

# **SATA RAID Cards**

## **ARC-1200**

( 2-Port PCIe x1 to SATA RAID Controller )

## **USER Manual**

Version: 1.1

Issue Date: January, 2008

## **Microsoft WHQL Windows Hardware Compatibility Test**

Areca is committed to submitting products to the Microsoft Windows Hardware Quality Labs (WHQL), which is required for participation in the Windows Logo Program. Successful passage of the WHQL tests results in both the "Designed for Windows" logo for qualifying Areca PCI-Express SATA RAID controllers and a listing on the Microsoft Hardware Compatibility List (HCL).

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## **FCC STATEMENT**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

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# INTRODUCTION

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## 1. Introduction

This section presents a brief overview of the 2-port PCIe x1 SATA RAID Controller.

### 1.1 Overview

The ARC-1200 SATA RAID controller is a PCIe x1 bus to SATA Disk Array host controller. It can provide two SATA II ports on a single controller. When properly configured, the SATA RAID controller can provide a high degree of performance and fault tolerance with data mirroring for maximum protection. The ARC-1200 is the industry's most compelling PCIe x1 to SATA II RAID solution which economically delivers full-featured true hardware RAID to desktop and workstations as well as entry-level servers.

### Unparalleled Performance

The SATA RAID controller raises the standard to higher performance levels with several enhancements including high-performance 500MHz storage Processor, a new DDR2 memory architecture (DDR400), 3Gb/s SATA II ports, and NCQ support in a high performance PCIe x1 bus interconnection. The ARC-1200 default supports on-board DDR2-400 SDRAM memory. The test result is against overall performance compared to other standard SATA controller.

### Unsurpassed Data Availability

With Areca entry-level RAID controllers incorporate onboard storage processors to deliver true hardware RAID. Hardware RAID cards have their own local RAID processor onboard, plus dedicated onboard cache for full hardware offloading of RAID-processing functions. The ability of hardware RAID controllers to rebuild an array in the event of a drive failure is superior to what software RAID controllers offer.

The SATA RAID controller can provide RAID levels 0, 1, Single Disk or JBOD RAID for maximum configuration flexibility. Its high data availability and protection derives from the following capabilities:



# INTRODUCTION

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Online RAID Capacity Expansion, Array Roaming, Online RAID Level / Stripe Size Migration, Global Online Spare, Automatic Drive Failure Detection, Automatic Failed Drive Rebuilding, Disk Hot-Swap, Online Background Rebuilding, Instant Availability and Auto Reassign sector.

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. Areca greater than 2TB support allows for very large volume set application in 64-bit environment such as data-mining and managing large databases.

## **Maximum Interoperability**

The ARC-1200 is a half length low profile 2-port SATA II RAID controller. It supports broad operating system including Windows Vista, Windows® Server 2003, Windows XP, Windows 2000, Red Hat Linux (Open Source), SuSE Linux (Open Source), FreeBSD (Open Source), Solaris (Open Source), Mac and more, along with key system monitoring features such as SMTP and SNMP function.

## **Easy RAID Management**

The BIOS contains an embedded McBIOS RAID manager that can access via hot key at BIOS boot-up screen. This pre-boot McBIOS RAID manager can use to simplify the setup and management of RAID adapter. The adapter firmware also contains and browser-based McRAID storage manager that can access through the Http proxy server in Windows, Linux, FreeBSD, Solaris, and Mac environment. The McBIOS RAID manager allows local and remote to create and modify RAID set, volume set, and monitor RAID status from standard web browser. API software components and CLI also support for the RAID manager. The Single Admin Portal (SAP) monitor utility can support one application to scan multiple RAID units in the network. The Disk Stress Test (DST) utility kicks out disks meeting marginal spec before the RAID unit is actually put on-line for real business.

# INTRODUCTION

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## 1.2 Features

### **Adapter Architecture**

- 400MHz storage processor
- PCIe x1 bus
- DDR2 400 SDRAM
- Write-through or write-back cache support
- Support up to 2 SATA II drives
- Multi-adapter support for large storage requirements
- BIOS boot support for greater fault tolerance
- BIOS PnP (plug and play) and BBS (BIOS boot specification) support
- NVRAM for RAID configuration & transaction log
- Redundant flash image for adapter availability
- RoHS Compliant

### **RAID Features**

- Support RAID level 0, 1, Single Disk, and JBOD
- Multiple RAID selection
- Online Array roaming
- Online RAID level/stripe size migration
- Online capacity expansion and RAID level migration simultaneously
- Instant availability
- Automatic drive insertion / removal detection and rebuilding
- Greater than 2TB per volume set (64-bit LBA support)
- SMART disk drive monitoring for reliability

### **Monitors/Notification**

- System status indication through HDD activity/fault connector, and alarm buzzer
- SMTP support for email notification
- SNMP support for remote Manager

### **RAID Management**

- Field-upgradeable firmware in flash ROM

#### **In-Band Manager**

- Web browser-based McRAID storage manager via ArchHttp proxy server for Windows, Linux, FreeBSD, Solaris, and Mac
- Hot key "boot-up" McBIOS RAID manager via M/B BIOS
- Support Command Line Interface (CLI)

# INTRODUCTION

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- Support controller's API library for customer to write its own AP
- Single Admin Portal (SAP) monitor utility
- Disk Stress Test (DST) utility for production

## **Operating System**

- Windows Vista/Server 2003/XP/2000
- RedHat Linux
- SuSE Linux
- FreeBSD
- Novell Netware 6.5
- Solaris 10 x86/x86\_64
- SCO Unixware 7.1.4
- Mac OS X 10.4 and 10.5 Leopard (EFI BIOS Support)

(For latest supported OS listing visit <http://www.areca.com.tw>)

# HARDWARE INSTALLATION

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## 2. Hardware Installation

This section describes the procedure for installing the SATA RAID controllers.

### 2.1 Before Your begin Installation

Thank you for purchasing the SATA RAID Controller as your RAID data storage and management system. This user guide gives you a simple step-by-step instructions for installing and configuring the SATA RAID Controller. To ensure personal safety and to protect your equipment and data, please read the information carefully in pack content list before you begin installing.

#### Package Contents

If any items listed in your package is missing, please contact your local dealer before proceeding with installation **(disk drives and disk mounting brackets are not included)**:

ARC-1200 SATA RAID Controller

- 1 x PCIe x1 SATA RAID Controller in an ESD-protective bag
- 2 x SATA interface cables (one per port)
- 1 x MCRAID Software Suite CD
- 1 x Quick Installation Guide Manual

# HARDWARE INSTALLATION

## 2.2 Board Layout

Follow the instructions below to install a PCIe RAID controller into your PC / Server.

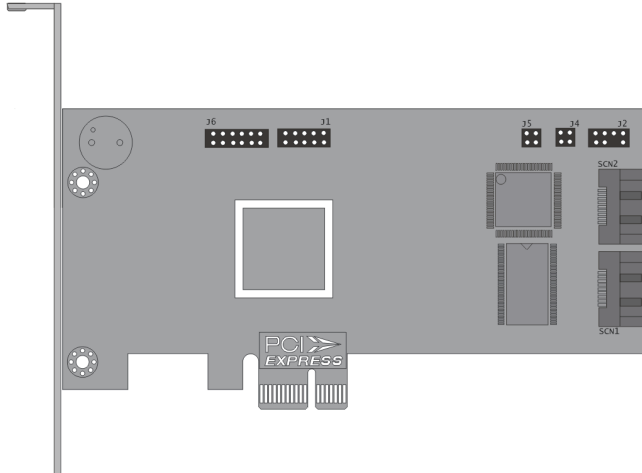


Figure 2-1, ARC-1200 (2-port PCIe x1 SATA RAID Controller)

Connector	Type	Description
1.(J6)	Reserved	12-pin box header
2.(J1)	Reserved	12-pin header
3.(J5)	Individual fault LED header	4-pin header
4.(J4)	Individual activity LED header	4-pin header
5.(J2)	Reserved	8-pin header
6.(SCN2)	SATA Port	SATA connector
7.(SCN1)	SATA Port	SATA connector

Table 2-1, ARC-1200 Connectors

# HARDWARE INSTALLATION

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## Tools Required

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

## System Requirement

The controller can be installed in a universal PCI slot and requires a motherboard that:

- Complies with the PCIe x1

The SATA RAID controller may be connected to up to 2 cables. Optional cables are required to connect any drive activity LEDs and fault LEDs on the enclosure to the SATA RAID controller.

## Installation Tools

The following items may be needed to assist with installing the SATA RAID controller into an available PCI expansion slot.

- Small screwdriver
- Host system hardware manuals and manuals for the disk or enclosure being installed.

## Personal Safety Information

To ensure personal safety as well as the safety of the equipment:

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

## Electrostatic Discharge

Static electricity can cause serious damage to the electronic components on this SATA RAID controller. To avoid damage caused by electrostatic discharge, observe the following precautions:

## **Warning:**

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

- Do not remove the SATA RAID controller from its anti-static packaging until you are ready to install it into a computer case.
- Handle the SATA RAID Controller by its edges or by the metal mounting brackets at its each end.
- Before you handle the SATA RAID controller in any way, touch a grounded, anti-static surface, such as an unpainted portion of the system chassis, for a few seconds to discharge any built-up static electricity.

## **2.3 Installation**

Follow the instructions below to install a SATA RAID controller into your PC / Server.

### **Step 1. Unpack**

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

### **Step 2. Power PC/Server Off**

Turn off computer and remove the AC power cord. Remove the system's cover. See the computer system documentation for instruction.

### **Step 3. Install the PCI RAID Cards**

To install the SATA RAID controller remove the mounting screw and existing bracket from the rear panel behind the selected PCIe slot. Align the gold-fingered edge on the card with the selected PCI expansion slot. Press gently but firmly down to ensure that the

# HARDWARE INSTALLATION

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card is properly seated in the slot, as shown in Figure 2-2. Next, screw the bracket into the computer chassis. ARC-1200 controller requires a PCIe x1 slot.

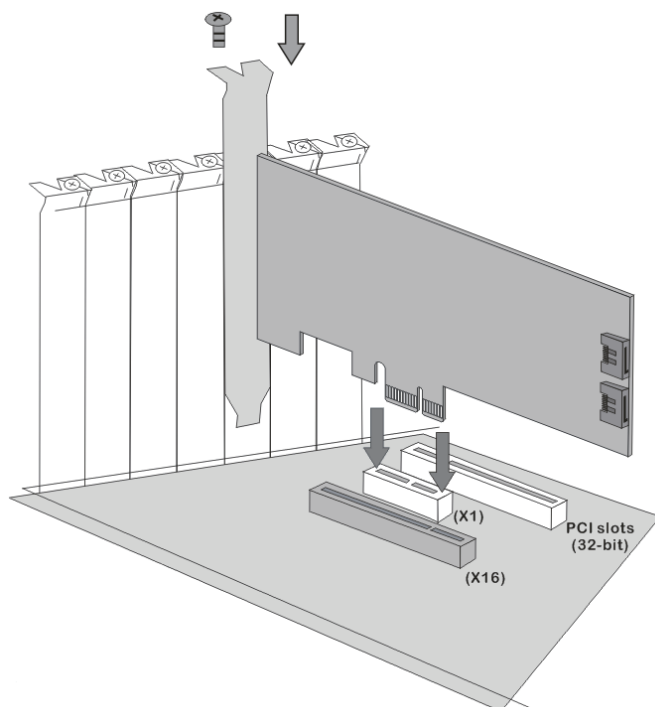


Figure 2-2, Insert SATA RAID controller into a PCIe x1 slot

## Step 4. Mount the Cages or Drives

Remove the front bezel from the computer chassis and install the cages or SATA drives in the computer chassis. Loading drives to the drive tray if cages are installed. Be sure that the power is connected to either the cage backplane or the individual drives.



# HARDWARE INSTALLATION

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## Step 5 Connect the SATA Cable

ARC-1200 controller has two SATA internal connectors. If you have not yet connected your SATA cables, use the cables included with your kit to connect the controller to the SATA hard drives. The cable connectors are all identical, so it does not matter which end you connect to your controller, SATA hard drive, or cage back-plane SATA connector.

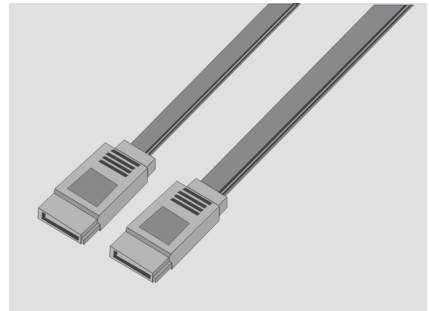


Figure 2-3, SATA Cable

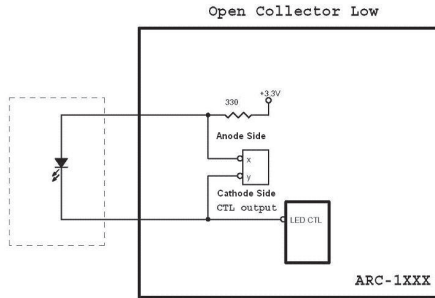
### **Note:**

The SATA cable connectors must match your HDD cage. For example: Channel 1 of RAID controller connects to channel 1 of HDD cage, channel 2 of RAID controller connects to channel 2 of HDD cage, and follow this rule.

## Step 6 Install the LED Cable (optional)

ARC-1200 Individual Fault/Activity Header Intelligent Electronics Schematic.

# HARDWARE INSTALLATION



If the logical level is different between the first 2 sets of the activity (HDD) LED header (LED attached to Set 1 but not Set 2), the controller will assign the first activity LED header as the global indicator connector. Otherwise, each LED output will show only individual drive status.

The SATA RAID controller provides two kinds of LED status connectors.

- A: Global indicator connector, which light up when any drive is active.
  - B: Individual LED indicator connector, for each drive channel.
- The following diagrams and description describes each type of connector.

## **Note:**

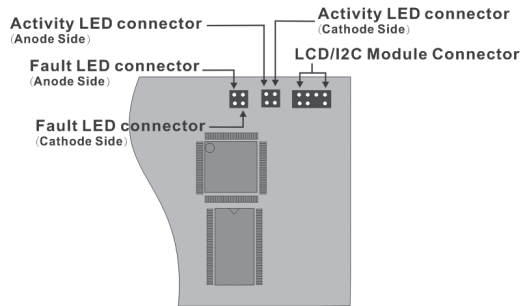
A cable for the global indicator comes with your computer system. Cables for the individual drive LEDs may come with a drive cage, or you may need to purchase them.

### A: Global Indicator Connector

If the system uses only a single global indicator, attach the global indicator cable to the two pins activity (HDD) LED connector. The following diagrams show the connector and pin locations.

# HARDWARE INSTALLATION

Figure 2-4, ARC-1200 global LED connection for computer case.



## B: Individual LED Indicator Connector

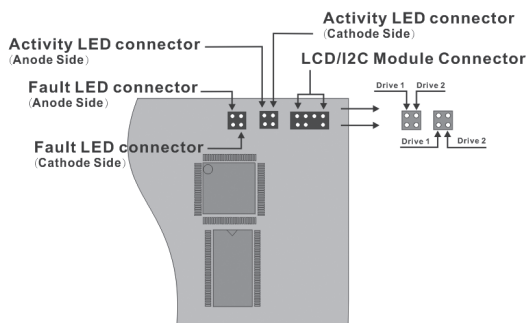
Connect the cables for the drive activity (HDD) LEDs and fault LEDs between the backplane of the cage and the respective connector on the SATA RAID controller. The following describes the fault/activity LED.

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

# HARDWARE INSTALLATION

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Figure 2-5, ARC-1200 Individual LED indicators connector, for each channel drive.



## Step 7. Re-check the SATA HDD LED and Fault LED Cable Connections

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

## Step 8. Power Up the System

Check the installation thoroughly, reinstall the computer cover, and reconnect the power cord cables. Turn on the power switch at the rear of the computer (if equipped) and then press the power button at the front of the host computer.

## Step 9. Configure Volume Set

The SATA RAID controller configures RAID functionality through the McBIOS RAID manager. Please refer to Chapter 3, McBIOS RAID Manager, for the detail regarding configuration. The RAID controller can also be configured through the McRAID storage manager software utility with ArchHttp proxy server installed. For this option, please refer to Chapter 6, Web Browser-Based Configuration.

# HARDWARE INSTALLATION

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## Step 10. Install the Controller Driver

For a new system:

- Driver installation usually takes places as part of operating system installation. Please refer to Chapter 4 Diver Installation for the detail installation procedure.

In an existing system:

- Install the controller driver into the existing operating system. Please refer to the Chapter 4, Driver Installation, for the detailed installation procedure.

### **Note:**

Look for newest release versions of drivers, please download from <http://www.areca.com.tw>

## Step 11. Install ArchHttp Proxy Server

The SATA RAID controller firmware has embedded the web-browser McRAID storage manager. ArchHttp proxy server utility will launch it. The browser-based McRAID storage manager provides all of the creation, management, and monitor SATA RAID controller status. Please refer to the Chapter 5 for the detail ArchHttp Proxy Server Installation. For SNMP agent function, please refer to Appendix C.

## Step 12. Determining the Boot Sequences

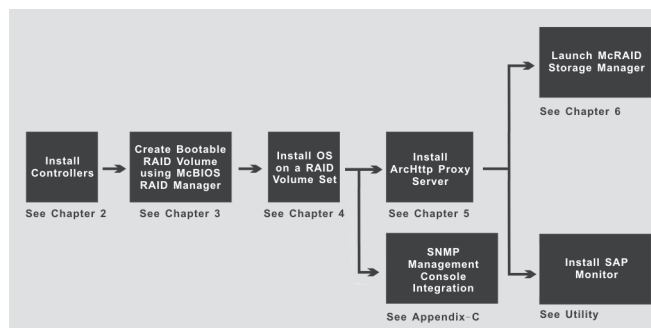
The SATA RAID controller is a bootable controller. If your system already contains a bootable device with an installed operating system, you can set up your system to boot a second operating system from the new controller. To add a second bootable controller, you may need to enter setup and change the device boot sequence so that the SATA RAID controller heads the list. If the system BIOS setup does not allow this change, your system may not be configurable to allow the SATA RAID controller to act as a second boot device.

# HARDWARE INSTALLATION

## Summary of the Installation

The flow chart below describes the installation procedures for SATA RAID controller. These procedures include hardware installation, the creation and configuration of a RAID volume through the McBIOS, OS installation and installation of SATA RAID controller software.

Configuration Utility	Operating System Supported
McBIOS RAID Manager	OS-Independent
McRAID Storage Manager (Via Archttp proxy server)	Windows 2000/XP/2003/Vista, Linux, FreeBSD, Solaris and Mac
SAP Monitor (Single Admin portal to scan for multiple RAID units in the net- work, Via Archttp proxy server)	Windows 2000/XP/2003/Vista
SNMP Manager Console Integration	Windows 2000/XP/2003/Vista, Linux, FreeBSD



The software components configure and monitor the SATA RAID controller via Archttp proxy server.

## McRAID Storage Manager

Before launching the firmware-embedded web server, McRAID storage manager, you can to install the Archttp proxy server on your server system. If you need additional information about installation and start-up of this function, see the McRAID Storage Manager section in Chapter 6.

# HARDWARE INSTALLATION

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## **SNMP Manager Console Integration**

### **• In-Band-Using PCIe Bus**

Before launching the SNMP agent in the sever, you need to enable the fireware-embedded SNMP community configuration first and install Areca SNMP Extension Agent in your server system. If you need additional information about installation and start-up the function, see the SNMP Operation and Installation section in the Appendix C

### **Single Admin Portal (SAP) Monitor**

This utility can scan for multiple RAID units on the network and monitor controller set status. It also includes a Disk Stress Test (DST) utility to identify marginal spec disks before putting the RAID unit into a production environment.

For additional information, see the utility manual in the packaged CD or download it from the web site <http://www.arec.com.tw>

# BIOS CONFIGURATION

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## 3. McBIOS RAID Manager

The system mainboard BIOS automatically configures the following SATA RAID controller parameters at power-up:

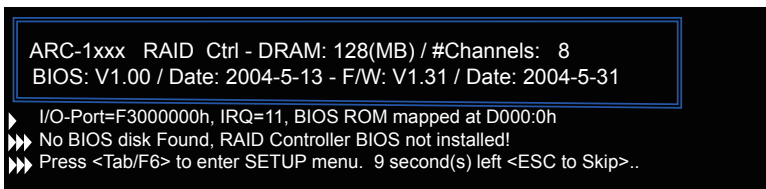
- I/O Port Address
- Interrupt Channel (IRQ)
- Adapter ROM Base Address

Use McBIOS RAID manager to further configure the SATA RAID controller to suit your server hardware and operating system.

### 3.1 Starting the McBIOS RAID Manager

This section explains how to use the McBIOS RAID manager to configure your RAID system. The McBIOS RAID manager is designed to be user-friendly. It is a menu-driven program, residing in the firmware, which allows you to scroll through various menus and sub-menus and select among the predetermined configuration options.

When starting a system with an SATA RAID controller installed, it will display the following message on the monitor during the start-up sequence (after the system BIOS startup screen but before the operating system boots):

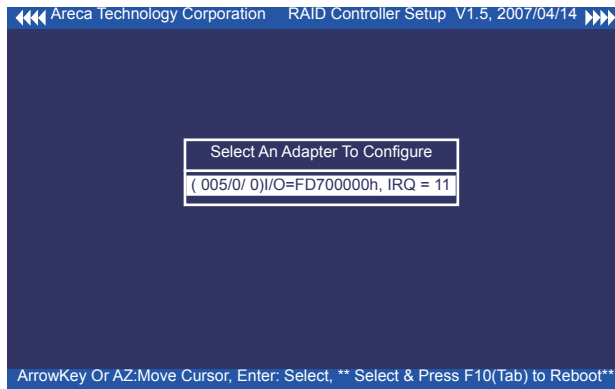


```
ARC-1xxx RAID Ctrl - DRAM: 128(MB) / #Channels: 8
BIOS: V1.00 / Date: 2004-5-13 - F/W: V1.31 / Date: 2004-5-31
> I/O-Port=F3000000h, IRQ=11, BIOS ROM mapped at D000:0h
>> No BIOS disk Found, RAID Controller BIOS not installed!
>> Press <Tab/F6> to enter SETUP menu. 9 second(s) left <ESC to Skip>..
```

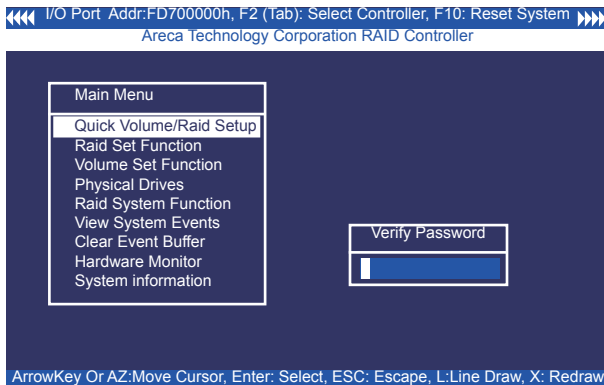
The McBIOS RAID manager message remains on your screen for about nine seconds, giving you time to start the configure menu by pressing **Tab** or **F6**. If you do not wish to enter configuration menu, press **ESC** key to skip configuration immediately. When activated, the McBIOS window appears showing a selection dialog box listing the SATA RAID controllers that are installed in the system. The legend at the bottom of the screen shows you what keys are enabled for the windows.



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Use the **Up** and **Down** arrow keys to select the adapter you want to configure. While the desired adapter is highlighted, press the **Enter** key to enter the main menu of the McBIOS RAID manager.



## Note:

The manufacture default password is set to **0000**; this password can be modified by selecting **Change Password** in the **Raid System Function** section.

## 3.2 McBIOS RAID manager

The firmware-based McBIOS RAID manager is used to configure RAID sets and volume sets. Because the utility resides in the SATA RAID controller firmware, operation is independent of any operating systems on your computer. This utility can be used to:

- Create RAID sets,
- Expand RAID sets,

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- Add physical drives,
- Define volume sets,
- Modify volume sets,
- Modify RAID level/stripe size,
- Define pass-through disk drives and
- Modify system functions.

## 3.3 Configuring Raid Sets and Volume Sets

You can configure RAID sets and volume sets with McBIOS RAID manager automatically using “Quick Volume/Raid Setup” or manually using “Raid Set/Volume Set Function”. Each configuration method requires a different level of user input. The general flow of operations for RAID set and volume set configuration is:

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

## 3.4 Using Quick Volume /Raid Setup Configuration

“Quick Volume / Raid Setup” configuration collects all available drives and includes them in a RAID set. The RAID set you create is associated with exactly one volume set. You will only be able to modify the default RAID level, the stripe size, and the capacity of the new volume set. 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

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## 3.5 Using RAID Set/Volume Set Function Method

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

Select this method to configure new RAID sets and volume sets. The "Raid Set/Volume Set Function" configuration option allows you to associate volume sets with partial and full RAID sets.

Step	Action
1	Choose "RAID Set Function" from the main menu. Select "Create RAID Set" and press the <b>Enter</b> key.
2	The "Select a Drive For Raid Set" window is displayed showing the SATA drives connected to the SATA RAID controller.
3	<p>Press the <b>UP</b> and <b>DOWN</b> arrow keys to select specific physical drives. Press the <b>Enter</b> key to associate the selected physical drive with the current RAID set.</p> <p>It is recommended that you drives of the same capacity in a specific array. If you use drives with different capacities in an array, all drives in the RAID set will be set to the capacity of the smallest drive in the RAID set.</p> <p>The numbers of physical drives in a specific array determines which RAID levels that can be implemented in the array.</p> <p>RAID 0 requires 1 or more physical drives.</p> <p>RAID 1 requires 2 physical drives.</p>
4	After adding the desired physical drives to the current RAID set, press <b>Yes</b> to confirm the "Create Raid Set" function.
5	An "Edit The Raid Set Name" dialog box appears. Enter 1 to 15 alphanumeric characters to define a unique identifier for this new raid set. The default RAID set name will always appear as Raid Set. #. Press <b>Enter</b> to finish the name editing.
6	Press the <b>Yes</b> option 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.
7	Choose the "Volume Set Function" from the main menu. Select "Create Volume Set" and press the <b>Enter</b> key.
8	Choose a RAID set from the "Create Volume From Raid Set" window. Press the <b>Enter</b> key to confirm the selection.
9	If space remains in the raid set, the next volume set can be configured. Repeat steps 5 to 9 to configure another volume set.

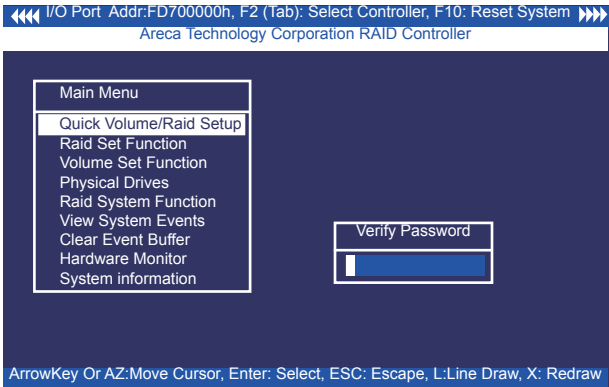
# BIOS CONFIGURATION

**Note:**

A user can use this method to examine the existing configuration. The “Modify Volume Set” configuration method provides the same functions as the “Create Volume Set” configuration method. In the volume set function, you can use “Modify Volume Set” to change all volume set parameters except for capacity (size).

## 3.6 Main Menu

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



**Note:**

The manufacture default password is set to **0000**; this password can be modified by selecting **Change Password** in the **Raid System Function** section.

Option	Description
Quick Volume/Raid Setup	Create a default configuration based on the number 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	Setup the RAID system configuration
View System Events	Record all system events in the buffer
Clear Event Buffer	Clear all information in the event buffer
Hardware Monitor	Show the hardware system environment status
System Information	View the controller system information

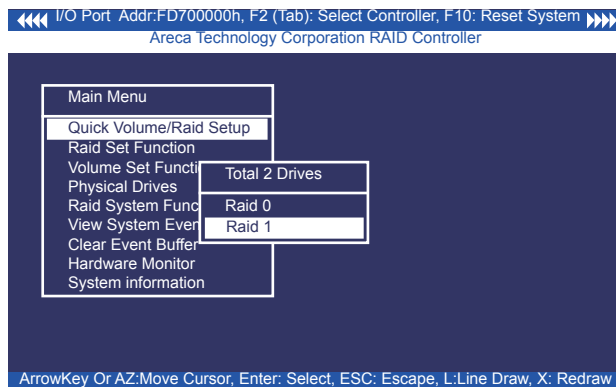
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This password option allows user to set or clear the RAID controller's password protection feature. Once the password has been set, the user can only monitor and configure the RAID controller by providing the correct password. The password is used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

## 3.6.1 Quick Volume/RAID Setup

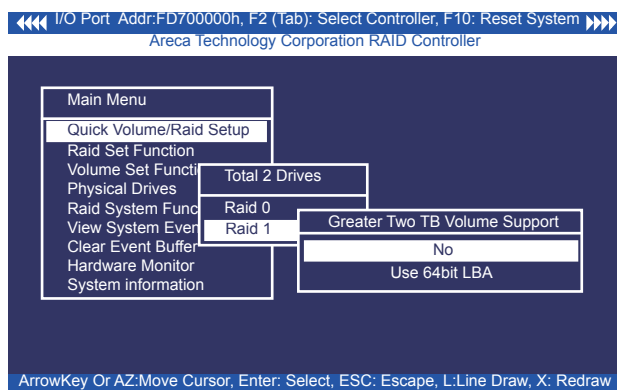
"Quick Volume/RAID Setup" is the fastest way to prepare a RAID set and volume set. It requires only a few keystrokes to complete. Although disk drives of different capacity may be used in the RAID set, it will use the capacity of the smallest disk drive as the capacity of all disk drives in the RAID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

1. All of the physical drives are contained in one RAID set.
2. The RAID level, capacity, and stripe size options are selected during the configuration process.
3. When a single volume set is created, it can consume all or a portion of the available disk capacity in this RAID set.
4. If you need to add an additional volume set, use the main menu "Create Volume Set" function.



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



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

- **No**

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

- **64bit LBA**

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

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

Windows 2003 with SP1

Linux kernel 2.6.x or latter

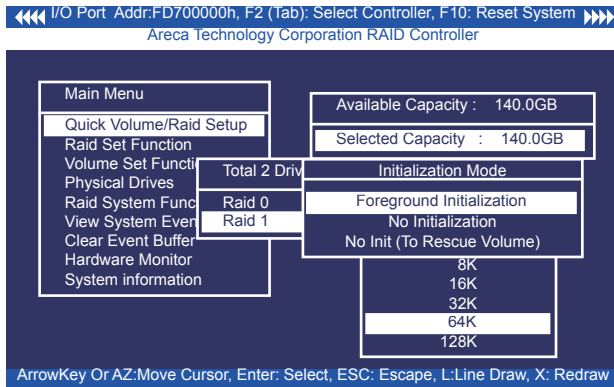
For more details please download PDF file from **[ftp://ftp.areca.com.tw/RaidCards/Documents/Manual\\_Spec/Over2TB\\_050721.zip](ftp://ftp.areca.com.tw/RaidCards/Documents/Manual_Spec/Over2TB_050721.zip)**

A single volume set is created and consumes all or a portion of the disk capacity available in this RAID set. Define the capacity of volume set in the "Available Capacity" popup. The default value for the volume set, which is 100% of the available capacity,

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is displayed in the selected capacity. The capacity value can be increased or decreased by the **UP** and **DOWN** arrow keys. The capacity of each volume set must be less than or equal to the total capacity of the RAID set on which it resides. If the volume set uses only part of the RAID set capacity, you can use the "Create Volume Set" option in the main menu to define additional volume sets.

**Stripe Size** This parameter sets the size of the stripe written to each disk in a RAID 0 or 1 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 certain that your computer performs random reads more often, select a smaller stripe size. Press the **Yes** option in the "Create Vol/Raid" Set dialog box, the RAID set and volume set will start to initialize it. Select "Foreground Initialization", "No Initialization" or "No Init (To Rescue Volume)" for initialization.

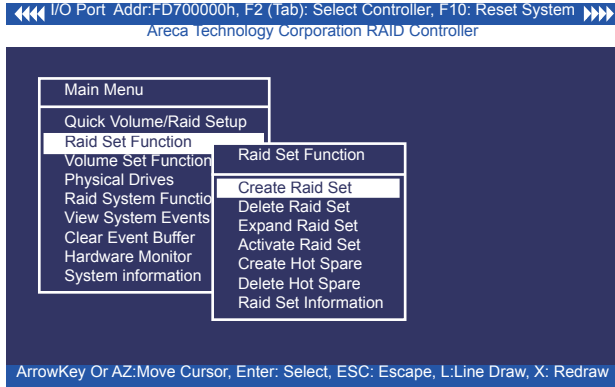


- Select "Foreground Initialization" for faster initialization of the selected volume set. When "Foreground Initialization", the initialization proceeds must be completed before the volume set ready for system accesses.
- Select "No Initialization", there is no initialization happened, the volume set is fully accessible for system reads and writes. The operating system can instantly access to the newly created arrays without requiring a reboot.
- Select "No Init" (To Rescue Volume) for customer to rescue volume without losing data in the disk.

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## 3.6.2 Raid Set Function

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



### 3.6.2.1 Create Raid Set

To define a RAID set, follow the procedure below:

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

When finish selecting SATA drives for RAID set, press the **Esc** key. A “Create Raid Set Confirmation” screen appears, select the **Yes** option to confirm it.

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



## 3.6.2.2 Delete Raid Set

To erase and reconfigure a RAID set completely, you must delete it and re-create the RAID set first. 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. Warning, data on RAID set will be lost if this option is used.

## 3.6.2.3 Expand Raid Set

Instead of deleting a RAID set and recreating it with additional disk drives, the "Expand Raid Set" function allows the users to add disk drives to the RAID set that have already been created. To expand a RAID set: Select the "Expand Raid Set" option. If there is an available disk, then the "Select SATA Drives For Raid Set Expansion" screen appears.

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

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

### **Note:**

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

### ● **Migrating**

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

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## 3.6.2.4 Activate Incomplete Raid Set

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

## 3.6.2.5 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. Press **Enter** key to select a disk drive and press **Yes** option 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 for RAID 1 to rebuild if you swap the failed drive.

## 3.6.2.6 Delete Hot Spare

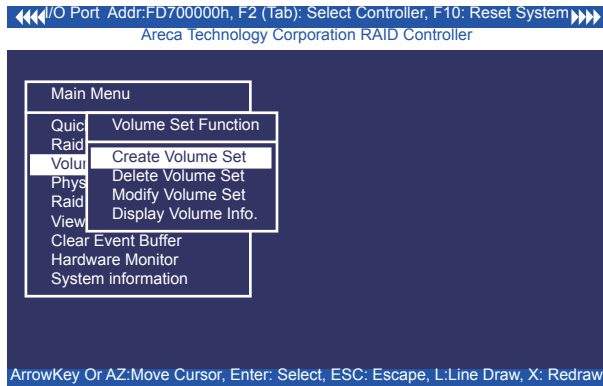
Select the target hot spare disk to delete by clicking on the appropriate check box. Press **Enter** key to select a hot spare disk drive and press **Yes** option in the "Delete Hot Spare" to delete the hot spares.

## 3.6.2.7 Raid Set Information

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

## 3.6.3 Volume Set Function

A volume set is seen by the host system as a single logical device; it is organized in a RAID level within the controller utilizing one or more physical disks. RAID level refers to the level of data performance and protection of a volume set. A volume set can consume all of the capacity or a portion of the available disk capacity of a RAID set. Multiple volume sets can exist on a RAID set. If multiple volume sets reside on a specified RAID set, all volume sets will reside on all physical disks in the RAID set. Thus each volume set on the RAID set will have its data spread evenly across all the disks in the RAID set. This is with regards in having more than one volume set using some of the available disks and another volume set using other disks.



### 3.6.3.1 Create Volume Set

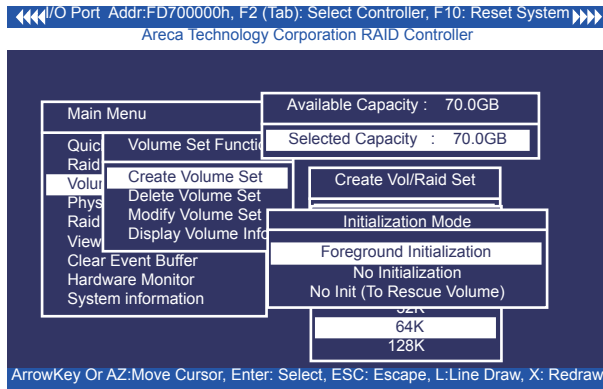
1. Volume sets of different RAID levels may coexist on the same RAID set.
2. Up to 16 volume sets can be created by the SATA RAID controller.
3. The maximum addressable size of a single volume set is not limited to 2TB because the controller is capable of 64-bit LBA mode. However, the operating system itself may not be capable of addressing more than 2TB. See the Areca website for details.

To create a volume set, follow the following steps:

1. Select the "Volume Set Function" from the main menu.

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2. Choose the "Create Volume Set" from "Volume Set Functions" dialog box screen.
3. The "Create Volume From RAID Set" dialog box will be appeared. This screen displays the existing arranged RAID sets. Select the RAID set number and press the **Enter** key. The "Volume Creation" dialogue is displayed in the screen.
4. A window with a summary of the current volume set's settings. The "Volume Creation" option allows user to select the volume name, RAID level, capacity, strip size, SCSI channel/SCSI ID/SCSI LUN, cache mode and tag queuing. The user can modify the default values in this screen; the modification procedures are in section 3.7.3.3.



5. After completing the modification of the volume set, press the **Esc** key to confirm it. An "Initialization Mode" screen is presented.
  - Select "Foreground Initialization" for faster initialization of the selected volume set. When "Foreground Initialization", the initialization proceeds must be completed before the volume set ready for system accesses.
  - Select "No Initialization", there is no initialization happened, 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.
  - Select "No Init" (To Rescue Volume) for customer to rescue volume without losing data in the disk.
6. Repeat steps 3 to 5 to create additional volume sets.

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

- **Volume Name**

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

- **Raid Level**

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

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

- **Capacity**

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

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

- **No**

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

- **64bit LBA**

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

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

Windows 2003 with SP1

Linux kernel 2.6.x or latter

For more details please download PDF file from **[ftp://ftp.areca.com.tw/RaidCards/Documents/Manual\\_Spec/Over2TB\\_050721.zip](ftp://ftp.areca.com.tw/RaidCards/Documents/Manual_Spec/Over2TB_050721.zip)**

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- **Stripe Size**

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

- **SCSI Channel**

The SATA RAID controller function simulates a SCSI RAID controller. The host bus represents the SCSI channel. Choose the SCSI Channel. A "Select SCSI Channel" dialog box will appear; select the channel number and press the **Enter** key to confirm it.

- **SCSI ID**

Each device attached to the SATA card, as well as the card itself, must be assigned a unique SCSI ID number. A SCSI channel can connect up to 15 devices. It is necessary to assign a SCSI ID to each device from a list of available SCSI IDs.

- **SCSI LUN**

Each SCSI ID can support up to 8 LUNs. Most SATA controllers treat each LUN as if it were a SATA disk.

- **Cache Mode**

User can set the cache mode to either "Write Through" or "Write Back" cache.

- **Tag Queuing**

This option, when enabled, can enhance 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 SATA drives that do not support command tag queuing.

## 3.6.3.2 Delete Volume Set

To delete volume set from a RAID set, move the cursor bar to the "Delete Volume Set" item, then press the **Enter** key. The "Delete Set Functions" menu will show all Raid Set # items. Move the cursor bar to a RAID set number, then press the **En-**

**ter** key to show all volume sets within that RAID set. Move the cursor to the volume set number that is to be deleted and press **Enter** to delete it.

### 3.6.3.3 Modify Volume Set

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

As shown, "Volume Modification" shows the volume set attributes that user can modify it. But user can only modify the last volume set capacity.

#### ● Volume Growth

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

#### To Expand an existing volume noticed:

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

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## For greater 2TB expansion:

- If your system installed on the volume, does not expand the volume capacity greater 2TB, currently OS can not support boot up from a greater 2TB capacity device.
- Expand over 2TB used 64-bit LBA mode. Please make sure your OS supports 64-bit LBA before expand it.

### • Volume Set Migration

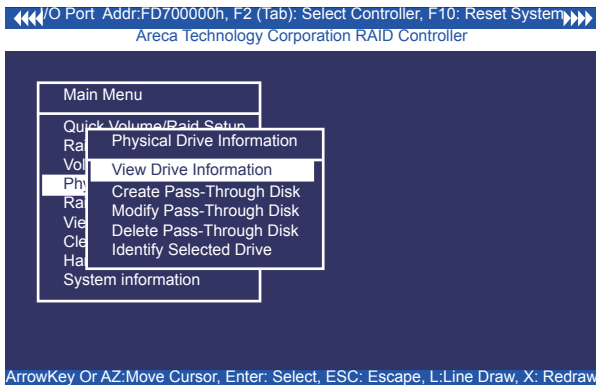
Migrating occurs when a volume set is migrating from one RAID level to another, when a volume set strip size changes, or when a disk is added to a RAID set. Migration state is displayed in the volume state area of the "Volume Set Information" screen.

### 3.6.3.4 Display Volume Set Info.

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

## 3.6.4 Physical Drives

Move the cursor bar to the "Physical Drives" function" on the main menu and then press the Enter key to perform the operations listed above.





## 3.6.4.1 View Drive Information

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

## 3.6.4.2 Create Pass-Through Disk

A pass-through disk is not controlled by the SATA RAID controller firmware and thus cannot be a part of a volume set. The disk is available directly to the operating system as an individual disk. It is typically used on a system where the operating system is on a disk not controlled by the SATA RAID controller firmware. The SCSI Channel, SCSI ID, SCSI LUN, Cache Mode, and Tag Queuing must be specified to create a pass-through disk.

## 3.6.4.3 Modify a Pass-Through Disk

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

## 3.6.4.4 Delete Pass-Through Disk

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

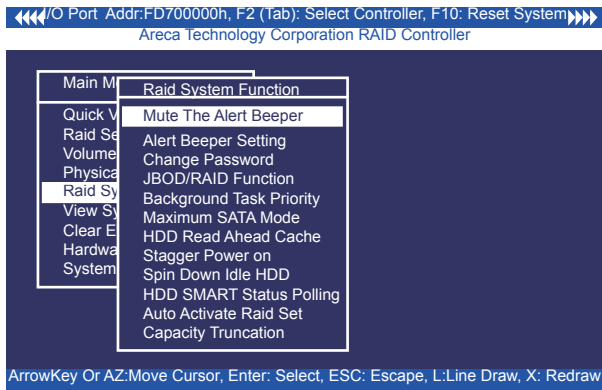
## 3.6.4.5 Identify Selected Drive

You can use the "Identify Selected Drive" feature to prevent removing the wrong drive, the selected drive fault LED will blank when the "Identify Selected Drive" is selected.

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## 3.6.5 Raid System Function

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



### 3.6.5.1 Mute The Alert Beeper

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

### 3.6.5.2 Alert Beeper Setting

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

### 3.6.5.3 Change Password

The manufacture default password is set to 0000. The password option allows user to set or clear the password protection feature. Once the password has been set, the user can monitor and configure the controller only by providing the correct password.

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This feature is used to protect the internal RAID system from unauthorized access. The controller will check the password only when entering the main menu from the initial screen. The system will automatically go back to the initial screen if it does not receive any command in 5 minutes. To set or change the password, move the cursor to "Raid System Function" screen, press the "Change Password" item. The "Enter New Password" screen will appear. Do not use spaces when you enter the password, If spaces are used, it will lock out the user. To disable the password, only press Enter 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.

## **3.6.5.4 JBOD/RAID Function**

JBOD is an acronym for "just a Bunch Of Disks". A group of hard disks in a RAID controller are not set up as any type of RAID configuration. All drives are available to the operating system as an individual disk. JBOD does not provide data redundancy. The operating system can see all disks when the JBOD option is selected. It is necessary to delete any RAID set(s) on any disk(s) if switching from a RAID to a JBOD configuration.

## **3.6.5.5 Background Task Priority**

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

## **3.6.5.6 Maximum SATA Mode**

The SATA RAID controller can support up to SATA II, which runs up to 300MB/s, twice as fast as SATA150. NCQ is a command protocol in Serial ATA that can only be implemented on native Serial ATA hard drives. It allows multiple commands to be outstanding within a drive at the same time. Drives that support NCQ have an internal queue where outstanding commands can be dynamically rescheduled or re-ordered, along with the neces-

# BIOS CONFIGURATION

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sary tracking mechanisms for outstanding and completed portions of the workload. The SATA RAID controller allows the user to choose the SATA mode: SATA150, SATA150+NCQ, SATA300, SATA300+NCQ.

## **3.6.5.7 HDD Read Ahead Cache**

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

## **3.6.5.8 Stagger Power On**

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

## **3.6.5.9 Spin Down Idle HDD**

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

## **3.6.5.10 HDD SMART Status Polling**

An external RAID enclosure has the hardware monitor in the dedicated backplane that can report HDD temperature status to the controller. However, PCI cards do not use backplanes if the drives are internal to the main server chassis. The type of enclosure cannot report the HDD temperature to the controller. For this reason, "HDD SMART Status Polling" was added to enable scanning of the HDD temperature function. It is necessary to enable "HDD SMART Status Polling" function before SMART information is accessible. This function is disabled by default.

## 3.6.5.11 Auto Activate Raid Set

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

## 3.6.5.12 Capacity Truncation

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

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

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

**Disabled:** It does not truncate the capacity.

## 3.6.6 View System Events

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

# BIOS CONFIGURATION

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events information: Time, Device, Event Type, ElapseTime, and Errors. The RAID system does not have a build-in real time clock. The time information is the relative time from the SATA RAID controller while it powered on.

## 3.6.7 Clear Events Buffer

Use this feature to clear the entire events buffer.

## 3.6.8 Hardware Monitor

To view the RAID controller's hardware monitor information, move the mouse cursor to the main menu and click the "Hardware Monitor" link. The "The Hardware Monitor" information screen appears. The hardware monitor information provides the HDD temperature of the SATA RAID controller.

## 3.6.9 System Information

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

## 4. Driver Installation

This chapter describes how to install the SATA RAID controller driver to your operating system. The installation procedures use the following terminology:

### **Installing operating system on the SATA Volume**

If you have a new drive configuration without an operating system and want to install operating system on a disk drive managed by the SATA RAID Controller. The driver installation is a part of the operating system installation.

### **Installing SATA RAID controller into an existing operating system**

The computer has an existing operating system installed and the SATA RAID controller is being installed as a secondary controller.

Have all required system hardware and software components on hand before proceeding with the setup and installation.

Materials required:

- Microsoft Windows 2000/XP/2003/Vista, Linux, FreeBSD, Solaris, Mac or more Installation CD
- SATA RAID Controller Software Suite CD
- SATA RAID Controller

### **4.1 Creating the Driver Diskettes**

The software suite CD disc shipped with the SATA RAID controller is a self booting CD. In order to create driver diskettes for Windows, Linux, FreeBSD or more installation drivers, your system is required to support booting from the CD-ROM.

If you do not have the software suite CD disc with the package, contact your local dealer or you can also download the latest version drivers for Windows 2000/XP/2003/Vista, Linux, FreeBSD, Solaris, Mac and more from the Areca web site at <http://www.areca.com.tw>

# DRIVER INSTALLATION

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These driver diskettes are intended for use with new operating system installations. Determine the correct kernel version and identify which diskette images contain drivers for that kernel. If the driver file ends in .img, create the appropriate driver diskette using "dd" utility. The following steps are required to create the driver diskettes:

1. The computer system BIOS must be set to boot-up from the CD-ROM.
2. Insert the SATA controller driver software suite CD disc into the CD-ROM drive.

## **Note:**

It will take about 5 minutes to boot up the Knoppix GNU/Linux, Live Linux CD.

3. The system will boot-up from CD-ROM drive.
4. To create the driver diskette, for example: making the CentOS 5 driver diskette.
  - 4a. Execute xterm by clicking the XTerm icon on left-bottom toolbar.
  - 4b. Change the path to the specific driver image.  
`cd /cdrom/PACKAGES/Linux/DRIVER/CentOS_5`
  - 4c. Dump the driver image into floppy diskette using "dd" utility, Command format: `dd if=<image file> of=<destination>`  
`dd if=driver.img of=/dev/fd0`
  - 4d. When the operation is complete, the following messages are shown.  
2880+0 records in  
2880+0 records out  
1474560 bytes (1.5 MB) copied, 97.5903 seconds, 15.1 kB/s

The driver diskette is made now. Proceed to the following instruction for installation procedures.



## 4.2 Driver Installation for Windows

The SATA RAID controller can be used with Microsoft Windows 2000, Windows XP, Windows Server 2003 and Windows Vista. The SATA RAID controllers support SCSI Miniport and StorPort Drivers for Windows Server 2003/Vista.

### 4.2.1 New Storage Device Drivers in Windows 2003/XP-64/Vista

The Storport driver is new to Windows 2003/XP-64/Vista. Storport implements a new architecture designed for better performance with RAID systems and in Storage Area Network (SAN) environments. Storport driver delivers higher I/O throughput, enhanced manageability, and an improved miniport interface. Storport driver better utilizes faster adapters through the use of reduced Delay Procedure Call (DPC) and improved queue management.

### 4.2.2 Install Windows 2000/XP/2003/Vista on a SATA RAID Volume

The following instructions explain how to install the SATA RAID controller driver. For completed details on installing Windows, see the Windows User's Manual.

#### 4.2.2.1 Installation procedures

The following detailed procedure installing the SATA RAID controller driver while installing Windows 2000/XP/2003/Vista. Have your bootable Microsoft Windows 2000/XP/2003/Vista CD and follow the required procedure below to install SATA RAID controller:

1. Make sure you follow the instructions in Chapter 2 "Hardware Installation" to install the controller and connect the disk drives or enclosure.
2. Start the system and then press **Tab+F6** to access the McBIOS RAID manager. Use the McBIOS RAID manager to create the RAID set and volume set to which you will install Windows.

# DRIVER INSTALLATION

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For details, see Chapter 3 McBIOS RAID Manager. Once a volume set is created and configured, continue with next step to install the operating system.

3. Insert the Windows setup CD and reboot the system to begin the Windows installation.

## **Note:**

The computer system BIOS must support bootable from CD-ROM.

4. Press **F6** as soon as the Windows screen shows "Setup is Inspecting your Computer's Hardware Configuration". A message stating "Press F6 to specify Third-party RAID Controller" will display during this time. This must be done or else the Windows installer will not prompt for the driver for from the SATA RAID controller and the driver diskette will not be recognized.

5. The next screen will show: "Setup could not determine the type of one or more mass storage device installed in your system." "Selected "Specify Additional SCSI adapter" by pressing **S**.

6. Window will prompt to place the "Manufacturer-supplied Hardware Support dDsk" into floppy drive A: Insert the SATA RAID series driver diskette in drive "A:" and press **Enter** key.

7. Window will check the floppy; select the correct card and CPU type for your hardware from the listing and press **Enter** key to install it.

8. After Windows scans the hardware and finds the controller, it will display:  
"Setup will load support for the following Mass Storage devices:"  
"Windows 2K, XP,2K3 (ARC1XX0) SATA PCI-X (or PCI-Express) RAID Controller". Press **Enter** key to continue and copy the driver files. From this point on, simply follow the Microsoft Windows Installation procedure. Follow the on-screen instructions, responding as needed, to complete the installation.

9. After the installation is completed, reboot the system to load the new drivers / operating system.
10. See Chapter 5 in this manual to customize your RAID volume sets using McRAID storage manager.

## **4.2.2.2 Making Volume Sets Available to Windows System**

When you reboot the system, log in as a system administrator. Continue with the following steps to make any additional volume sets or pass-through disks accessible to Windows. This procedure assumes that the SATA RAID controller hardware, driver, and Windows are installed and operational in your system.

1. Partition and format the new volume set or disks using Disk Administrator:
  - a. Choose "Administrative Tools" from the "Start" menu.
  - b. Choose "Computer Management" from the "Administrative Tools" menu.
  - c. Select "Storage".
  - d. Select "Disk Management".
2. Follow the on-screen prompts to write a signature to the drive.
3. Right click on the disk drive and select "Create Volume" from the menu.
4. Follow the on-screen prompts to create a volume set and to give a disk drive letter.

## **4.2.3 Installing Controller into an Existing Windows 2000/XP/2003/Vista Installation**

In this scenario, you are installing the controller in an existing Windows system. To install the driver:

1. Follow the instructions in Chapter 2, the Hardware Installation Chapter, to install the controller and connect the disk drives or enclosure.

# DRIVER INSTALLATION

---

2. Start the system and then press **Tab+F6** to enter the McBIOS manager utility. Use the configuration utility to create the RAID set and volume set. For details, see Chapter 3, McBIOS RAID Manager. Once a volume set is created and configured, continue with installation of the driver.
3. Re-Boot Windows and the OS will recognize the SATA RAID controller and launch the "Found New Hardware Wizard", which guides you in installing the SATA RAID driver.
4. The "Upgrade Device Driver Wizard" will pop-up and provide a choice of how to proceed. Choose "Display a list of known drivers for this device, so that you can choose a specific driver." and click on "Next".
5. When the next screen queries the user about utilizing the currently installed driver, click on the "Have Disk" button.
6. When the "Install From Disk" dialog appears, insert the SATA RAID controller driver diskette or the shipping software suite CD and type-in or browse to the correct path for the "Copy manufacturer's files from:" dialog box.
7. After specifying the driver location, the previous dialog box will appear showing the selected driver to be installed. Click the "Next" button.
8. The "Digital Signature Not Found" screen will appear. Click on "Yes" to continue the installation.
9. Windows automatically copies the appropriate driver files and rebuilds its driver database.
10. The "Found New Hardware Wizard" summary screen appears; click the "Finish" button.
11. The "System Settings Change" dialog box appears. Remove the diskette from the drive and click **Yes** option to restart the computer to load the new drivers.
12. See Chapter 5 in this manual for information on customizing your RAID volumes using McRAID storage manager.

## **4.2.3.1 Making Volume Sets Available to Windows System**

When you reboot the system, log in as a system administrator. The following steps show how to make any new disk arrays or independent disks accessible to Windows 2000/XP/2003/Vista. This procedure assumes that the SATA RAID controller hardware, driver, and Windows are installed and operational in your system.

1. Partition and format the new arrays or disks using Disk Administrator:
  - a. Choose "Administrative Tools" from the "Start" menu.
  - b. Choose "Computer Management" from the "Administrative Tools" menu.
  - c. Select "Storage".
  - d. Select "Disk Management".
2. Follow the on-screen prompts to write a signature to the drive.
3. Right click on the drive and select "Create Volume" from the menu.
4. Follow the on-screen prompts to create a volume set and to assign a disk drive letter.

## **4.2.4 Uninstall Controller from Windows 2000/XP/2003/Vista**

To remove the SATA RAID controller driver from the Windows system, follow the instructions below.

1. Ensure that you have closed all applications and are logged in with administrative rights.
2. Open "Control Panel" and start the "Add/Remove Program" icon and uninstall and software for the SATA RAID controller.

# DRIVER INSTALLATION

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3. Go to "Control Panel" and select "System". Select the "Hardware" tab and then click the "Device Manager" Button. In Device Manager, expand the "SCSI and RAID Controllers" section. Right click on the "ARECA SATA RAID Controller" and select "Uninstall".
4. Click **Yes** option to confirm removing the SATA RAID driver. The prompt to restart the system will then be displayed.

## 4.3 Driver Installation for Linux

This chapter describes how to install the SATA RAID controller driver to RedHat Linux, and SuSE Linux. Before installing the SATA RAID driver to the Linux, complete the following actions:

1. Install and configure the controller and hard disk drives according to the instructions in Chapter 2 Hardware Installation.
2. Start the system and then press **Tab+F6** to enter the McBIOS RAID manager utility. Use the McBIOS RAID manager utility to create the RAID set and volume set. For details, see Chapter 3, McBIOS RAID Manager.

If you are using a Linux distribution for which there is not a compiled driver available from Areca, you can copy the source from the SATA software suite CD or download the source from the Areca website and compile a new driver.

Compiled and tested drivers for Red Hat and SuSE Linux are included on the shipped software suite CD. You can download updated versions of compiled and tested drivers for Red Hat or SuSE Linux from the Areca web site at <http://www.areca.com.tw>. Included in these downloads is the Linux driver source, which can be used to compile the updated version driver for RedHat, SuSE and other versions of Linux.

Please refer to the "readme.txt" file on the included Areca software suite CD or website to make driver diskette and to install driver to the system.

## 4.4 Driver Installation for FreeBSD

This chapter describes how to install the SATA RAID controller driver to FreeBSD. Before installing the SATA RAID driver to FreeBSD, complete following actions:

1. Install and configure the controller and hard disk drives according to the instructions in Chapter 2, Hardware Installation.
2. Start the system and then press **Tab+F6** to enter the McBIOS RAID manager utility. Use the McBIOS RAID manager utility to create the RAID set and volume set. For details, see Chapter 3, McBIOS RAID Manager.

The supplied software suite CD that came with the SATA RAID controller includes compiled and tested drivers for FreeBSD 4.x (4.2 and onwards) and 5.x (5.2 and onwards). To check if a more current version driver is available, please see the Areca web site at <http://www.areca.com.tw>.

Please refer to the "readme.txt" file on the SATA RAID controller software software suite CD or website to make driver diskette and to install driver to the system.

## 4.5 Driver Installation for Solaris 10

Please refer to the "readme.txt" file on the software CD or a manual from website: <http://www.areca.com.tw>

## 4.6 Driver Installation for Mac 10.x

After hardware installation, the SATA disk drives connected to the SATA RAID Adapter must be configured and the volume set units initialized by the controller before they are ready to use by the system.

You must have administrative level permissions to install Areca Mac Driver & Software. You can install Driver& Software on your Power Mac G5 or Mac Pro as below:

# DRIVER INSTALLATION

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1. Insert the Areca Mac driver & software CD that came with your Areca SATA RAID Adapter.
2. Double-click on the following file that resides at <CD-ROM>\packages\MacOS to add the installer on the Finder.
  - a. install\_mr raid\_mac.zip (For Power Mac G5)
  - b. install\_mr raid\_macpro.zip (For Mac Pro)
3. Launch the installer by double-clicking the install\_mr raid\_mac or install\_mr raid\_macpro on the Finder.
4. Follow the installer steps to install Areca driver, archttp64 and arc\_cli utility at the same time.
5. Reboot your Power Mac G5 or Mac Pro system

Normally archttp64 and arc\_cli are installed at the same time you install the driver for your Areca SATA RAID adapter. Once archttp64 and arc\_cli have been installed, the background task automatically starts each time you start your computer. There is one MARID icon showing on your desktop. This icon is for you to start up the McRAID storage manager (by archttp64) and arc\_cli utility.

Please refer to the "Mac\_manual" file on the software CD <CD-ROM>\DOCS directory.

## 4.7 Driver Installation for UnixWare 7.1.4

Please refer to the "readme.txt" file on the software suite CD or a manual from website: <http://www.areca.com.tw>

## 4.8 Driver Installation for NetWare 6.5

Please refer to the "readme.txt" file on the software suite CD or a manual from website: <http://www.areca.com.tw>



## 5. ArchHttp Proxy Server Installation

### Overview

After hardware installation, the SATA disk drives connected to the SATA RAID controller must be configured and the volume set units initialized before they are ready to use.

The user interface for these tasks can be accessed through the built-in configuration and administration utility that resides in the controller's firmware. It provides complete control and management of the controller and disk arrays, eliminating the need for additional hardware or software.

In addition, a software utility to configure the SATA RAID is provided on the software suite CD delivered with SATA controller. This software suite CD contains the software utility that can monitor, test, and support the SATA RAID controller. The software utility and McRAID storage manager can configure and monitor the SATA RAID controller via ArchHttp Proxy Server. The following table outlines their functions:

Configuration Utility	Operating System Supported
McBIOS RAID Manager	OS-Independent
McRAID Storage Manager (Via Archhttp proxy server)	Windows 2000/XP/2003/Vista, Linux, Free-BSD, Solaris and Mac
SAP Monitor (Single Admin Portal (SAP) to scan for multiple RAID units in the network, Via ArchHttp proxy server)	Windows 2000/XP/2003/Vista

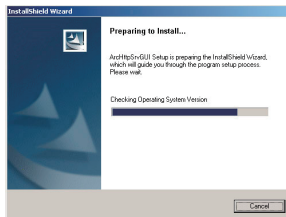
The HTTP management software (ArchHttp) runs as a service or daemon, and have it automatically start the Archhttp proxy server for all controllers found. This way the controller can be managed remotely without having to sign in the server. The HTTP management software (ArchHttp) also has integrated the General Configuration, Mail Configuration and SNMP Configuration. Those can be configured in local or remote standard web browser.

# ARCHTTP PROXY SERVER INSTALLATION

## 5.1 For Windows

You must have administrative level permissions to install SATA RAID software. This procedure assumes that the SATA RAID hardware and Windows are installed and operational in your system. Screen captures in this section are taken from a Windows XP installation. If you are running another version of Windows, your installation screen may look different, but the ArchHttp proxy server installation is essentially the same.

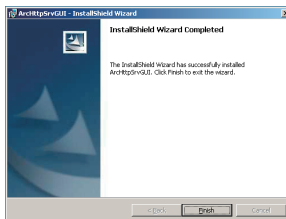
1. Insert the RAID subsystem software CD in the CD-ROM drive.
2. Run the setup.exe file that resides at: <CD-ROM>\PACKAGES\Windows\http\setup.exe on the CD-ROM.
3. The screen shows "Preparing to Install".



Follow the on-screen prompts to complete ArchHttp proxy server software installation.

A program bar appears that measures the progress of the ArchHttp setup. When this screen complete, you have completed the ArchHttp proxy server software setup.

4. After a successful installation, the "Setup Complete" dialog box is displayed.

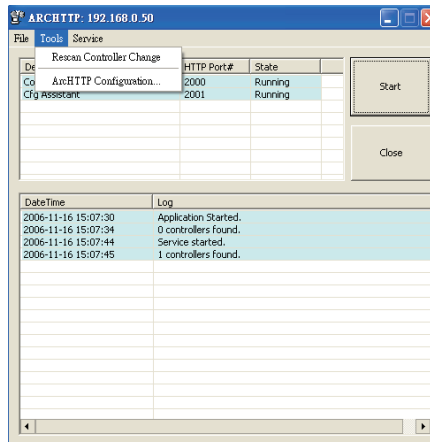


Click the "Finish" button to complete the installation.

# ARCHTTP PROXY SERVER INSTALLATION

Click on the "Start button" in the Windows 2000/XP task bar and then click "Program", select the "McRAID" and run " ArchHttp proxy server". The ArchHttp dialog box appears.

1. When you select "Controller#01(PCI)" then click "Start" button. Then web browser appears.
2. If you select "Cfg Assistant" then click "Start" button. The ArchHttp Configuration appears. (please refer to section 5.6 ArchHttp Configuration)



## 5.2 For Linux

You should have administrative level permissions to install SATA RAID software. This procedure assumes that the SATA RAID hardware and Linux are installed and operational in your system. The following details the Linux installation procedure of the SATA RAID controller software.

The ArchHttp proxy server is provided on the software CD delivered with SATA card or download from the [www.areca.com.tw](http://www.areca.com.tw). The firmware embedded McRAID storage manager can configure and monitor the SATA RAID controller via ArchHttp proxy server.

1. Login as root. Copy the ArchHttp proxy server file to a local directory.

# ARCHTTP PROXY SERVER INSTALLATION

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- (1). Insert the SATA RAID controller CD in the CD-ROM drive.
- (2). Copy <CD-ROM>\PACKAGES\Mac\http directory to local (Ex:/usr/local/sbin).

Or

- (1). Download from the [www.areca.com.tw](http://www.areca.com.tw) or from the email attachment.

2. You must have administrative level permissions to install SATA RAID controller ArchHttp proxy server software. This procedure assumes that the SATA RAID hardware and driver are installed and operational in your system.

The following details are the installation procedure of the SATA RAID controller for ArchHttp proxy server software.

- (1).Run the Archhttp proxy server by using the following command:

Usage: ./archhttp32 (TCP\_PORT) or ./archhttp64 (TCP\_PORT). It depends on your OS version.

Parameters: TCP\_PORT value= 1~65535 (If TCP\_PORT assigned, Archhttp will start from this port. Otherwise, it will use the setting in the archhttpsvr.conf or default 81). This is the port address assigning for the first adapter.

Such as: archhttp64 1553

- (2). Archhttp server console started, controller card detected then ArchHttp proxy server screen appears.

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Areca HTTP proxy server V1.80.240 for Areca RAID controllers.

Controller(s) list

-----

Controller[1](PCI) : Listen to port[1553].

Cfg Assistant : Listen to port[1554].

Binding IP:[0.0.0.0]

Note: IP[0.0.0.0] stands for any ip bound to this host.

-----

#####

Press CTRL-C to exit program!!

#####

# ARCHTTP PROXY SERVER INSTALLATION

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Controller [1] Http: New client [9] accepted  
Controller [1] Http: New Recv 243 bytes  
Controller [1] Http: Send [174] bytes back to the client

- (3). If you need the "Cfgr Assistant", please refer to section 5.6 ArchHttp Configuration.  
3. See the next chapter detailing the McRAID Storage Manager to customize your RAID volume set.

## **For Mozilla user:**

Because our management need Java support, so user may need upgrade to version 1.6 or later.

## **5.3 For FreeBSD**

You should have administrative level permissions to install SATA RAID software. This procedure assumes that the SATA RAID hardware and FreeBSD are installed and operational in your system.

The following details FreeBSD installation procedure of the SATA RAID controller software.

1. Insert the RAID controller software CD in the CD-ROM drive.
2. Copy <CD-ROM>\PACKAGES\FreeBSD\http directory to local  
The next following step is same with Linux. Please see section 5.2 For Linux.

## **5.4 For Solaris10 x86**

You must have administrative level permissions to install SATA RAID software. This procedure assumes that the SATA RAID hardware and FreeBSD are installed and operational in your system. The following details Solaris installation procedure of the SATA RAID controller software.

1. Insert the RAID controller software CD in the CD-ROM drive.
2. Copy <CD-ROM>\PACKAGES\Solaris\http directory to local  
The next following step is same with Linux. Please see section 5.2 For Linux.

# ARCHTTP PROXY SERVER INSTALLATION

## 5.5 For Mac OS 10.x

The ArchHttp proxy server is provided on the software CD delivered with SATA RAID controller or download from the [www.areca.com.tw](http://www.areca.com.tw). The firmware embedded McRAID storage manager can configure and monitor the SATA RAID controller via ArchHttp proxy server. The Archhttp proxy server for Mac, please reference Chapter 4.6 Driver Installation for Mac 10.x or refer to the the Mac\_manual\_ xxxx.pdf that resides at CD <CD-ROM>\DOCS directory. You can install driver, archhttp64 and arc-cli from software CD < CD >\package\Mac OS directory at the same time.

## 5.6 ArchHttp Configuration

The ArchHttp proxy server will automatically assign one additional port for setup its configuration. If you want to change the "archhttp-srv.conf" setting up of ArchHttp configuration, For example: General Configuration, Mail Configuration, and SNMP Configuration, please start web browser by entering `http://[computer IP address]:[cfg port number]`.

The ArchHttp configuration starts.

### ARCHTTP Configurations

[General Configuration](#)  
[Mail Configuration](#)  
[SNMP Trap Configuration](#)

#### General Configurations

Binding IP	0.0.0.0
HTTP Port#	8080
Display HTTP Connection Information To Console	<input type="checkbox"/>
Scanning PCI Device	<input checked="" type="radio"/> Yes <input type="radio"/> No
Scanning RS-232 Device	<input type="radio"/> Yes <input checked="" type="radio"/> No
Scanning In-band Device	<input type="radio"/> Yes <input checked="" type="radio"/> No

☐ Confirm The Operation

SubmitReset

# ARCHTTP PROXY SERVER INSTALLATION

---

## ● General Configuration

Binding IP 0.0.0.0: You can choose either local administration or remote administration to connect web browser.

Binding IP 127.0.0.1: Using local administration to connect web browser.

Binding IP 192.166.0.44: Using remote administration to connect web browser.

HTTP Port#: Value 1~65535

Display HTTP Connection Information To Console: Select "Yes" to show Http send bytes and receive bytes information in the console.

Scanning PCI Device: Select "Yes" for ARC-1XXX series adapter

Scanning RS-232 Device: No

Scanning Inband Device: No

## ● Mail Configuration

When you open the mail configuration page, you will see following settings:

SMTP server IP Address: Enter the SMTP server IP address which is not MCRAID storage manager IP. Ex: 192.168.0.2

Sender Name: Enter the sender name that will be shown in the outgoing mail. Ex: RaidController\_1

Mail address: Enter the sender email that will be shown in the outgoing mail, but don't type IP to replace domain name.

Ex: RaidController\_1@areca.com.tw

Account: Enter the valid account if your SMTP mail server need authentication.

Password: Enter the valid password if your SMTP mail server need authentication.

MailTo Name: Enter the alert receiver name that will be shown in the outgoing mail.

Mail Address: Enter the alert receiver mail address.

Ex: admin@areca.com.tw

# ARCHTTP PROXY SERVER INSTALLATION

## ARCHTTP Configurations

[General Configuration](#)

[Mail Configuration](#)

[SNMP Trap Configuration](#)

<b>SMTP Server Configuration</b>	
SMTP Server IP Address: <input type="text"/>	
<b>Mail Address Configurations</b>	
Sender Name: <input type="text"/>	Mail Address: <input type="text"/>
Account: <input type="text"/>	Password: <input type="text"/>
MailTo Name1: <input type="text"/>	Mail Address: <input type="text"/>
MailTo Name2: <input type="text"/>	Mail Address: <input type="text"/>
MailTo Name3: <input type="text"/>	Mail Address: <input type="text"/>
MailTo Name4: <input type="text"/>	Mail Address: <input type="text"/>
<b>Event Notification Configurations</b>	
<input checked="" type="radio"/> Disable Event Notification	No Event Notification Will Be Sent
<input type="radio"/> Urgent Error Notification	Send Only Urgent Event
<input type="radio"/> Serious Error Notification	Send Urgent And Serious Event
<input type="radio"/> Warning Error Notification	Send Urgent, Serious And Warning Event
<input type="radio"/> Information Notification	Send All Event
<input type="checkbox"/> Notification For No Event	Notify User If No Event Occurs Within 24 Hours
<input type="checkbox"/> Confirm The Operation	
<input type="button" value="Submit"/> <input type="button" value="Reset"/>	

### Note:

Please make sure you have completed mail address before you submit mail configurations.

## ● SNMP Trap Configuration

When you open the SNMP configuration page, you will see following settings:

## ARCHTTP Configurations

[General Configuration](#)

[Mail Configuration](#)

[SNMP Trap Configuration](#)

<b>SNMP Trap Configurations</b>					
SNMP Trap IP Address #1	<input type="text" value="192"/>	<input type="text" value="168"/>	<input type="text" value="0"/>	<input type="text" value="173"/>	port# <input type="text" value="162"/>
SNMP Trap IP Address #2	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	port# <input type="text" value="162"/>
SNMP Trap IP Address #3	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	port# <input type="text" value="162"/>
<b>SNMP System Configurations</b>					
Community		<input type="text" value="public"/>			
<b>SNMP Trap Notification Configurations</b>					
<input type="radio"/> Disable Event Notification	No Event Notification Will Be Sent				
<input type="radio"/> Urgent Error Notification	Send Only Urgent Event				
<input type="radio"/> Serious Error Notification	Send Urgent And Serious Event				
<input type="radio"/> Warning Error Notification	Send Urgent, Serious And Warning Event				
<input type="radio"/> Information Notification	Send All Event				
<input type="checkbox"/> Confirm The Operation					
<input type="button" value="Submit"/> <input type="button" value="Reset"/>					

## ● SNMP Trap Configurations

Enter the SNMP Trap IP Address.



# ARCHTTP PROXY SERVER INSTALLATION

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- **SNMP System Configurations**

About community, please refer to Appendix C of SNMP community name. The system Contact, Name and Location that will be shown in the outgoing SNMP trap.

- **SNMP Trap Notification Configurations**

The Community Name should be the same as firmware-embedded SNMP Community. The SNMP Trap Notification Configurations include level 1: Serious, level 2: Error, level 3: Warning and level 4: Information. The level 4 covers notification events such as initialization of the controller and initiation of the rebuilding process; Level 3 includes events which require the issuance of warning messages; Level 2 covers notification events which once have happen; Level 1 is the highest level, and covers events the need immediate attention (and action) from the administrator.

**Note:**

For event notification configurations refer to Appendix C. After you confirm and submit configurations, you can use "Generate Test Event" feature to make these settings are correct.

## 6. Web Browser-based Configuration

Before using the firmware-based browser McRAID storage manager utility, do the initial setup and installation of this product. If you need to boot up the operating system from a RAID volume set, you must first create a RAID volume by using McBIOS RAID manager. Please refer to section 3.3 Using Quick Volume /Raid Setup Configuration for information on creating this initial volume set.

The McRAID storage manager is firmware-based utility, which is accessible via the web browser installed on your operating system. The web browser-based McRAID storage manager is a HTML-based application, which utilizes the browser (IE, Netscape and Mozilla etc) installed on your monitor station.

It can be accessed through the In-Band PCIe bus. The In-Band method via Archttp proxy server to launch the web browser-based McRAID storage manager.

- 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
- Update firmware.

### 6.1 Start-up McRAID Storage Manager

With the McRAID storage manager, you are able to locally manage a system containing a SATA RAID controller that has Windows , Linux or more and a supported browser. A locally managed system requires all of the following components:

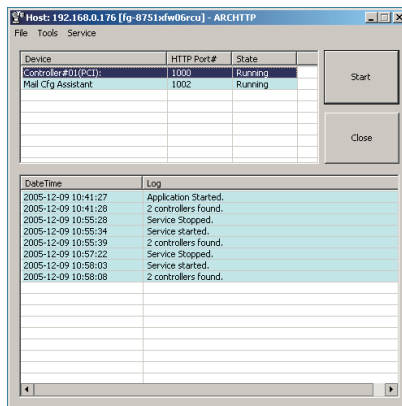
- A supported web browser, which should already be installed on the system.
- Install Archttp proxy server on the SATA RAID system. (Refer to Chapter 5, Archttp Proxy Server Installation)
- Remote and managed systems must have a TCP/IP connection.

# WEB BROWSER-BASED CONFIGURATION

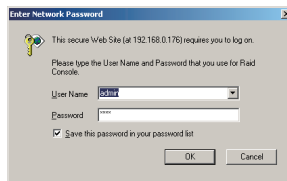
## • Start-up McRAID Storage Manager from Windows Local Administration

Screen captures in this section are taken from a Windows XP installation. If you are running another version of Windows, your screens may look different, but the ArchHttp proxy server installation is essentially the same.

1. To start the McRAID Storage Manager for browser-based management, selecting Controller#01(PCI) and then 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 entering the user name and password, press Enter to access the McRAID storage manager.



# WEB BROWSER-BASED CONFIGURATION

## ● Start-up McRAID Storage Manager from Linux/ FreeBSD/Solaris/Mac Local Administration

To configure the SATA RAID controller. You need to know its IP address. You can find the IP address assigned by the Archhttp proxy server installation: Binding IP:[X.X.X.X] for[Computer IP Address] and controller listen to port for [Port Number].

(1). Launch your McRAID storage manager by entering http:// [Computer IP Address]:[Port Number] in the web browser.

(2). When connection is established, the "System Login" screen appears. The SAS RAID controller default User Name is "admin" and the Password is "0000"

## 6.2 McRAID Storage Manager

The McRAID storage manager start-up configuration screen displays the current configuration of your SATA RAID controller. It displays the Raid Set List, Volume Set List, and Physical Disk List. The RAID set information, volume set information, and drive information can be viewed by clicking on the start-up "Raid Set Hierarchy" screen. The current configuration can also be viewed by clicking on "Raid Set Hierarchy" in the main menu.

Quick Function

RaidSet Functions

VolumeSet Functions

Physical Drives


System Controls

Information

RaidSet Hierarchy

System Information

Hardware Monitor

Areca Technology Corporation

Raid Set Hierarchy

Raid Set	IDE Channels	Volume Set(ChId/Lun)	Volume State	Capacity
Raid Set # 00	Ch01	WD740ADFD-00NLR0(0/0/0)	Normal	74.4GB
Raid Set # 01	Ch02	WD1500ADFD-00NLR0(0/0/1)	Normal	150.0GB

IDE Channels

Channel	Usage	Capacity	Model
Ch01	Pass Through	74.4GB	WDC WD740ADFD-00NLR0
Ch02	Pass Through	150.0GB	WDC WD1500ADFD-00NLR3

# WEB BROWSER-BASED CONFIGURATION

To display RAID set information, move the mouse cursor to the desired RAID set number, then click it. The RAID set information will display. To display volume set information, move the mouse cursor to the desired volume set number, then click it. The volume set information will display. To display drive information, move the mouse cursor to the desired physical drive number, then click it. The drive information will display.

## 6.3 Main Menu

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

Individual Category	Description
Quick Function	Create a default configuration, which is based on the number of physical disks installed; it can modify the volume set Capacity, Raid Level, and Stripe Size.
Raid Set Functions	Create a customized RAID set.
Volume Set Functions	Create customized volume sets and modify the existed volume sets parameter.
Physical Drives	Create pass through disks and modify the existing pass through drives parameters. Also provides the function to identify disk drives (blinking fault LED ).
System Controls	Setting the raid system configuration.
Information	Viewing the controller information. The Raid Set Hierarchy can be viewed through the "Raid Set Hierarchy" item.

## 6.4 Quick Function

Quick Function

Quick Create


RaidSet Functions

VolumeSet Functions

Physical Drives

System Controls

Information

Areca Technology Corporation

Quick Create Raid Volume Set

Total Number Of Disks2

Select Raid LevelRaid 1

Maximum Capacity Allowed70 GB

Select Capacity70 GB

Volume Initialization ModeForeground Initialization

Select Stripe Size64 KBytes

☒ Confirm The Operation

Submit

Reset

# WEB BROWSER-BASED CONFIGURATION

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## **Note:**

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

The number of physical drives in the SATA RAID controller determines the RAID levels that can be implemented with the RAID set. You can create a RAID set associated with exactly one volume set. The user can change the RAID level, stripe size, and capacity. A hot spare option is also created depending upon the existing configuration.

Click the "Confirm The Operation" check box and click on the "Submit" button in the "Quick Create" screen, the RAID set and volume set will start to initialize.

## **Note:**

If volume capacity exceeds 2TB, controller will show the "Greater Two TB Volume Support" sub-menu. Greater Than Two TB Volume Choose 64bit LBA option.

For more details please download PDF file from **[ftp://ftp.areca.com.tw/RaidCards/Documents/Manual\\_Spec/Over2TB\\_050721.zip](ftp://ftp.areca.com.tw/RaidCards/Documents/Manual_Spec/Over2TB_050721.zip)**

## 6.5 Raid Set Functions

Use the "Raid Set Function" and "Volume Set Function" if you prefer to customize your system. Manual configuration can provide full control of the RAID set settings, but it will take longer to complete than the "Quick Create" configuration. Select the "Raid Set Functions" to manually configure the RAID set for the first time or delete and reconfigure existing RAID sets. (A RAID set is a group of disks containing one or more volume sets.)

Quick Function

RaidSet Functions


- Create Raid Set
- Delete Raid Set
- Expand Raid Set
- Activate Raid Set
- Create Hot Spare
- Delete Hot Spare
- Remove Raid Set

VolumeSet Functions

Physical Drives

System Controls

Information



Areca Technology Corporation

Select The IDE Drives For RAID Set

Select	Channel	Capacity	Model
<input checked="" type="checkbox"/>	IDE Ch01	74.4GB	WDC WD740ADEFD-00NLR0
<input checked="" type="checkbox"/>	IDE Ch02	150.0GB	WDC WD1500ADEFD-00NLR3

Raid Set Name:

☒ Confirm The Operation

## 6.5.1 Create Raid Set

To create a RAID set, click on the "Create Raid Set" link. A "Select The Drive For RAID Set" screen will be displayed showing the drive(s) connected to the current controller. Click on the selected physical drives within the current RAID set. The default RAID set name will always appear as "Raid Set. #".

Click the "Confirm The Operation" check box and click on the "Submit" button on the screen; the RAID set will start to initialize.

## 6.5.2 Delete Raid Set

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

Click the "Confirm The Operation" check box and click on the "Submit" button in the screen to delete it.

## 6.5.3 Expand Raid Set

Use this option to expand a RAID set when a disk is added to your RAID system. This function becomes 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 to be expanded. Click the available disk and the "Confirm The Operation" check box and then click on the "Submit" button on the screen to add disks to the RAID set.

# WEB BROWSER-BASED CONFIGURATION

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

## 6.5.4 Activate Incomplete Raid Set

If one of the disk drives is removed in power off state, the RAID set state will change to "Incomplete State". If the user wants to continue to power-on the SATA RAID controller, the user can use the "Activate Raid Set" option to active the RAID set. After the user completes this 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 sets existing on the current controller. Click the RAID set number to activate in the select column. Click on the "Submit" button on the screen to activate the RAID set that had a disk removed (or failed) in the power off state. The SATA RAID controller will continue to work in "Degraded Mode".

## 6.5.5 Create Hot Spare

When you choose the "Create Hot Spare" option, all unused physical devices connected to the current controller appear. Select the target disk by clicking on the appropriate check box. Click the "Confirm The Operation" check box and click the "Submit" button in the screen to create the hot spares. The "Create Hot Spare" option gives you the ability to define a hot spare for RAID 1 to rebuild if you swap the failed drive.

## 6.5.6 Delete Hot Spare

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



## 6.5.7 Rescue Raid Set

When the system is powered off in the RAID set update/creation period, the configuration possibly could disappear due to this abnormal condition. The "RESCUE" function can recover the missing RAID set information. The RAID controller uses the time as the RAID set signature. The RAID set may have different time after the RAID set is recovered. The "SIGANT" function can regenerate the signature for the RAID set.

## 6.5.8 Offline Raid Set

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

## 6.6 Volume Set Functions

A volume set is seen by the host system as a single logical device.

The screenshot shows the 'Volume Set Functions' section of the Areca Technology Corporation web interface. On the left is a navigation menu with options: #Quick Function, #RAIDSet Functions, #VolumeSet Functions (selected), #Physical Drives, #System Controls, and #Information. The main content area is titled 'Enter Volume Attribute On Raid Set #01'. It contains a table of configuration options for a RAID set named 'ARC-1200-VOL000'. The options include Member Disks (1), Volume Fast Level (Raid 0), Max Capacity Allowed (150 GB), Select Volume Capacity (150 GB), Volume Sanitization Mode (Enhanced Sanitization), Volume Stripe Size (64 KB Bytes), Volume Cache Mode (Write Back), Tagged Command Queuing (Enabled), and SCSI Channel SCSI ID-SCSI LUN (0, 0, 0). At the bottom, there is a 'Confirm The Operation' checkbox and 'Submit' and 'Reset' buttons.

Enter Volume Attribute On Raid Set #01	
Volume Name	ARC-1200-VOL000
Member Disks	1
Volume Fast Level	Raid 0
Max Capacity Allowed	150 GB
Select Volume Capacity	150 GB
Volume Sanitization Mode	Enhanced Sanitization
Volume Stripe Size	64 KB Bytes
Volume Cache Mode	Write Back
Tagged Command Queuing	Enabled
SCSI Channel SCSI ID-SCSI LUN	0 0 0
<input type="checkbox"/> Confirm The Operation	
<input type="button" value="Submit"/> <input type="button" value="Reset"/>	

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.

## 6.6.1 Create Volume Set

1. Volume sets of different RAID levels may coexist on the same raid set.
2. Up to 16 volume sets can be created by the SATA RAID controller.
3. The maximum addressable size of a single volume set is not limited to 2TB because the controller is capable of 64-bit LBA mode. However, the operating system itself may not be capable of addressing more than 2TB. See the Areca website for details. To create a volume set on a RAID set, move the cursor bar to the main menu and click on the "Create Volume Set". The screen will show all RAID set numbers. Click the RAID set number that to be used and then click the "Submit" button.

The "Create New Volume Set" option allows users to select the volume name, capacity, RAID level, strip size, SCSI channel/ID/LUN, cache mode, and tag queuing.

### ● Volume Name

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

### ● Raid Level

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

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

### ● Capacity

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

### ● Greater Two TB Volume Support

If volume capacity exceeds 2TB, controller will show the "Greater Two TB Volume Support" sub-menu. Greater Two TB Volume Supports: No and 64bit LBA.

# WEB BROWSER-BASED CONFIGURATION

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For more details please download PDF file from **[ftp://ftp.areca.com.tw/RaidCards/Documents/Manual\\_Spec/Over2TB\\_050721.zip](ftp://ftp.areca.com.tw/RaidCards/Documents/Manual_Spec/Over2TB_050721.zip)**

## ● Initialization Mode

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

## ● Stripe Size

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

A larger stripe size produces better read performance, especially if your computer does mostly sequential reads. However, if you are sure that your computer does random reads more often, select a smaller stripe size.

## ● Cache Mode

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

## ● SCSI Channel/SCSI ID/SCSI Lun

SCSI Channel: The SATA RAID controller function is simulated as a SCSI RAID controller. The host bus is represented as a SCSI channel. Choose the SCSI channel.

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

SCSI LUN: Each SCSI ID can support up to 8 LUNs. Most SATA controllers treat each LUN like a SATA disk.

# WEB BROWSER-BASED CONFIGURATION

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## ● 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. "Disabled" this function only when using older SATA drives that do not support command tag queuing

## 6.6.2 Delete Volume Set

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

## 6.6.3 Modify Volume Set

To modify a volume set from a RAID set:

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

### 6.6.3.1 Volume Growth

Use "Expand RAID Set" function to add disk to a RAID set. The additional capacity can be used to enlarge the last volume set size or to create another volume set. The "Modify Volume

# WEB BROWSER-BASED CONFIGURATION

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Set" function can support the modification of the last volume capacity attribute. To expand the last volume set capacity , move the cursor bar to the " Capacity" item and entry the capacity size. When finished the above action, click the "Confirm The Operation" check box and then click the "Submit" button to enlarge the last volume set. The last volume set starts to expand its capacity

## **To expand an existing volume noticed:**

- Only the last volume can expand capacity.
- When expand volume capacity, you can not modify stripe size or modify raid level simultaneously.
- You can expand volume capacity, but can not reduce volume capacity size.
- After volume expansion, the volume capacity can not be decreased.

## **For greater 2TB expansion:**

- If your system installed in the volume, do not expand the volume capacity greater 2TB, currently OS can not support boot up from a greater 2TB capacity device.
- Expand over 2TB used 64-bit LBA mode. Please make sure your OS supports 64-bit LBA before expand it.

### **6.6.3.2 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 "Raid Set Hierarchy" screen.

## **6.7 Physical Drive**

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

Quick Function

RaidSet Functions


VolumeSet Functions

Physical Drives

- Create Pass Through
- Modify Pass Through
- Delete Pass Through
- Identify Drive

System Controls

Information

Areca Technology Corporation

Select the IDE drive For Pass Through

Select	Channel	Capacity	Model
<input checked="" type="radio"/>	IDE Ch01	74.4GB	WDC WD740ADFD-00NLR0
<input type="radio"/>	IDE Ch02	150.0GB	WDC WD1500ADFD-00NLR3

Enter Pass Through Disk Attribute

Volume Cache Mode

Write Back

Tagged Command Queuing

Enabled

SCSI Channel:SCSI\_ID:SCSI\_Lun

000

☒ Confirm The Operation

Submit

Reset

## 6.7.1 Create Pass-Through Disk

To create pass-through disk, move the mouse cursor to the main menu and click on the “Create Pass-Through” link. The relative setting function screen appears. A pass-through disk is not controlled by the SATA RAID controller firmware, it 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. The user can also select the Cache Mode, Tagged Command Queuing, SCSI Channel/SCSI\_ID/SCSI\_LUN for this pass-through disk.

## 6.7.2 Modify Pass-Through Disk

Use this option to modify the “Pass-Through Disk Attribute”. The user can modify the Cache Mode, Tagged Command Queuing, and SCSI Channel/ID/LUN on an existing pass-through disk. To modify the pass-through drive attribute from the pass-through drive pool, move the mouse cursor bar and click on the “Modify Pass-Through” link. The “Select The Pass Through Disk For Modification” screen appears mark the checkbox for the pass-through disk from the pass-through drive pool and click on the “Submit” button to select drive.

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

After you complete the selection, mark the checkbox for “Confirm The Operation” and click on the “Submit” button to complete the selection action.

# WEB BROWSER-BASED CONFIGURATION

## 6.7.3 Delete Pass-Through Disk

To delete a pass-through drive from the pass-through drive pool, move the mouse cursor bar to the main menus and click the “Delete Pass Through” link.

After you complete the selection, mark the checkbox for “Confirm The Operation” and click the “Submit” button to complete the delete action.

## 6.7.4 Identify Selected Drive

To prevent removal of the wrong drive, the selected fault LED will blink so as to physically locate the intended disk when “Identify Selected Drive” is selected.

To identify the selected drive from the drives pool, click “Identify Selected Drive”. The “Select The IDE Device For Identification” screen appears mark the check box for the SATA device from the drive pool. After completing the selection, click on the “Submit” button to identify selected drive.

## 6.8 System Controls

### 6.8.1 System Config

To set the RAID controller system function, move the cursor to the main menu and click the “Raid System Function” link. The “Raid System Function” menu will show all items, then select the desired function.

Quick Function

RaidSet Functions

VolumeSet Functions

Physical Drives

System Controls

System Config

SNMP Configuration

View System/Zone Settings


Generate Test Event

Clear Event Buffer

Modify Password

Upgrade Firmware

Information



Areca Technology Corporation

System Configurations

System Beeper Setting	Enabled
Background Task Priority	Low(20%)
JBOD/RAID Configuration	RAID
Max SATA Mode Supported	SATA300+NCQ
HDD Read Ahead Cache	Enabled
Stagger Power On Control	0.7
Spin Down Idle HDD (Minutes)	Disabled
Empty HDD Shot LED	ON
HDD SMART Status Polling	Disabled
Auto Activate Incomplete Read	Disabled
Disk Capacity Truncation Mode	Multiples Of 100

☒ Confirm The Operation

SubmitReset

# WEB BROWSER-BASED CONFIGURATION

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- **System Beeper Setting**

The "System Beeper Setting" function is used to "Disabled" or "Enabled" the SATA RAID controller alarm tone generator.

- **Background Task Priority**

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

- **JBOD/RAID Configuration**

JBOD is an acronym for "Just a Bunch Of Disks". A group of hard disks in a RAID controller are not set up as any type of RAID configuration. All drives are available to the operating system as an individual disk. JBOD does not provide data redundancy. that is created by the concatenation of partitions on the disk. The OS can see all disks when this option is selected. It is necessary to delete a RAID set if the disks in that set are to be converted to JBOD mode.

- **Maximum SATA Mode Supported**

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

- **HDD Read Ahead Cache**

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



# WEB BROWSER-BASED CONFIGURATION

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## ● Stagger Power on

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

## ● Spin Down Idle HDD

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

## ● HDD SMART Status Polling

An external RAID enclosure has the hardware monitor in the dedicated backplane that can report HDD temperature status to the controller. However, PCI type controllers do not use backplanes if the drives are internal to the main server chassis. The type of enclosure cannot report the HDD temperature to the controller. For this reason, "HDD SMART Status Polling" was added to enable scanning of the HDD temperature function. It is necessary to enable "HDD SMART Status Polling" function before SMART information is accessible. This function is disabled by default.

## ● Disk Write Cache Mode

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

## ● Disk Capacity Truncation Mode

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

**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. The "Multiples Of 10G" truncates the number under tens. This makes

# WEB BROWSER-BASED CONFIGURATION

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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. The "Multiples Of 1G" truncates the fractional parts. This makes the same capacity for both of these drives so that one could replace the other.

**Disabled:** It does not truncate the capacity.

## 6.8.2 View Events/Mute Beeper

To view the SATA RAID controller's information, click on the "System Information" link. The SATA RAID controller 'System Events Information' screen appears.

Choose this option to view the system events information: Time, Device, Event Type, Elapse Time and Errors. The RAID system does not have a built-in real time clock. The time information is the relative time from the SATA RAID controller while it powered on.

## 6.8.3 Generate Test Event

Use this feature is to generate events for testing purposes.

## 6.8.4 Clear Events Buffer

Use this feature to clear the entire events buffer information.

## 6.8.5 Modify Password

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

**The manufacture default password is set to 0000.** The password option allows user to set or clear the SATA RAID controller's password protection feature. Once the password has been set,

# WEB BROWSER-BASED CONFIGURATION

the user can only monitor and configure the SATA RAID controller by providing the correct password.

The password is used to protect the SATA RAID controller from unauthorized entry. The controller will check the password only when entering the Main menu from the initial screen. The SATA RAID controller will automatically go back to the initial screen when it does not receive any command in 5 minutes. Do not use spaces when you enter the password, If spaces are used, it will lock out the user. To disable the password, leave the fields blank. Once the user confirms the operation and clicks the Submit button, the existing password will be cleared. Afterwhich, no password checking will occur when entering the main menu from the starting screen.

## 6.8.6 Update Firmware

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

## 6.9 Information

### 6.9.1 Raid Set Hierarchy

Use this feature to view the SATA RAID controller current RAID set, current volume set and physical disk configuration. Please reference the this chapter “Configuring Raid Sets and Volume Sets”

Ⓚ Quick Function

Ⓚ RaidSet Functions

Ⓚ VolumeSet Functions

Ⓚ Physical Drives


Ⓚ System Controls

Ⓚ Information

RaidSet Hierarchy

System Information

Hardware Monitor



Areca Technology Corporation

Raid Set Hierarchy

Raid Set	IDE Channels	Volume Set(ChId/Lun)	Volume State	Capacity
Raid Set # 00	Ch01	WD740ADEFD-00NLR0(0/0/0)	Normal	74.4GB
Raid Set # 01	Ch02	WD1500ADEFD-00NLR3(0/0/1)	Normal	150.0GB

IDE Channels

Channel	Usage	Capacity	Model
Ch01	Pass Through	74.4GB	WDC WD740ADEFD-00NLR0
Ch02	Pass Through	150.0GB	WDC WD1500ADEFD-00NLR3

## 6.9.2 System Information

To view the SATA RAID 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 SATA RAID 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.

## 6.9.3 Hardware Monitor

To view the RAID controller's hardware monitor information, move the mouse cursor to the main menu and click the "Hardware Monitor" link. The "Hardware Monitor Information" screen appears.

The "Hardware Monitor Information" provides the HDD temperature of the SATA RAID controller.

## Appendix A

### Upgrading Flash ROM Update Process

Since the SATA RAID controller features flash firmware, it is not necessary to change the hardware flash chip in order to upgrade the RAID firmware. The user can simply re-program the old firmware through the In-Band PCIe bus McRAID storage manager. New releases of the firmware are available in the form of a DOS file on the shipped CD or Areca's web site. The files available at the FTP site for each model contain the following files in each version:

ARCXXXXNNNN.BIN Software Binary Code (where "XXXX" refers to the model name and "NNNN" refers to the software code type)

ARCXXXBIOS.BIN :→ PCI card BIOS for system board using

ARCXXXBOOT.BIN :→ RAID controller hardware initialization

ARCXXXFIRM.BIN :→ RAID kernel program

ARCXXXMBR0.BIN:→ Master Boot Record for supporting Dual Flash Image in the SATA II RAID controller

README.TXT contains the history information of the software code change in the main directory. Read this file first to make sure you are upgrading to the proper binary file. Select the right file for the upgrade. Normally, user upgrades the ARCXXXXBIOS.BIN for system M/B compatibility and ARCXXXXFIRM.BIN for RAID function upgrades.

#### **Note:**

Please update all Binary Code (BIOS, BOOT and FIRM) before you reboot system. Otherwise, a mixed firmware package may hang the controller.

### Upgrading Firmware Through McRAID Storage Manager

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

# APPENDIX



1. To upgrade the RAID controller firmware, move the mouse cursor to "Upgrade Firmware" link. The "Upgrade The RAID System Firmware" screen appears.
2. Click "Browser". Look in the location to which the firmware upgrade software was downloaded. Select the file name and click "Open". **All files (BIOS, BOOT, FIRM and MBR0) can be updated through this function.**
3. Click "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 completed, a bar indicator will show "Firmware Has Been Updated Successfully"
6. After the new firmware has completed downloading, find a chance to restart the controller/computer for the new firmware to take effect.

The web browser-based McRAID storage manager can be accessed through the In-Band PCIe bus. The In-Band method uses the ArchHttp proxy server to launch the McRAID storage manager. The IP address can reference to chapter 5 Archhttp Proxy Server Installation.

From a remote pc, you can directly open a web browser and enter the IP address. Then enter user name and password to login and start your management. You can find the firmware update feature in the browser console: "System Controls".

## Upgrading Firmware Through nflash DOS Utility

Areca now offers an alternative means communication for the ARC-1200 SATA RAID controller – Upgrade the all files (BIOS, BOOT, FIRM and MBR0) without necessary system starting up to running the ArchHttp proxy server. The nflash utility program is a DOS application, which runs in the DOS operating system. Be sure of ensuring properly to communicate between ARC-1200 PCIe SATA RAID controller and nflash DOS utility. Please make a bootable DOS floppy diskette or UBS devices from other Windows operating system and boot up the system from those bootable devices.

### • Starting the nflash Utility

You do not need to short any jumper cap on running nflash utility. The nflash utility provides an on-line table of contents, brief descriptions of the help sub-commands. The nflash utility put on the <CD-ROM>\Firmware directory. You can run the <nflash> to get more detailed information about the command usage. Typical output looks as below:

```
A:\nflash
Raid Controller Flash Utility
V1.11 2007-11-8
Command Usage:
NFLASH FileName
NFLASH FileName /cn --> n=0,1,2,3 write binary to controller#0
FileName May Be ARC1210FIRM.BIN or ARC1210*
For ARC1210* Will Expand To ARC1210BOOT /FIRM/BIOS.BIN

A:\>nflash arc120~1.bin
Raid Controller Flash Utility
V1.11 2007-11-8
MODEL : ARC-1200
MEM FE620000 FE7FF000
File ARC120~1.BIN : >>*** => Flash OK
```

# APPENDIX

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**Note:**

Areca SAS and SATA II RAID controller firmware version 1.43 date: Feb 2007 and later has supported the ATA-8 spec for HDD microcode download, allowing customer using nflash DOS utility or web browser to upgrade ATA-8 spec for microcode download supported HDD's firmware connected with Areca's entire family RAID controllers without necessary removing any single drive and upgrade. Areca has provided one utility for customer to make the ATA-8 spec for microcode download drive's firmware for readable by Areca firmware.



## Appendix B

### SNMP Operation & Definition

#### Overview

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

#### SNMP Definition

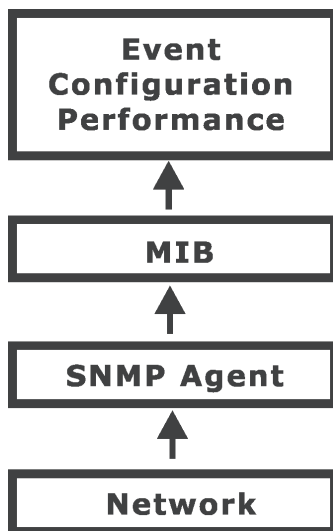
SNMP, an IP-based protocol, has a set of commands for getting the status of target devices. The SNMP management platform is called the SNMP manager, and the managed devices have the SNMP agent loaded. Management data is organized in a hierarchical data structure called the Management Information Base (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.

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## MIB Compilation and Definition File creation

Before the manager application accesses the SATA RAID controller, it is necessary 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.



## SNMP Installation

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

- Starting the firmware-embedded SNMP community configuration.
- Installing the SNMP Extension Agent on the server
- Installing the SNMP 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



The screenshot shows the Areca Technology Corporation web interface. On the left is a navigation menu with the following items: Quick Function, RAID Set Functions, Volume Set Functions, Physical Drives, System Controls, System Config, SNMP Configuration, View Events/Write Responder, Generate Test Event, Clear Event Buffer, Modify Password, Upgrade Firmware, and Information. The main content area is titled 'SNMP Community Configuration'. It contains a 'Community' input field, a 'Confirm The Operation' checkbox, and 'Submit' and 'Reset' buttons.

### ● Community Name

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

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

### SNMP Extension Agent Installation for Windows

You must have the administrative level permission to install SATA RAID software. This procedure assumes that the SATA RAID hardware and Windows are both installed and operational in your system.

To enable the SNMP agent for Windows, configure Windows for TCP/IP and SNMP services. The Areca SNMP Extension Agent file is ARCSNMP.DLL.

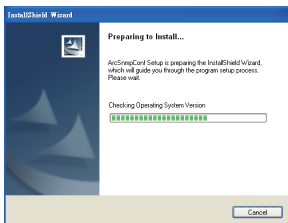
Screen captures in this section are taken from a Windows XP installation. If you are running another version of Windows, your screens may look different, but the Areca SNMP Extension Agent installation is essentially the same.

1. Insert the SATA RAID controller CD in the CD-ROM drive.

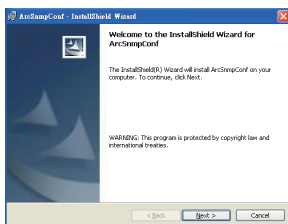
# APPENDIX

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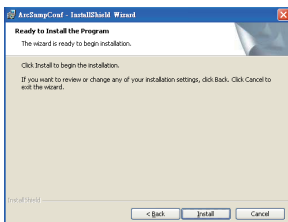
2. Run the setup.exe file that resides at: <CD-ROM>\packages\windows\http\setup.exe on the CD-ROM. (If SNMP service was not installed, please install SNMP service first.)



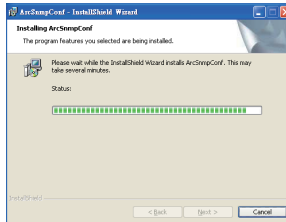
3. Click on the "Setup.exe" file then the welcome screen appears.



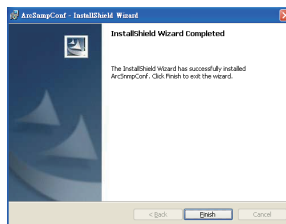
4. Click the "Next" button and then the "Ready Install the Program" screen appears. Follow the on-screen prompts to complete Areca SNMP Extension Agent installation.



5. A Progress bar appears that measures the progress of the Areca SNMP Extension Agent setup. When this screen complete, you have completed the Areca SNMP Extension Agent setup.



6. After a successful installation, the "Installshield Wizard Completed" dialog box of the installation program is displayed. Click the "Finish" button to complete the installation.



## Starting SNMP Trap Notification Configurations

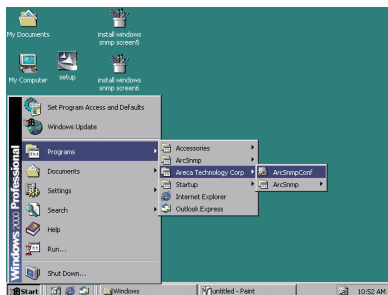
To start "SNMP Trap Notification Configurations", There have two methods. First, double-click on the "Areca Raid Controller".



Second, you may also use the "Taskbar Start/programs/Areca Technology Corp/ArcSnmpConf" menus shown below.

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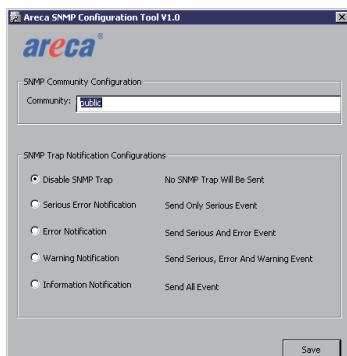


## SNMP Community Configurations

Please refer to the community name in this appendix.

## SNMP Trap Notification Configurations

The "Community Name" should be the same as firmware-embedded SNMP Community. The "SNMP Trap Notification Configurations" include level 1: Serious, level 2: Error, level 3: Warning and level 4: Information. The level 4 covers notification events such as initialization of the controller and initiation of the rebuilding process; Level 3 includes events which require the issuance of warning messages; Level 2 covers notification events which once have happen; Level 1 is the highest level, and covers events the need immediate attention (and action) from the administrator.



## SNMP Extension Agent Installation for Linux

You must have administrative level permission to install SATA RAID software. This procedure assumes that the SATA RAID hardware and Linux are installed and operational in your system.

For the SNMP Extension Agent Installation for Linux procedure, please refer to **<CD-ROM>\packages\Linux\SNMP\Readme** or download from **<http://www.areca.com.tw>**

## **SNMP Extension Agent Installation for FreeBSD**

You must have administrative level permission to install SATA RAID software. This procedure assumes that the SATA RAID hardware and FreeBSD are installed and operational in your system. For the SNMP Extension Agent Installation for FreeBSD procedure please refer to **<CD-ROM>\packages\FreeBSD\SNMP\Readme** or download from **<http://www.areca.com.tw>**

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## Appendix C

### Event Notification Configurations

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

#### A. Device Event

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



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

## B. Volume Event

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

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## C. RAID Set Event

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

## D. Hardware Monitor Event

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

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

**Note:**

It depends on models, not every model will encounter all events.

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## Appendix D

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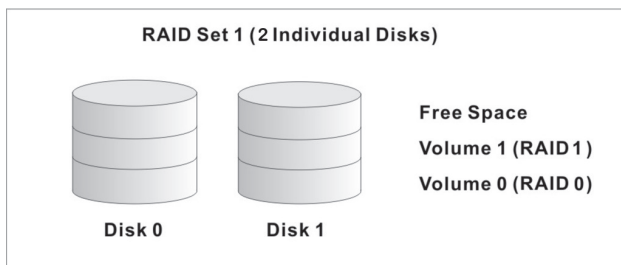
### RAID Concept

#### • RAID Set

A RAID set is a group of disks connected to a RAID controller. A RAID set contains one or more volume sets. The RAID set itself does not define the RAID level (RAID 0 and RAID 1); the RAID level is defined within each volume set. Therefore, volume sets are contained within RAID sets and RAID Level is defined within the volume set. If physical disks of different capacities are grouped together in a RAID set, then the capacity of the smallest disk will become the effective capacity of all the disks in the RAID set.

#### • Volume Set

Each volume set is seen by the host system as a single logical device (in other words, a single large virtual hard disk). A volume set will use a specific RAID level, which will require one or more physical disks (depending on the RAID level used). RAID level refers to the level of performance and data protection of a volume set. The capacity of a volume set can consume all or a portion of the available disk capacity in a RAID set. Multiple volume sets can exist in a RAID set. For the SATA 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 about to become part of a RAID set). If there are pre-existing RAID sets with available capacity and enough disks for the desired RAID level, then the volume set can be created in the existing RAID set of the user's choice.



In the illustration, volume 1 can be assigned a RAID level 1 of operation while volume 0 might be assigned a RAID level 0 of operation. Alternatively, the free space can be used to create volume 2, which could then be set to use RAID level 1.

## **Ease of Use Features**

### **• Online Array Roaming**

The SATA RAID controllers store RAID configuration information on the disk drives. The controller therefore protect the configuration settings in the event of controller failure. Array roaming allows the administrators the ability to move a completed RAID set to another system without losing RAID configuration information or data on that RAID set. Therefore, if a server fails, the RAID set disk drives can be moved to another server with an Areca RAID controller and the disks can be inserted in any order.

### **• Online Capacity Expansion**

Online Capacity Expansion makes it possible to add one or more physical drives to a volume set without interrupting server operation, eliminating the need to backup and restore after reconfiguration of the RAID set. When disks are added to a RAID set, unused capacity is added to the end of the RAID set. Then, data on the existing volume sets (residing on the newly expanded RAID set) is redistributed evenly across all the disks. A contiguous block of unused capacity is made available on the RAID set. The unused capacity can be used to create additional volume sets.

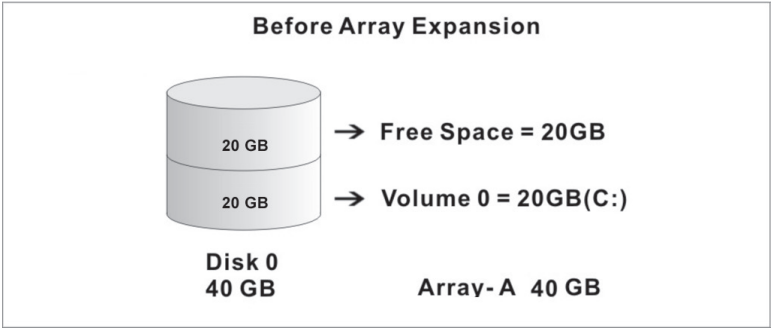
A disk, to be added to a RAID set, must be in normal mode (not failed), free (not spare, in a RAID set, or passed through to host) and must have at least the same capacity as the smallest disk capacity already in the RAID set.

Capacity expansion is only permitted to proceed if all volumes on the RAID set are in the normal status. During the expansion process, the volume sets being expanded can be accessed by the host system. In addition, the volume sets with RAID level 1, is protected against data loss in the event of disk failure(s). In

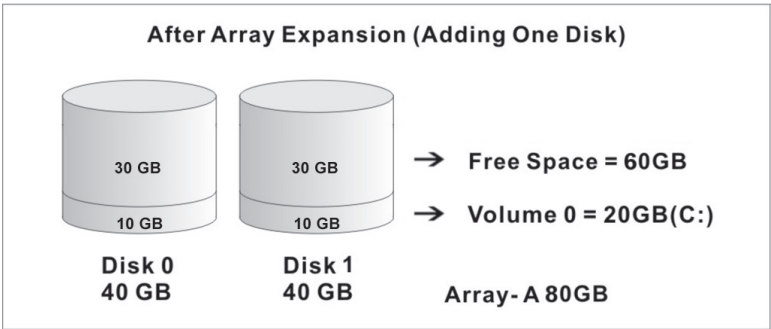
# APPENDIX

the case of disk failure, the volume set transitions from “migrating” state to “migrating+degraded” state. When the expansion is completed, the volume set would then transition to “degraded” mode. If a global hot spare is present, then it further transitions to the “rebuilding” state.

The expansion process is illustrated as following figure.



The SATA 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 set, with a different fault tolerance setting (if required by the user.)



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

## • **Online RAID Level and Stripe Size Migration**

For those who wish to later upgrade to any RAID capabilities, a system with Areca online RAID level/stripe size migration allows a simplified upgrade to any supported RAID level without having to reinstall the operating system.

The SATA RAID controllers 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 when additional physical disks are added to the SATA RAID controller. It is only possible to migrate to a higher RAID level by adding a disk; disks in an existing array can't be reconfigured for a higher RAID level without adding a disk.

Online migration is only permitted to begin, It all volumes to be migrated are in the normal mode. During the migration process, the volume sets being migrated are accessed by the host system. In addition, the volume sets with RAID level 1 is protected against data loss in the event of disk failure(s). In the case of disk failure, the volume set transitions from migrating state to (migrating+degraded) state. When the migration is completed, the volume set transitions to degraded mode.

## • **Online Volume Expansion**

Performing a volume expansion on the controller is the process of growing only the size of the latest volume. A more flexible option is for the array to concatenate an additional drive into the RAID set and then expand the volumes on the fly. This happens transparently while the volumes are online, but, at the end of the process, the operating system will detect free space at after the existing volume.

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Windows, NetWare and other advanced operating systems support volume expansion, which enables you to incorporate the additional free space within the volume into the operating system partition. The operating system partition is extended to incorporate the free space so it can be used by the operating system without creating a new operating system partition.

You can use the Diskpart.exe command line utility, included with Windows Server 2003 or the Windows 2000 Resource Kit, to extend an existing partition into free space in the dynamic disk. Third-party software vendors have created utilities that can be used to repartition disks without data loss. Most of these utilities work offline. Partition Magic is one such utility.

## High availability

### • Hot-Swap Disk Drive Support

The SATA controller chip includes a protection circuit that supports the replacement of SATA hard disk drives without having to shut down or reboot the system. A removable hard drive tray can deliver “hot swappable” fault-tolerant RAID solutions at prices much less than the cost of conventional SCSI hard disk RAID controllers. This feature provides advanced fault tolerant RAID protection and “online” drive replacement.

### • Auto Rebuilding

The failed disk drive must be replaced with a new disk drive so that the data on the failed drive can be automatically rebuilt and so that fault tolerance can be maintained.

The SATA RAID controllers will automatically restart the system and the rebuild process if the system is shut down or powered off abnormally during a reconstruction procedure condition.

When a disk is hot swapped, 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.

During the automatic rebuild process, system activity will contin-



ue as normal, however, the system performance and fault tolerance will be affected.

## • Adjustable Rebuild Priority

Rebuilding a degraded volume incurs a load on the RAID subsystem. The SATA RAID controllers allow the user to select the rebuild priority to balance volume access and rebuild tasks appropriately. The Background Task Priority is a relative indication of how much time the controller devotes to a background operation, such as rebuilding or migrating.

The RAID controller allows user to choose the task priority (Ultra Low (5%), Low (20%), Medium (50%), High (80%)) to balance volume set access and background tasks appropriately. For high array performance, specify an Ultra Low value. Like volume initialization, after a volume rebuilds, it does not require a system reboot.

## High Reliability

### • Hard Drive Failure Prediction

In an effort to help users avoid data loss, disk manufacturers are now incorporating logic into their drives that acts as an "early warning system" for pending drive problems. This system is called SMART. The disk integrated controller works with multiple sensors to monitor various aspects of the drive's performance, determines from this information if the drive is behaving normally or not, and makes available status information to RAID controller firmware that probes the drive and look at it.

The SMART can often predict a problem before failure occurs. The controllers will recognize a SMART error code and notify the administer of an impending hard drive failure.

### • Auto Reassign Sector

Under normal operation, even initially defect-free drive media can develop defects. This is a common phenomenon. The bit density and rotational speed of disks is increasing every year, and so are the potential of problems. Usually a drive can internally remap

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bad sectors without external help using cyclic redundancy check (CRC) checksums stored at the end of each sector.

SATA drives perform automatic defect re-assignment for both read and write errors. Writes are always completed - if a location to be written is found to be defective, the drive will automatically relocate that write command to a new location and map out the defective location. If there is a recoverable read error, the correct data will be transferred to the host and that location will be tested by the drive to be certain the location is not defective. If it is found to have a defect, data will be automatically relocated, and the defective location is mapped out to prevent future write attempts.

In the event of an unrecoverable read error, the error will be reported to the host and the location will be flagged as being potentially defective. A subsequent write to that location will initiate a sector test and relocation should that location prove to have a defect. Auto Reassign Sector does not affect disk subsystem performance because it runs as a background task. Auto Reassign Sector discontinues when the operating system makes a request.

## Data Protection

### • RECOVERY ROM

The SATA RAID controller firmware is stored on the flash ROM and is executed by the I/O processor. The firmware can also be updated through the PCIe bus 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.

## Appendix D

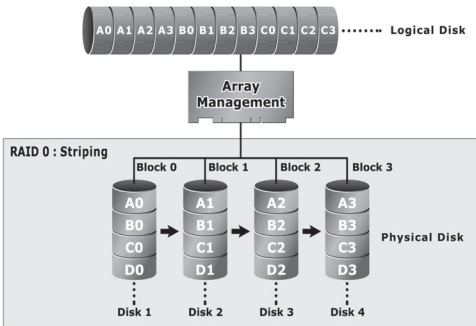
### Understanding RAID

RAID is an acronym for Redundant Array of Independent Disks. It is an array of multiple independent hard disk drives that provides high performance and fault tolerance. The SATA 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 should be based on the desired disk capacity, data availability (fault tolerance or redundancy), and disk performance. The following section discusses the RAID levels supported by the SATA RAID controller.

The SATA RAID controller makes the RAID implementation and the disks' physical configuration transparent to the host operating system. This means that the host operating system drivers and software utilities are not affected, regardless of the RAID level selected. Correct installation of the disk array and the controller requires a proper understanding of RAID technology and the concepts.

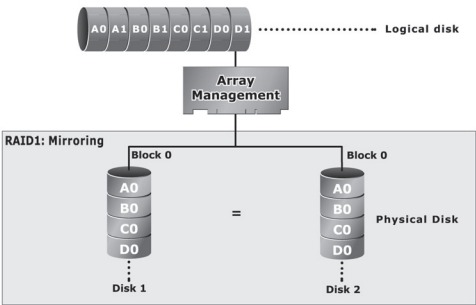
#### • RAID 0

RAID 0, also referred to as striping, writes stripes 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; the reliability of RAID Level 0 is less because the entire array will fail if any one disk drive fails, due to a lack of redundancy, the reliability of RAID Level 0 is less because the entire array will fail if any one disk drive fails.



## • RAID 1

RAID 1 is also known as “disk mirroring”; data written on one disk drive is simultaneously written to another disk drive. Read performance will be enhanced if the array controller can, in parallel, access 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. But at the cost of doubling the required data storage capacity.



- **JBOD**

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

- **Single Disk (Pass-Through Disk)**

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