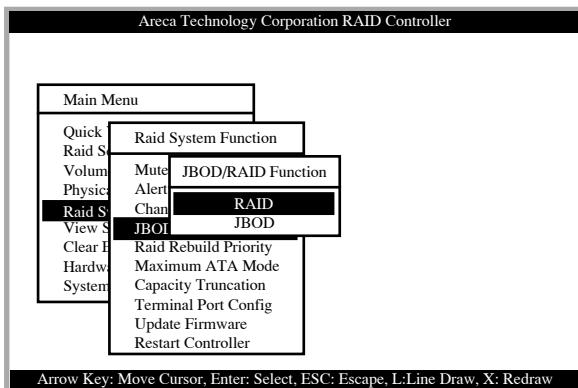
```
┌─────────────────────────────────────────────────────────┐
│           Areca Technology Corporation RAID Controller   │
│                                                          │
│                                                          │
│   ┌─ Main Menu ──────────┐                               │
│   │                      │                               │
│   │ Quick    Raid System Function                        │
│   │ Raid S┌───────────┬─ Alert Beeper Setting ─┐        │
│   │ Volum │ Mute      │                         │        │
│   │ Physic│ Alert     │    Disabled             │        │
│   │ Raid S│ Chang     │    Enabled              │        │
│   │ View S│ JBOD/RAID Function                           │
│   │ Clear │ Raid Rebuild Priority                        │
│   │ Hardw │ Maximum ATA Mode                             │
│   │ System│ Capacity Truncation                          │
│   │       │ Terminal Port Config                         │
│   │       │ Update Firmware                              │
│   │       │ Restart Controller                           │
│                                                          │
│   Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└─────────────────────────────────────────────────────────┘
```

The Mute The Alert Beeper function item is used to control the SATA RAID controller Beeper. Select the **No** and press **Enter** key in the dialog box to turn the beeper off temporarily. The beeper will still activate on the next event.

5.5.5.3 Change Password

```
┌─────────────────────────────────────────────────────────┐
│           Areca Technology Corporation RAID Controller   │
│                                                          │
│                                                          │
│   ┌─ Main Menu ──────────┐                               │
│   │                      │                               │
│   │ Quick  ┌ Raid System Function ┐                       │
│   │ Raid S │                      │                       │
│   │ Volum  │ Mute The Alert Beeper│                       │
│   │ Physic │ Alert Beeper Setting │  ┌ Enter New Password ┐ │
│   │ Raid S │ Change Password      │  │                    │ │
│   │ View S │ JBOD/RAID Function   │  │ █                  │ │
│   │ Clear  │ Raid Rebuild Priority│  └────────────────────┘ │
│   │ Hardw  │ Maximum ATA Mode     │                       │
│   │ System │ Capacity Truncation  │                       │
│   │        │ Terminal Port Config │                       │
│   │        │ Update Firmware      │                       │
│   │        │ Restart Controller   │                       │
│                                                          │
│   Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└─────────────────────────────────────────────────────────┘
```

The password option allows user to set or clear the password protection feature. Once the password has been set, the user can only monitor and configure the controller by providing the correct password. This feature is used to protect the internal RAID system from unauthorized entry. 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 when it does not received any command in 20 seconds. To set or change the password, move the cursor to Raid System

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Function screen, press the Change Password item. The Enter New Password screen appears.

To disable the password, press **Enter** only 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 from the starting screen.

5.5.5.4 JBOD/RAID Configuration

```
┌─────────────────────────────────────────────────────────────┐
│         Areca Technology Corporation RAID Controller          │
│                                                               │
│                                                               │
│   ┌──────────────────────┐                                    │
│   │ Main Menu            │                                     │
│   ├──────────────────────┴─────────────┐                      │
│   │ Quick  │ Raid System Function       │                     │
│   │ Raid S │                            │                      │
│   │ Volum  │ Mute │ JBOD/RAID Function  │                      │
│   │ Physic │ Alert├─────────────────────┤                     │
│   │ Raid S │ Chan │      RAID           │                     │
│   │ View S │ JBOD │      JBOD           │                     │
│   │ Clear  │ Raid Rebuild Priority      │                     │
│   │ Hardw  │ Maximum ATA Mode           │                     │
│   │ System │ Capacity Truncation        │                     │
│   │        │ Terminal Port Config       │                     │
│   │        │ Update Firmware            │                     │
│   │        │ Restart Controller         │                     │
│   └────────┴────────────────────────────┘                     │
│                                                               │
│ Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└─────────────────────────────────────────────────────────────┘
```

JBOD/RAID Configuration

JBOD is an acronym for "**just a Bunch Of Disk**". it is a relative indication of how much time the controller devotes to a rebuild operation. The RAID subsystem allows user to choose the re-build priority (low, normal, high) to balance volume set access and rebuild tasks appropriately.

5.5.5.5 RAID Rebuild Priority
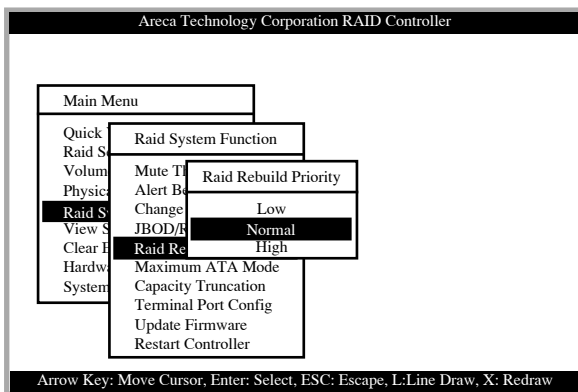
```
┌─────────────────────────────────────────────────────────────┐
│         Areca Technology Corporation RAID Controller          │
│                                                               │
│                                                               │
│   ┌──────────────────────┐                                    │
│   │ Main Menu            │                                     │
│   ├──────────────────────┴─────────────┐                      │
│   │ Quick  │ Raid System Function       │                     │
│   │ Raid S │                            │                      │
│   │ Volum  │ Mute T │ Raid Rebuild Priority │                 │
│   │ Physic │ Alert B├──────────────────────┤                  │
│   │ Raid S │ Change │      Low           │                    │
│   │ View S │ JBOD/F │      Normal        │                    │
│   │ Clear  │ Raid Re│      High          │                    │
│   │ Hardw  │ Maximum ATA Mode           │                     │
│   │ System │ Capacity Truncation        │                     │
│   │        │ Terminal Port Config       │                     │
│   │        │ Update Firmware            │                     │
│   │        │ Restart Controller         │                     │
│   └────────┴────────────────────────────┘                     │
│                                                               │
│ Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└─────────────────────────────────────────────────────────────┘
```

The "**Raid Rebuild Priority**" is a relative indication of how much time the controller devotes to a rebuild operation. The SATA RAID controller allows user to choose the rebuild priority (low, normal, high) to balance volume set access and rebuild tasks appropriately.

5.5.5.6 Maximum SATA Mode Supports

```
 ┌─────────────────────────────────────────────────────────────┐
 │         Areca Technology Corporation RAID Controller          │
 │                                                               │
 │  ┌──────────────────┐                                         │
 │  │ Main Menu        │                                         │
 │  ├──────────────────┤                                         │
 │  │ Quick    ┌──────────────────────┐                          │
 │  │ Raid S   │ Raid System Function │                          │
 │  │ Volum    ├──────────────────────┤                          │
 │  │ Physic   │ Mute The Alert Beeper │                         │
 │  │ Raid S   │ Alert   ┌──────────────────────┐                │
 │  │ View S   │ Chang   │ Maximum ATA Mode     │                │
 │  │ Clear    │ JBOD    ├──────────────────────┤                │
 │  │ Hardw    │ Raid R  │     ATA133           │                │
 │  │ System   │ Maxim   │     ATA100           │                │
 │  │          │ Capac   │     ATA66            │                │
 │  │          │ Terminal Port Config  ATA33    │                │
 │  │          │ Update Firmware      └─────────┘                │
 │  │          │ Restart Controller                              │
 │                                                               │
 │  Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
 └─────────────────────────────────────────────────────────────┘
```

Within the subsystem, the SCSI/Fibre chip acts as a target and 16 SATA ll bus are connected to the drive. The 16 SATA drive channel can support up to SATA ll, which runs up to 300MB/ s. NCQ is a command protocol in Serial ATA that can only be implemented on native Serial ATA hard drives like Seagate's. It allows multiple commands to be outstanding within a drive at the same time. Drives that support NCQ have an internal queue where outstanding commands can be dynamically rescheduled or re-ordered, along with the necessary tracking mechanisms for outstanding and completed portions of the workload. The RAID subsystem allows user to choose the SATA Mode: SATA150, SAT150+NCQ, SAT300, SATA300+NCQ.

5.5.5.7 Disk Capacity Truncation Mode

```
┌────────────────────────────────────────────────────────────┐
│          Areca Technology Corporation RAID Controller        │
│                                                              │
│   ┌──────────────────────┐                                   │
│   │ Main Menu            │                                   │
│   │                      │                                   │
│   │ Quick │ Raid System Function    │                        │
│   │ Raid S│                         │                        │
│   │ Volum │ Mute T  Al  t B         │                        │
│   │ Physic│ Alert I │ Truncation Disk Capacity │             │
│   │ Raid S│ Chang │                           │              │
│   │ View S│ JBOD/ │ Multiples of 10G          │              │
│   │ Clear │ Raid R│ Multiples of 1G           │              │
│   │ Hardw │ Maxim │      Disable              │              │
│   │ System│ Capacity Truncation              │              │
│   │       │ Terminal Port Config             │              │
│   │       │ Update Firmware                  │              │
│   │       │ Restart Controller               │              │
│   └──────────────────────────────────────────┘              │
│ Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└────────────────────────────────────────────────────────────┘
```

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 **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. Areca drive Truncation mode **Multiples Of 10G** uses the same capacity for both of these drives so that one could replace the other.

Multiples Of 1G: If you have 123 GB drives from different vendors; chances are that the capacity varies slightly. For example, one drive might be 123.5 GB, and the other 123.4 GB. Areca drive Truncation mode **Multiples Of 1G** uses the same capacity for both of these drives so that one could replace the other.
No Truncation: It does not truncate the capacity.

5.5.5.8 Terminal Port Configuration

```
┌──────────────────────────────────────────────────────────────┐
│            Areca Technology Corporation RAID Controller        │
│                                                                │
│   ┌─────────────────┐                                          │
│   │ Main Menu       │                                          │
│   │ Quick ┌──────────────────────┐                             │
│   │ Raid S│ Raid System Function │                             │
│   │ Volum │                      ┌──────────────────────┐      │
│   │ Physic│ Mute The Alert B     │ RS232 Speed Selection│      │
│   │ Raid S│ Ale ┌──────────┐     │                      │      │
│   │ View S│ Cha │ Terminal │     │      1200            │      │
│   │ Clear │ JBC ├──────────┤     │      2400            │      │
│   │ Hardw │ Rai │  Bau     │     │      4800            │      │
│   │ System│     │  Sto     │     │      9600            │      │
│   │       │ Maximum ATA     │     │      19200          │      │
│   │       │ Terminal Port Co│     │      38400          │      │
│   │       │ Update Firmware │     │      57600          │      │
│   │       │ Restart Controller    │      115200         │      │
│   └─────────────────────────┘     └──────────────────────┘      │
│                                                                │
│  Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└──────────────────────────────────────────────────────────────┘
```
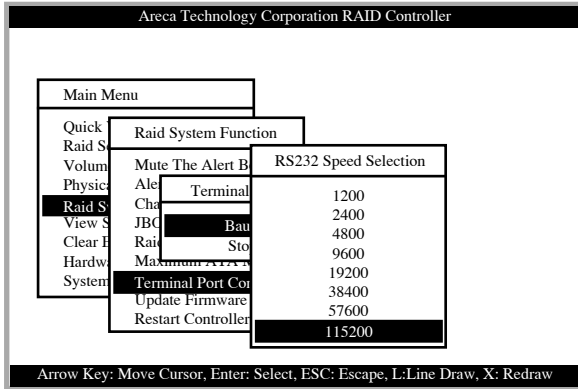
Parity Value is fixed at None.
Handshaking value is fixed at None.
Speed sending values are 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200.

```
┌──────────────────────────────────────────────────────────────┐
│            Areca Technology Corporation RAID Controller        │
│                                                                │
│   ┌─────────────────┐                                          │
│   │ Main Menu       │                                          │
│   │ Quick ┌──────────────────────┐                             │
│   │ Raid S│ Raid System Function │                             │
│   │ Volum │                      │                             │
│   │ Physic│ Mute The Alert Beeper│                             │
│   │ Raid S│ Ale ┌──────────────┐ ┌──────────────────┐          │
│   │ View S│ Cha │ Terminal Por │ │ Select Stop Bits │          │
│   │ Clear │ JBC ├──────────────┤ ├──────────────────┤          │
│   │ Hardw │ Rai │  Baud R      │ │      1 bit       │          │
│   │ System│     │  Stop B      │ │      2 bits      │          │
│   │       │ Maximum ATA Mode   │ └──────────────────┘          │
│   │       │ Terminal Port Config                               │
│   │       │ Update Firmware                                    │
│   │       │ Restart Controller                                 │
│   └─────────────────────────┘                                  │
│                                                                │
│  Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└──────────────────────────────────────────────────────────────┘
```
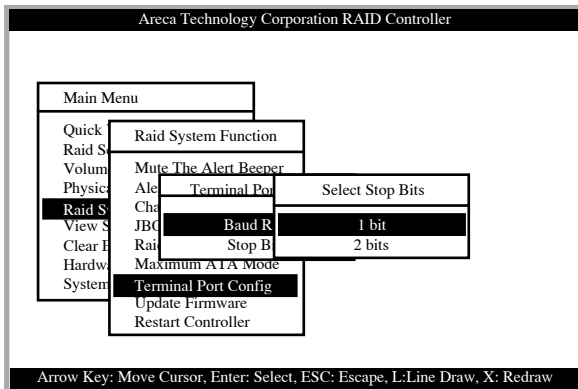
Stop Bits values are 1 bit and 2 bits.

5.5.5.9 Update Firmware

Please, reference the appendix B firmware utility for updating firmware.

VT-100 UTILITY CONFIGURATION

> ## Note:
>
> 1. The Bootable CD VT100 utility connected through the controller's serial port cannot support the update firmware feature.
> 2. User can only update the firmware through the VT100 Terminal or web browser-based RAID Management via HTTP Proxy through the controller's serial port

5.5.5.10 Restart Controller

Use the Restart Controller Function to reset the entier configuration from the RAID subsystem controller non-volatile memory. To reset the controller, move the cursor bar to the Main menu Raid System Function itme and then press the Enter key. The Raid system Function menu appears on the screen. Press Enter key to select Restart Controller item. The Restart Controller confirmation screen appers. Select Yes key to reset entire Raid System.

> ## Note:
>
> It can only work properly at Host and Drive without any activity.
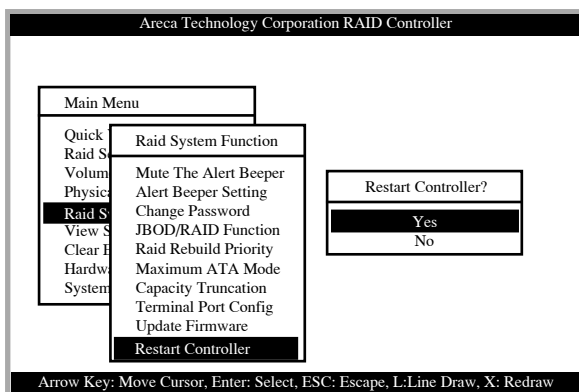
5.5.5.11 View Events

To view the SATA RAID controller's information, move the cursor bar to the main menu and select the View Events link, then press the **Enter** key The SATA RAID controller's events screen appear.

```
          Areca Technology Corporation RAID Controller

   ┌──────────────────────────┐
   │ Main Menu                │
   ├──────────────────────────┤
   │ Quick Volume/Raid Setup  │
   │ Raid Set Function        │
   ├───────────┬──────────┬──────────────┬──────────────────┐
        Time        Device      Event Type      ElapseTime Errors

   2004-1-1  12:00:00   H/W Monitor   Raid Powered On
   2004-1-1  12:00:00   H/W Monitor   Raid Powered On
   2004-1-1  12:00:00   H/W Monitor   Raid Powered On




   Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw
```

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

5.5.6 U320 SCSI Target Config

Arbitration allows one SCSI device to gain control of the SCSI bus to allow that SCSI device to initiate or resume a task. There are two methods that a SCSI device may use to arbitrate for the SCSI bus: normal arbitration and QAS. Normal arbitration is mandatory and requires the detection of a BUS FREE phase on the SCSI bus before starting. QAS is optional and, when enabled, requires the initiation and detection of a QAS REQUEST message before starting.

5.5.7 Ethernet Configuration

Use this feature to set the controller Ethernet port configuration. Customer doesn't need to create a reserved space on the arrays before the Ethernet port and HTTP service working.

5.5.7.1 DHCP Function

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 manually configure the IP address of the controller, 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 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.

```
                Areca Technology Corporation RAID Controller


      Main Menu
      Quick Volume/Raid Setup
      Raid Set Function
      Volume Set Function
      Ph    Ethernet Configuration
      R
      Et  DHC    Select DHCP Setting
      V   Loca             001.100
      C   Ether   Disabled  9.7F.FF.FF
      Hardware Monitor       Enabled
      System information

   Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw
```
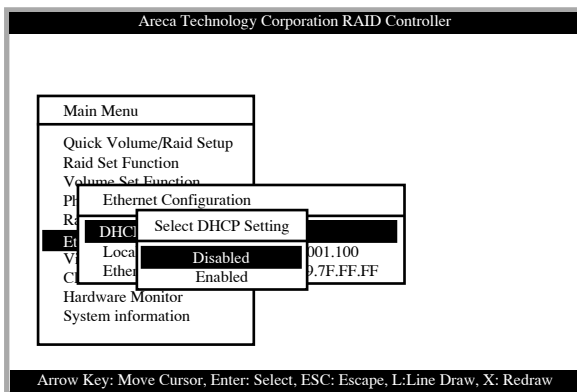
5.5.7.2 Local IP address

If you intend to set up your client computers manually, make sure that the assigned IP address is in the same range of your default router address and that it is unique to your private network. However we would highly recommend that if you have

a network of computers and the option to assign your TCP/IP client configurations automatically, please do. An IP address allocation scheme will reduce the time it takes to set-up client computers and eliminate the possibilities of administrative errors.

To manually configure the IP address of the controller, 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 Local IP Address item, then press Enter key to show the default address setting in the RAID controller. You can reassign the IP address of the controller.

```
                Areca Technology Corporation RAID Controller


      Main Menu

      Quick Volume/Raid Setup
      Raid Set Function
      Volume Set Function
      Ph    Ethernet Configuration
      Ra
      Et      DHCP F          Enable
      V     Local II  Edit The local IP Address  00
      Cl    Etherne                        FF.FF
      Hardware Monitor    192.168.001.100
      System information

    Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw
```
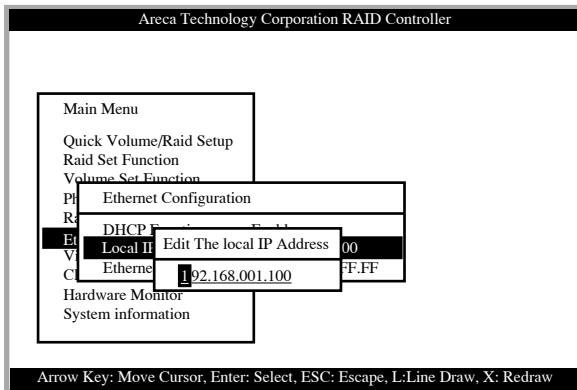
5.5.7.3 Ethernet Address

A MAC address stands for Media Access Control address and is your computer's unique hardware number. On an Ethernet LAN, it's the same as your Ethernet address. When you're connected to the Internet from the RAID controller Ethernet port, a correspondence table relates your IP address to the RAID controller's physical (MAC) address on the LAN.

```
┌────────────────────────────────────────────────────────────┐
│         Areca Technology Corporation RAID Controller          │
│                                                                │
│   ┌─────────────────────────────────┐                         │
│   │ Main Menu                        │                         │
│   │                                  │                         │
│   │ Quick Volume/Raid Setup          │                         │
│   │ Raid Set Function                │                         │
│   │ Volume Set Function              │                         │
│   │ Ph┌───── Ethernet Configuration ──────────────┐            │
│   │ R│                                             │           │
│   │ Et│  DHCP Function     :  Enable               │           │
│   │ V│   Local IP Address   :  192.168.001.100     │           │
│   │ C│   Ethernet Address   :  00.04.D9.7F.FF.FF   │           │
│   │ Hardware Monitor │                             │           │
│   │ System information └─────────────────────────────┘         │
│   └─────────────────────────────────┘                         │
│                                                                │
│ Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└────────────────────────────────────────────────────────────┘
```
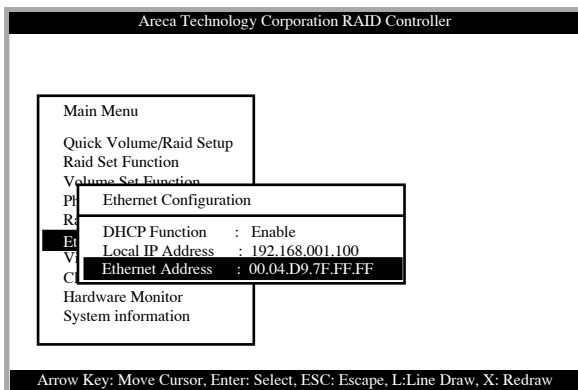
5.5.8 View System Events

To view the RAID subsystem controller's system event information, move the cursor bar to the main menu and select the View System Events link, then press the Enter key The RAID subsystem events screen appear.
Choose this option to view the system events information: Time, Device, Event type, Elapse Time and Errors. The RAID system does not built the real time clock. The Time information is the relative time from the RAID subsystem power on.

5.5.9 Clear Events Buffer

Use this feature to clear the entire events buffer information.

5.5.10 Hardware Monitor Information

```
┌────────────────────────────────────────────────────────────┐
│         Areca Technology Corporation RAID Controller          │
│                                                                │
│   ┌─────────────────────────────────┐                         │
│   │ Main Menu                        │                         │
│   │                                  │                         │
│   │ Quick Volume/Raid Setup          │                         │
│   │ Raid Set Func┌──── The Harware Monitor Information ────┐   │
│   │ Volume Set F │                                         │   │
│   │ Physical Drive│ Controller Temp.  :  36 (Celsius)      │   │
│   │ Raid System P │ BackPlane Temp.   :  33 (Celsius)      │   │
│   │ View System   │ Fan Speed (RPM)   :  3013              │   │
│   │ Clear Event B │ Power +12V        :  11.977            │   │
│   │ Hardware Mo   │ Power +5V         :   4.892            │   │
│   │ System inform │ Power +3V         :   3.296            │   │
│   │               │ Power +1.5V       :   1.520            │   │
│   └───────────────└─────────────────────────────────────────┘ │
│                                                                │
│ Arrow Key: Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw │
└────────────────────────────────────────────────────────────┘
```

VT-100 UTILITY CONFIGURATION

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

Item	Warning Condition
Controller Board Temperature	**> 60°**
Backplane Temperature	**> 55°**
Controller Fan Speed	**< 1900 RPM**
Power Supply +12V	**< 10.5V or > 13.5V**
Power Supply +5V	**< 4.7V or > 5.3V**
Power Supply +3.3V	**< 3.0V or > 3.6V**
CPU Core Voltage +1.5V	**< 1.35V or > 1.65V**

5.5.11 System Information

Choose this option to display Main processor, CPU Instruction cache and data cache size, firmware version, serial number, controller model name, and the cache memory size. To check the system information, move the cursor bar to System Information item, then press **Enter** key. All major controller system information will be displayed.

6. Web Browser-based Configuration

The RAID subsystem 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
- Designate drives as hot spares

If you need to boot the operating system from a RAID system, you must first create a RAID volume by using front panel touch-control keypad, Bootable CD VT-100 utility at X86-based system, Web Browser through Ethernet LAN, or VT-100 terminal.

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

To ensure proper communications between the RAID subsystem and Web browser-based RAID management, Please connect the RAID system Ethernet LAN port to any LAN switch port.
The controller has embedded the TCP/IP & Web Browser-based RAID manager in the firmware. User can remote manage the RAID system without adding any user specific software (platform independent) via standard web browsers directly connected to the 10/100 Ethernet RJ45 LAN port.
To configure External RAID subsystem 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.
Note that you must be logged in as administrator with local admin

rights on the remote machine to remotely configure it. The RAID subsystem controller default User Name is "admin" and the Password is "0000".

6.2 Configuring Raid Sets and Volume Sets

You can configure raid sets and volume sets with web browser-based RAID manager using Quick Create automatically, or Raid Set/Volume Set Function manually configuration method. Each configuration method requires a different level of user input. The general flow of operations for raid set and volume set configuration is:

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

6.3 Designating Drives as Hot Spares

All unused disk drive that is not part of a raid set can be created as a Hot Spare. The Quick Create configuration will automatically add the spare disk drive with the raid level for user to select. For the Raid Set Function configuration, user can use the Create Hot Spare option to define the hot spare disk drive. Reference the 6.9.5 Create Hot Spare section.

6.4 Using Quick Volume /Raid Setup Configuration

In Quick Create Configuration, it collects all drives in the tray and include them in a raid set. The raid set you create is associated with exactly one volume set, and you can modify the default RAID level, stripe size, and capacity of the volume set. Designating Drives as Hot Spares will also show in the raid level selection option. The volume set default settings will be:

WEB BROWSER-BASED CONFIGURATION

Parameter	Setting
Volume Name	Volume Set # 00
SCSI Channel/SCSI ID/SCSI LUN	0/0/0
Cache Mode	Write Back
Tag Queuing	Yes
Max Sync Rate	Depend on your hous adapter setting.

The default setting values can be changed after configuration is complete.
Follow the steps below to create arrays using Quick Create 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	Recommend use drives have 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. The numbers of physical drives in a specific array determine the RAID levels that can be implemented with the array. 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 6 requires at least 4 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 Highlight *RAID level* for the volume set and press **Enter** key to confirm.
3	Set the capacity size for the current volume set. After Highlight RAID level and press **Enter** key. The selected capacity for the current volume set is displayed. Using the **UP** and **DOWN** arrow key to create the current volume set capacity size and press **Enter** key to confirm. The available stripe sizes for the current volume set are displayed.

4	Using **UP** and **DOWN** arrow key to select the current volume set stripe size and press **Enter** key to confirm it. This parameter specifies the size of the stripes written to each disk in a RAID 0, 1, 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.
5	When you are finished defining the volume set, press **Enter** 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). 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 Fast Initialization, the initialization proceeds must be completed before the volume set ready for system accesses.
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

6.5 Using Raid Set/Volume Set Function Method

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 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 set with partial and full raid set.

Note: User can use this method to examine the existing configura-

WEB BROWSER-BASED CONFIGURATION

Step	Action
1	To setup the Hot Spare (option), choose **Raid Set Function** from the main menu. Select the **Create Hot Spare** and press **Enter** key to set the Hot Spare.
2	Choose Raid Set Function from the main menu. Select the Create Raid Set and press Enter key.
3	Select a Drive For Raid Set window is displayed showing the IDE drive connected to the current controller.
4	Press **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. 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 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 6 requires at least 4 physical drives per raid set RAID 3 +Spare requires at least 4 physical drives RAID 5 + Spare requires at least 4 physical drives
5	After adding physical drives to the current raid set as desired, press Yes 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 a raid set. The default raid set name will always appear as Raid Set. #. Press Enter to finish the name editing.
7	Press **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 **Volume Set Function** from the Main menu. Select the **Create Volume Set** and press **Enter** key.
9	Choose one raid set from the Create Volume From Raid Set window. Press Enter key to confirm it.

10	The Volume Creation screen shows the volume set default attribute values that are currently being configured. The attribute column headings are: The Raid Level, The Stripe Size, The SCSI HOST/SCSI ID/SCSI LUN/, The Cache Mode, The Tagged Queuing, The SCSI Max Rate, and The Volume Name (number). The user can change all values After the current volume set attributes are defined, press Esc key to enter Initialization selection screen.
11	Fast Initialization Press Enter key to define fast initialization and Esc key to normal initialization. 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. In Fast Initialization, the initialization proceeds must be completed before the volume set ready for system accesses.
12	If space remains in the raid set, the next volume set can be configured. Repeat steps 8 to 10 to configure another volume set.

tion. Modify volume set configuration method provides the same functions as create volume set configuration method. In volume set function, you can use the modify volume set function to modify the volume set parameters except the capacity size:

6.6 Configuring Raid Sets and Volume Sets

The web browser start-up screen will display the current configuration of your RAID subsystem. 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.
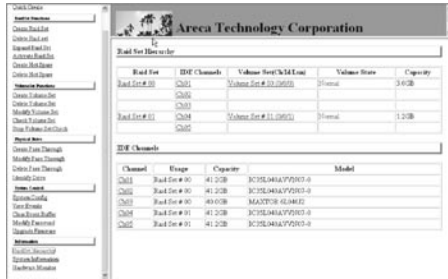
To display raid set information, move the mouse cursor to the desired raid set number, then click it. The raid set Information will show in the screen.

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.

6.6.1 Main Menu

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

Individual Category	Description
Quick Function	Create a default configuration, which is based on the number of physical disk installed; it can modify the volume set Capacity, Raid Level, and Stripe Size.
RaidSet Functions	Create a customized raid set
VolumeSet Functions	Create customized volume sets and modify the existed volume sets parameter.
Physical Drives	Create pass through disks and modify the existed pass through drives parameter. It also provides the function to identify the respect disk drive.
System Controls	Setting the raid system configurations
Information	View the controller information. The Raid Set Hierarchy can also view through the RaidSet Hierarchy item.

6.7 Quick Create
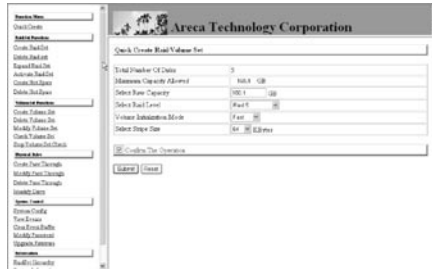
The number of physical drives in the raid subsystem determines the RAID levels that can be implemented with the raid set. You can create a raid set associated with exactly one volume set. The user can change the raid level, stripe size, and capacity. A hot spare option is also created depending upon the existing configuration. Tick on the Confirm The Operation and click on the Submit button in the Quick Create screen, the raid set and volume set will start to initialize.

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

6.8 Raid Set Functions

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

6.8.1 Create Raid Set
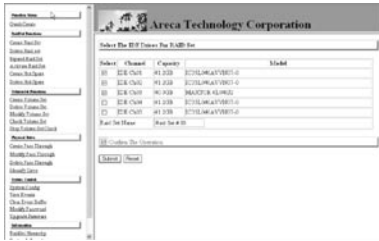
To create a raid set, click on the Delete Raid Set link. A Select The SATA Drive For RAID Set screen is displayed showing the IDE drive connected to the current controller. Click on the selected physical drives with the current raid set. Enter 1 to 15 alphanumeric characters to define a unique identifier for a raid set. The default raid set name will always appear as Raid Set. #.
Tick on the Confirm The Operation and click on the Submit button in the screen, the raid set will start to initialize.

6.8.2 Delete Raid Set

To delete a raid set, click on the Create Raid Set link. A Select The RAID SET To Delete screen is displayed showing all raid set existing in the current controller. Click the raid set number you which to delete in the select column to delete screen.
Tick on the Confirm The Operation and click on the Submit button in the screen to delete it.

6.8.3 Expand Raid Set

Use this option to expand a raid set, when a disk is added to your system. This function is active when at least one drive is available.
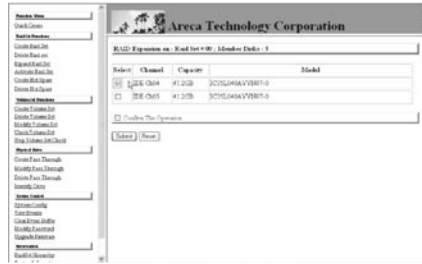
To expand a raid set, click on the Expand Raid Set link. Select the target raid set, which you want to expand it.

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

6.8.4 Activate Incomplete Raid Set

When one of the disk drive is removed in power off state, the raid set state will change to Incomplete State. If user wants to continue to work, when the RAID subsystem is power on. User can use the Activate Raid Set option to active the raid set. After user complete the function, the Raid State will change to Degraded Mode. To activate the incomplete the raid set, click on the Activate Raid Set link. A "Select The RAID SET To Activate" screen is displayed showing all raid set existing in the current controller. Click the raid set number you which to activate in the select column.
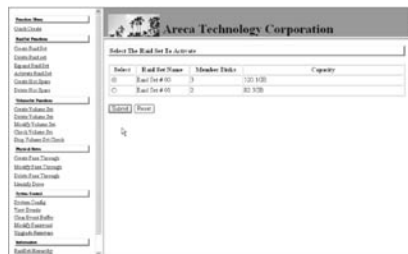
Click on the Submit button in the screen to activate the raid set that has removed one of disk drive in the power off state. The RAID subsystem will continue to work in degraded mode.
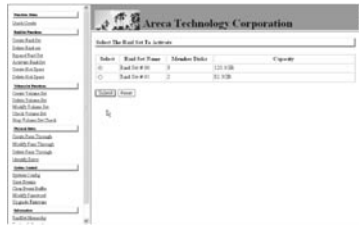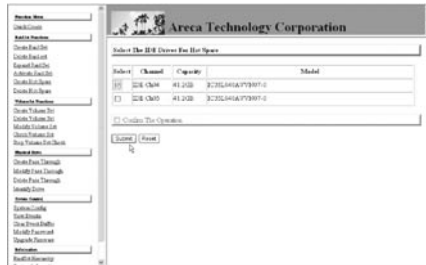
6.8.5 Create Hot Spare

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

6.8.6 Delete Hot Spare

Select the target Hot Spare disk to delete by clicking on the appropriate check box.
Tick on the Confirm The Operation, and click on the Submit button in the screen to delete the hot spares.

6.8.7 Rescue RaidSet

When the system is power off in the Raidset update period, it may be disappeared in this abnormal condition. The "RESCUE ' function can recover the missing RiaidSet information.
The RAID controller uses the time as the RaidSet signature. The RaidSet may have different time after the RaidSet is recovered.

The "SIGANT ' function can regenerate the signature for the Ri-aidSet.

6.9 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.

6.9.1 Create Volume Set

The following is the volume set features for the ARC-6060
 1. Volume sets of different RAID levels may coexist on the same raid set.
 2. Up to 16 volume sets in a raid set can be created by the SATA RAID controller.
 3. The maximum addressable size of a single volume set is 2 TB(32-bit mode).
To create volume set from raid set system, move the cursor bar to the main menu and click on the Create Volume Set link. The Select The Raid Set To Create On It screen will show all raid set number. Tick on a raid set number that you want to create and then click on the Submit button.

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

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

● Capacity:
The maximum volume size is default in the first setting. Enter the appropriate volume size to fit your application. The capacity can also increase or decrease by the .UP and DOWN arrow key

● Raid Level:
Set the RAID level for the Volume Set. Highlight Raid Level and press <Enter>.
The available RAID levels for the current Volume Set are displayed. Select a RAID level and press <Enter> to confirm.

● Strip Size:
This parameter sets the size of the stripe written to each disk in a RAID 0, 1, 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

● Cache Mode:
The RAID subsystem supports Write-Through Cache and Write-Back Cache.

● Tag Queuing:
The Enabled option is useful for enhancing overall system performance under multi-tasking operating systems. The Command Tag (Drive Channel) function controls the SCSI command tag

queuing support for each drive channel. This function should normally remain enabled. Disable this function only when using older SCSI drives that do not support command tag queuing

● Max SCSI Speed:
The RAID subsystem supports 160.00 MB/sec ......as the highest data transfer rate.

● SCSI Channel/SCSI ID/SCSI Lun:
SCSI Channel: The RAID subsystem only supports one SCSI Channel.

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

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

6.9.2 Delete Volume Set

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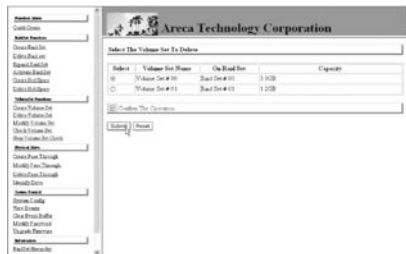
6.9.3 Modify Volume Set

To modify a volume set from a raid set:

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

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

The following screen appears.

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

6.9.3.3 Volume Expansion

Use this raid set expands to expand a raid set, when a disk is added to your system. The expand capacity can use to enlarge the volume set size or create another volume set. The modify volume set function can support the volume set expansion function. To expand volume set capacity value from raid set system function, move the cursor bar to the volume set Volume capacity item and entry the capacity size. Tick on the Confirm The Operation and click on the Submit button to complete the action. The volume set start to expand.

6.9.3.4 Volume Set Migration

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

6.9.4 Check Volume Set

To check a volume set from a raid set:
  1. Click on the Check Volume Set link.
  2. Tick on the volume set from the list that you wish to check.
  Tick on Confirm The Operation and click on the Submit button.
Use this option to verify the correctness pf the redundant data in a volume set. For example, in a system with dedicated parity, volume set check means computing the parity of the data disk drives and comparing the results to the contents of the dedicated parity disk drive. The checking percentage can also be viewed by clicking on RaidSet Hierarchy in the main menu.
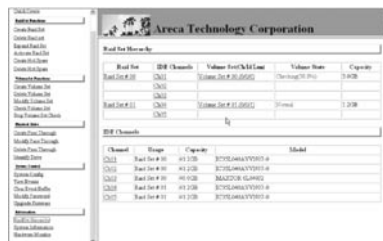
6.9.5 Stop VolumeSet Check

Use this option to stop the Check Volume Set function.

6.10 Physical Drive

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

6.10.1 Create Pass-Through Disk

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

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

6.10.2 Modify Pass-Through Disk

Use this option to modify the Pass-Through Disk Attribute. User can modify the cache mode, Tagged Command Queuing, Max SCSI speed and SCSI channel/ID/LUN on an existed pass through disk.
To modify the pass-through drive attribute from the pass-through drive pool, move the mouse cursor bar to click on Modify Pass-Through link. The Select The Pass Through Disk For Modification screen appears tick on the Pass-Through Disk from the pass-through drive pool and click on the Submit button to select drive. The Enter Pass-Through Disk Attribute screen appears, modify the drive attribute values, as you want.

6.10.3 Delete Pass-Through Disk

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

6.10.4 Identify Selected Drive

To prevent removing the wrong drive, the selected disk LED will light for physically locating the selected disk when the Identify Selected Drive is selected.
To identify the selected drive from the drives pool, move the mouse cursor bar to click on Identify Selected Drive link. The Select The SATA Device For identification screen appears tick on the SATA device from the drives pool and Flash method. After completing the selection, click on the Submit button to identify selected drive.
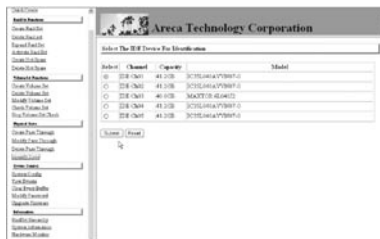
6.11 System Controls

6.11.1 System Configuration

To set the raid system function, move the cursor bar to the main menu and click on the System Configuration link. The System Configuration menu will show all items. Move the cursor bar to an item, then press Enter key to select the desired function.

• System Beeper Setting:
The Alert Beeper function item is used to Disabled or Enable the RAID subsystem controller alarm tone generator.

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

• Terminal Port Configuration:
Speed setting values are 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200.
Stop Bits values are 1 bit and 2 bits.
Note: Parity value is fixed at None.
Data Bits value is fixed at 8 bits.

• Maximum SATA Mode Supported:
Within the subsystem, the SCSI/Fibre chip acts as a target and 16 SATA ll bus are connected to the drive. The 16 SATA drive channel can support up to SATA ll, which runs up to 300MB/s. NCQ is a command protocol in Serial ATA that can only be

implemented on native Serial ATA hard drives like Seagate's. It allows multiple commands to be outstanding within a drive at the same time. Drives that support NCQ have an internal queue where outstanding commands can be dynamically rescheduled or re-ordered, along with the necessary tracking mechanisms for outstanding and completed portions of the workload. The RAID subsystem allows user to choose the SATA Mode: SATA150, SAT150+NCQ, SAT300, SATA300+NCQ.

• JBOD/RAID Configuration:

JBOD is an acronym for "Just a Bunch Of Disk". It repressents a volume set that is created by the concatenation of partitions on the disks. For the ARC-5010, it can only see the first two disks, when you select the JBOD option. User needs to delete the RAID set, when you want to change the option from the RAID to the JBOD function.

• 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 **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. Areca drive Truncation mode **Multiples Of 10G** uses the same capacity for both of these drives so that one could replace the other.

Multiples Of 1G: If you have 123 GB drives from different vendors; chances are that the capacity varies slightly. For example, one drive might be 123.5 GB, and the other 123.4 GB. Areca drive Truncation mode **Multiples Of 1G** uses the same capacity for both of these drives so that one could replace the other.
No Truncation: It does not truncate the capacity.

6.11.2 U320 SCSI Target Config

Arbitration allows one SCSI device to gain control of the SCSI bus to allow that SCSI device to initiate or resume a task. There are two methods that a SCSI device may use to arbitrate for the SCSI bus: normal arbitration and QAS. Normal arbitration is mandatory and requires the detection of a BUS FREE phase on the SCSI bus before starting. QAS is optional and, when enabled, requires the initiation and detection of a QAS REQUEST message before starting.

6.11.3 EtherNet Config

Use this feature to set the controller Ethernet port configuration. Customer doesn't need to create a reserved space on the arrays before the Ethernet port and HTTP service working. The firmware-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 bar to the EtherNet Config item, then press Enter key to select the desired function.

6.11.4 Alert By Mail Config

To configure the raid controller email 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 Config item, then press Enter key to select the desired function. This function can only set by the web-based configuration.
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 with no software required.

6.11.5 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 reference to Appendix –d SNMP operation & Definition for more detail information about the SNMP trap and definition.

6.11.6 View Events/ Mute Beeper

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

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

6.11.5 Clear Events Buffer

Use this feature to clear the entire events buffer information.

6.11.6 Modify Password

To set or change the RAID subsystem password, move the mouse

cursor to Raid System Function screen, and click on the Change Password link. The Modify System Password screen appears.

The password option allows user to set or clear the raid subsystem's password protection feature. Once the password has been set, the user can only monitor and configure the raid subsystem by providing the correct password.

The password is used to protect the internal RAID subsystem from unauthorized entry. The controller will check the password only when entering the Main menu from the initial screen. The RAID subsystem will automatically go back to the initial screen when it does not receive any command in ten seconds.

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

6.11.7 Update Firmware:

Please reference the appendix B firmware utility.

6.11.8 Restart Controller

Please reference the appendix B firmware utility.

6.12 Information Menu

6.12.1 RaidSet Hierarchy

Use this feature to view the internal raid subsystem current raid set, current volume set and physical disk configuration. Please reference this chapter "Configuring Raid Sets and Volume Sets"

6.12.2 System Information

To view the RAID subsystem controller's information, move the mouse cursor to the main menu and click on the System Information link. The Raid Subsystem Information screen appears. Use this feature to view the raid subsystem controller's information. The controller name, firmware version, serial number, main processor, CPU data/Instruction cache size and system memory size/speed appear in this screen.

6.12.3 Hardware Monitor

To view the RAID subsystem controller's hardware monitor information, move the mouse cursor to the main menu and click the Hardware Monitor link. The Hardware Information screen appears. The Hardware Monitor Information provides the temperature, fan speed (chassis fan) and voltage of the internal RAID subsystem. All items are also unchangeable. The warning messages will indicate through the LCM, LED and alarm buzzer.
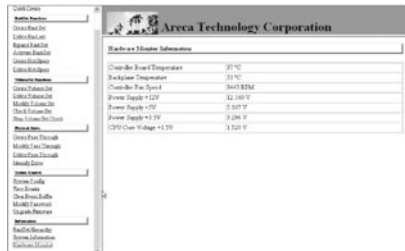
Item	Warning Condition
Controller Board Temperature	**> 60º**
Backplane Temperature	**> 55º**
Controller Fan Speed	**< 1900 RPM**
Power Supply +12V	**< 10.5V or > 13.5V**
Power Supply +5V	**< 4.7V or > 5.3V**
Power Supply +3.3V	**< 3.0V or > 3.6V**
CPU Core Voltage +1.5V	**< 1.35V or > 1.65V**

APPENDIX

APPENDIX A

Specifications

System Architecture

• Intel 80321 400MHz 64-bit I/O processor
• Up to 1GB DDR200MHz SDRAM on one DIMM socket with ECC protection or non-ECC SDRAM module using X8 or x16 devices.
• Marvell 8 channels SATA 1.0 controller (88sX5080,PCB 1.1)
• Marvell 8 channels SATA ll controller (88sX6081,PCB 2.0 or later)
• Areca ASIC 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
• Battery Backup Module (BBM) ready (Option)

RAID Features

• RAID level 0, 1 (10), 3, 5, 6 and JBOD
• Multiple RAID selection
• Online Array roaming
• Online RAID level/stripe size migration
• Online capacity expansion and RAID level migration simultaneously
• Online Dynamic Volume set capacity expansion
• Greater than 2TB per volume set
• Support 4Kbytes/sector for Windows system to 16TB per volume set
• Instant availability and background initialization
• Automatic drive insertion / removal detection and rebuild
• Support S.M.A.R.T NCQ and OOB Staggered Spin-up capable drives

Host Interface
Ultra320 SCSI-to-SATA
  • Two Ultra320 SCSI Channels - 320MB/sec per channel
2Gb Fibre-to-SATA
  • Two 2Gbps Fibre Channels - 200MB/sec per channel

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Drive Interface

• 8/12/16 SATA 1.0 Channel-1.5Gpbs (PCB 1.1)
• 8/12/16 SATA ll Channel-3.0Gpbs (PCB 2.0 or later)

Monitors / Indicators

• LCD Control Panel for setup, alarm mute and configuration
• System status indication through HDD activity/fault connector
LCD connector and alarm buzzer
• I2C Enclosure management ready

RAID Management

• Field-upgradeable firmware in flash ROM
• Browser-based RAID manager via ArcHttp Proxy Server through
RS232 for Windows & Linux system
• Firmware-embedded manager via RS-232 port
• Support controller's API library for customer to write its own
software
• Single Admin Portal (SAP) monitor utility
• Disk Stress Test (DST) utility for production in Windows
• Firmware-embedded Browser-based RAID manager, SMTP man-
ager, SNMP agent, and Telnet function via Ethernet port with no
software required
• Firmware-embedded Telnet function via Ethernet port

Operation System

• OS independent

Mechanical

• **Form Factor**
  • One 5.25" half-height driver bays

• **Dimension (W x H x D)**
  • 148x 43 x 220 mm

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- **I/O Interface**
  - (16 X 2) header for fault LED connector
  - (16 X2) header for activity LED connector
  - (2 X 4) header I2C Port for activity LCD & button connector
  - (10 X 2) header for Battery Backup Module (BBM) connector
  - (2 X 5) box header serial port connector
  - (2 X SFP) ports for optical Fibre connector
  - (1 X RJ45) Ethernet Port
  - (2 X 68pin) LVD SCSI connector
  - (16 X 7ping) SATA connector

Environmental

- Operating Temperature
- Temperature: $+5^oC$ to $+50^oC$
- Humidity: 15-80%, non-condensing
- Storage Temperature
- Temperature: -40^oC to 70^oC
- Humidity: 5-90%, non-condensing

Electrical

- Input Voltage
- 20W max. On +5V
- 1.2W max. On +12V

Appendix B

Upgrading Flash Firmware Programming Utility

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

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

README.TXT It contains the history information of the firmware change. Read this file first before upgrading the firmware.
These files must be extracted from the compressed file and copied to one directory in drive A or C.

Establishing the Connection for the RS-232

The firmware can be downloaded to the RAID subsystem controller by using an ANSI/VT-100 compatible terminal emulation program or 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.
Configuration of the internal RAID subsystem web browser-based RAID management is an HTTP based application, which utilizes the browser installed on your operating system. Web browser-based RAID management can be used to update the firmware. You must complete the appropriate installation procedure before proceeding with this firmware upgrade. Please refer to chapter 6.1, "Web browser-based RAID management via HTTP Proxy (Using the controller's serial port)" for details on establishing the connection.

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Note: CD-ROM bootable VT-100 utility cannot support the update firmware function.

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 Firmware dialog box appears.
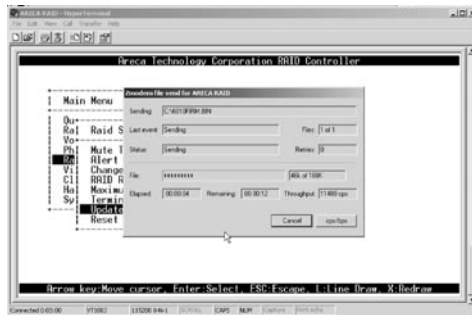

3. Go to the tool bar and select Transfer. Open Send File.

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

5. Click Browse. Look in the location where the Firmware upgrade software is located. Select the File name:
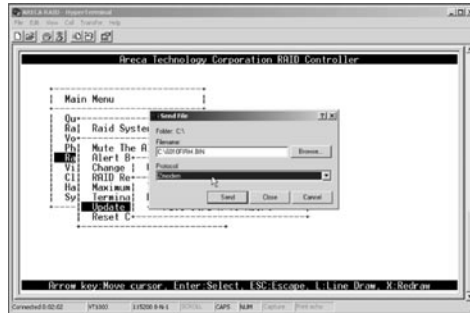
6. Click Send. Send the Firmware Binary to the controller.

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

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

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

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

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

Upgrade Firmware Through HTTP Proxy Web Browser Manager

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. To upgrade the RAID subsystem 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

software is located. Select the File name:
"6010FIRM.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"
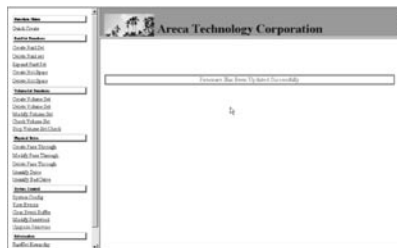
NOTE: The user has to reconfigure all of the settings after the firmware upgrade is complete, because all of the settings will default to the original default values.

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Appendix C

Connector and Pin Definitions

ARC-6060 Controller Diagram

Connector	Description
1 (J1)	DC Power Input Connector
2 (J6)	Ethernet Port Connector
3 (JP2)	RS232 Connector
4 (J6)	Fault LED Connector
5 (J7)	HDD LED Connector
6 (CH1~CH16)	SATA Device Drive Channel Port Connector

DC Power Connector (JP6)

Pin	Pin Name	Description
1	+12V	+12V Voltage Input
2	GND	Singal Ground
3	GND	Singal Ground
4	+5V	+5V Voltage Input

RS232 Connector

Pin	Pin Name	Pin	Description
1	N/C	2	RXD0
3	TXD0	4	N/C
5	GND	6	N/C
7	RTS0	8	CTS0
9	N/C	10	N/C

Fault LED Connector (JP6)

(2*16) Pin Header Connector	Description
LED-1	Pin-1(low)
LED-2	Pin-2(low)
LED-3	Pin-3(low)
LED-4	Pin-4(low)
LED-5	Pin-5(low)
LED-6	Pin-6(low)
LED-7	Pin-7(low)
LED-8	Pin-8(low)
LED-9	Pin-9(low)
LED-10	Pin-10(low)
LED-11	Pin-11(low)
LED-12	Pin-12(low)
LED-13	Pin-13(low)
LED-14	Pin-14(low)
LED-15	Pin-15(low)
LED-16	Pin-1(low)

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HDD LED Activity Connector (JP7)

(2*16) Pin Header Connector	Description
LED-1	Pin-1(low)
LED-2	Pin-2(low)
LED-3	Pin-3(low)
LED-4	Pin-4(low)
LED-5	Pin-5(low)
LED-6	Pin-6(low)
LED-7	Pin-7(low)
LED-8	Pin-8(low)
LED-9	Pin-9(low)
LED-10	Pin-10(low)
LED-11	Pin-11(low)
LED-12	Pin-12(low)
LED-13	Pin-13(low)
LED-14	Pin-14(low)
LED-15	Pin-15(low)
LED-16	Pin-1(low)

ARC-1232 Null Modem Cable (Swap pin 2 &3, pin 4&6, and pin 7&8)

9 Pin D-SUB Female Connector	9 Pin D-SUB Female Connector
Pin-1	Pin-1
Pin-2	Pin-3
Pin-3	Pin-2
Pin-4	Pin-6
Pin-5	Pin-5
Pin-6	Pin-4
Pin-7	Pin-8
Pin-8	Pin-7
N/C	N/C

ARC-1132 Internal to External Cable

10 Pin IDC Female Connector	9 Pin External D-SUB Male Connector
Pin-1	Pin-1
Pin-2	Pin-2
Pin-3	Pin-3
Pin-4	Pin-4
Pin-5	Pin-5
Pin-6	Pin-6
Pin-7	Pin-7
Pin-8	Pin-8
Pin-9	Pin-9
Pin-10	N/C

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Appendix D

SNMP Operation & Definition

Overview

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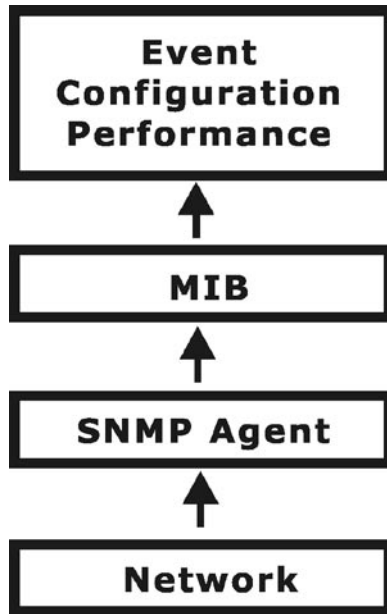
SNMP Installation

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

Starting the SNMP function setting

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• Community Name

Community name act as password of 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 names to 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.

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.

Appendix E

Battery Backup Module (BBM)

The SATA RAID controller operates using cache memory .The battery Backup Module is an add-on module that provides power to the PCI SATA RAID controller cache memory in the event of a power failure. The Battery Backup Module monitors the write back cache on the SATA 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 Components
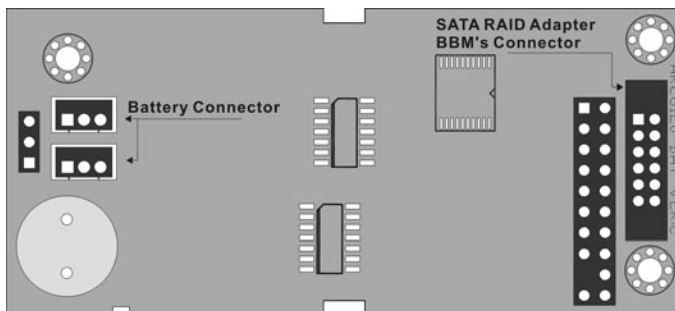
BBM Specifications

Mechanical
- Module Dimension (W x H x D)
  40 x 22 x 85 mm
- BBM Connector
  2 * 6 box header

Environmental
- Operating Temperature
  Temperature: +5° C to +40° C
- Humidity: 45-85%, non-condensing
- Storage Temperature
  Temperature: -40° C to 60° C

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 • Humidity: 45-85%, non-condensing
Electrical
 • Input Voltage
   +3.6VDC
 • On Board Battery Capacity
1000mAH (1*1000mAH)

Installation

1. Make sure all power to the system is disconnected.
2. Connector J2 is available for the optional battery backup module. Connect the BBM cable to the 12-pin battery connector on the controller
3. Integrators may provide pre-drilled holes in their cabinet for securing the BBM using its three mounting positions.

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 SATA RAID controller.

Capacity	Memory Type	Battery Backup duration (Hours)
128MB DDR	Low Power (18mA)	56

Operation

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

Changing the Battery Backup Module

The LI-ION battery will no longer accept a charge properly. LI-ION battery life expectancy is approximately 1 to 5 years.

1. Shutdown the operating system properly. Make sure that cache memory has been flushed.
2. Disconnect the battery backup module cable from J2 on the SATA RAID card.
3. Disconnect the battery pack cable from JP2 on the Battery Backup Module.
4. Install a new battery pack and connect the new battery pack to JP2.
5. Connect the Battery Backup Module to J2 on the SATA card.
6. Disable the write-back function from the BIOS or Utility.

Note:

The BBM can not work in the mainboard which turn off the PCI-x/pci-exprss clock in the begining stage of power failure.

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Appendix F

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.