

# Preface

## Notice

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## About this manual

Congratulations on your selection of the ACS-61000/61010. The card is monitored by a Java-based RAID GUI.

### INTENDED USER

This manual is designed and written for users installing and using RAID GUI. The intended user should have working knowledge of RAID planning and data storage.

### ORGANIZATION OF THE MANUAL

#### PART ONE: Introduction

Chapter 1: **Introduction** provides an overview of the card and its features.

#### PART TWO: Installing the card

Chapter 2: **Setting up RAID GUI** provides details of how to setting up your card and connecting to the RAID GUI.

#### PART THREE: Card Configurations

Chapter 3: **Card Connections** provides details of the connectors on the RAID card.

#### PART FOUR: Card BIOS and EFI

Chapter 4: The Card BIOS and EFI allows the user to configure a RAID array without using the RAIDGuard X GUI.

#### PART FIVE: Appendices

Appendix A: **Specifications** lists the technical details of the ACS-61000/61010 RAID card.

Appendix B: **Contact Us** lists contact details of Accusys business units around the world.

## Guide to conventions

Important information that users should be aware of is indicated with the following icons:



### Caution

*This icon indicates the existence of a potential hazard that could result in personal injury, damage to your equipment or loss of data if the safety instruction is not observed.*



### Note

*This icon indicates useful tips on getting the most from your RAID card.*

Important terms, commands and programs are put in **Boldface** font.

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# PART ONE

Introduction

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**Chapter 1****Introduction**

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This chapter introduces the features and capabilities of ACS-61000/61010. You will find:

- ⇒ A full introduction to your RAID card
- ⇒ Details of key features
- ⇒ A checklist of package contents
- ⇒ A checklist of what else you need to start installation
- ⇒ An overview of the RAID card

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**Overview**

The ACS 61000/61010 PCI Express to SATA II RAID adaptors provide the latest functionality and performance for Windows, Linux and MAC operating systems. And with a Java based GUI the RAIDGuard X server and client software offers improved functionality and manageability. Using the latest Intel XScale® 64-bit RISC processor the eXpeRAID family of adaptors supports up to 16 x SATA I/II disk drives making it ideal for applications that require high storage capacity and fast access such as video editing, digital surveillance, file servers and shared storage.

Using intelligent I/O processing and elaborate algorithms the card bypasses slow disk drives and rebuilds the data by sustaining a stable throughput and streamlining the data transfer therefore enabling the smooth handling of heavy loaded and time critical applications.

Data protection is one of the key features of the eXpeRAID adaptors. Not only do they protect against disk failure but also bad sectors using online recovery and reallocation. Disk scrubbing is available to fix the bad sectors and online data and parity refresh protects against data loss caused by media aging.

The RAIDGuard X management software supports the online changing of RAID configurations; quick configuration on any Java enabled platform; and with the next generation BIOS and Windows Storport driver it's future is guaranteed.

## Key Features

ACS-61000/61010 features the following:

- Multiple RAID levels: 0, 1, 0+1, 5, 6, and JBOD
- Up to 4 independent disk arrays
- Support 4~16 x SATA I/II drives
- RAID capacity partitioning: up to 16 slices
- Support up to 64 LUNs
- Variable stripe sizes, up to 256KB
- Selective initialization method with on-the-fly background initialization and performance evaluation
- Support over-2TB volumes
- Online RAID group expansion
- Online RAID level migration
- On-the-fly RAID initialization
- Snapshot for fast backup and restore
- Support write-back and write-through caching
- Selective and adaptive read/write optimization policies
- Fast read response by intelligently bypass slow drive
- Automatic drive insertion/removal detection and fast disk rebuilding
- Online bad block data recovery and reallocation
- Online disk scrubbing with data refresh and parity regeneration
- Disk health monitoring by S.M.A.R.T.
- NVRAM-based transaction log and auto parity resynchronization
- Array roaming and drive traveling with redundant on-disk meta data
- Array recovery to restore RAID configurations
- Dual firmware images for firmware recovery
- Support boot from RAID
- Enclosure components monitoring and control
- Optimized for multiple-stream video processing
- Support for Windows Mac OS and Linux
- Java-based GUI for remote management
- Reliable multi-lane SATA connectors
- RoHS compliant

### **SERIAL ATA (Serial advanced technology attachment)**

The ACS-61000/61010 is designed for use with the latest Serial ATA II hard disk drives. Serial ATA (often abbreviated as SATA or S-ATA) allows data transfer up to 3 Gbps and is compatible with older Parallel ATA standards. It has an additional advantage parallel ATA in that cables are thinner, so airflow within computer cases is less impeded, and can extend to one meter in length (against only 40 cm for parallel ATA).

### **PCI-EXPRESS X 8**

Developed by Intel in 2002 PCI-Express has been developed to match the speed of CPUs. It provides a serial communications channel that provides up to 2.5 Gbits/sec in each direction of a pair of wires. The 8 refers to the number of pairs of wires, therefore allowing a maximum of 20 Gbits/sec transfer.

### **FIRMWARE**

Appropriate firmware must be loaded into the card for it to function. ACS-61000/61010 and are shipped with firmware preloaded. Check the installation disk that came with the package to find a backup firmware copy. You can also periodically check the vendor's web site to find the latest firmware version for use with the card.

### **BIOS and EFI**

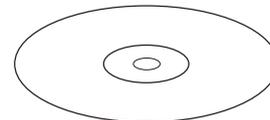
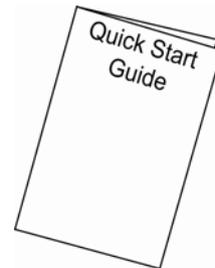
The ACS-61000/61010 contains an internal BIOS and EFI which can be used to configure a RAID Array instead of using the RAIDGuard X GUI. The BIOS and EFI are accessed as the card boots up and contains all the functionality of the RAIDGuard X GUI. The BIOS and EFI may be upgraded using the RAIDGuard X GUI, see [www.accusys.com.tw](http://www.accusys.com.tw) for upgrades.

## Before you begin

### WHAT'S IN THE BOX

Some vendors may ship certain components as standard, while other vendors treat the same component as optional. In its most basic configuration, your package should include the following:

- 1 x ACS-61000/61010 PCI-Express to SATA RAID Card
- 1~4 x Mini SAS x 4 multi-lane cable (50cm) by different model
- Quick Start Guide
- Installation CD (includes Application Software and Hardware user manuals)



**OPTIONAL ITEMS**

- Battery Backup Module (BBM) – the BBM stores the cached data in the event of power supply failure.



- LCD Control panel for seeing card status and advanced configuration.



**WHAT ELSE YOU NEED**

- LBA 48 bit Hard disk drives (HDDs) (different RAID levels requires different numbers of HDDs. See the RAIDGuard X User Manual to determine how many HDDs you require).
- Disk enclosure / disk storage locations and power connection for each disk drive.
- Host computer with spare PCI-e slot.
- Static grounding strap or electrostatic discharge (ESD) safe work area.



**Note**

*The hard drives in a RAID should match in size and speed. All drives in any array should be identical models with the same firmware versions. Arrays can use a minimum of 1GB HDDs, however, the smallest drive will determine the size of the array.*

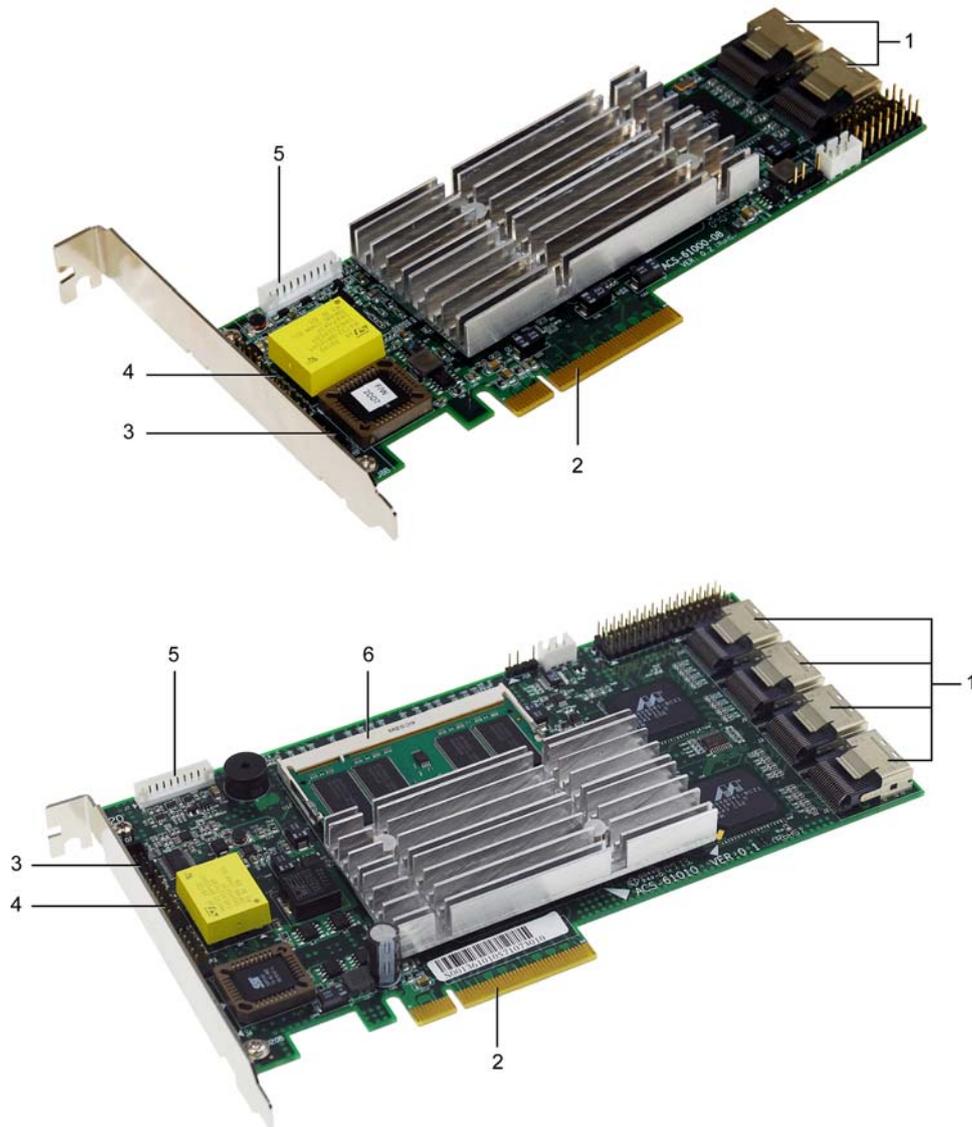


**Caution**

*The PCI-e slot on some motherboards is for graphics cards only. Check with the motherboards vendor for compatibility.*

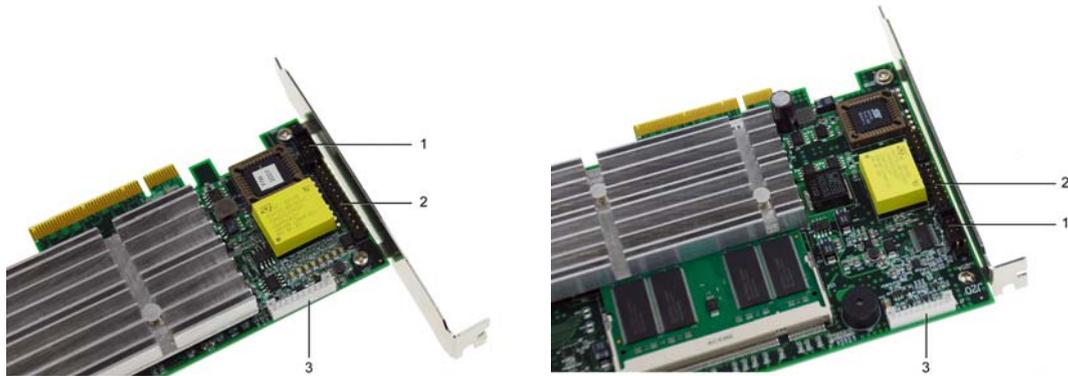
## Familiarizing yourself with the RAID card

### OVERVIEW



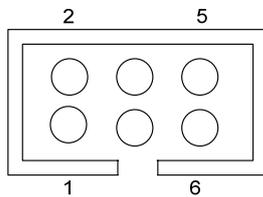
1. Mini SAS connectors
2. PCI-Express x 8 connector
3. Serial cable connector
4. LCD panel connector
5. Battery module connector
6. DDR memory connector

## PIN SETTINGS



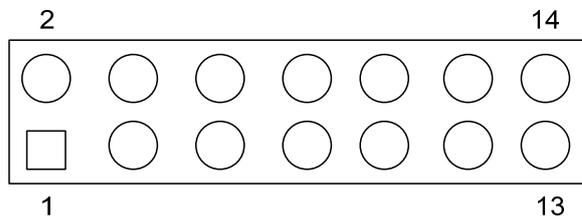
The PIN settings on the card are as follows:

### Serial Cable Connectors (1)

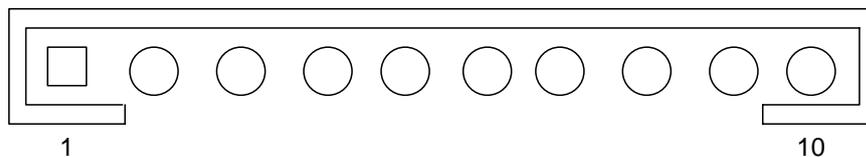


Connect the red strip of the serial connector cable to pin 1.

### LCD Panel Connector (2)



### Battery Module Connector (3)



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# PART TWO

Installing the Card

## Chapter 2

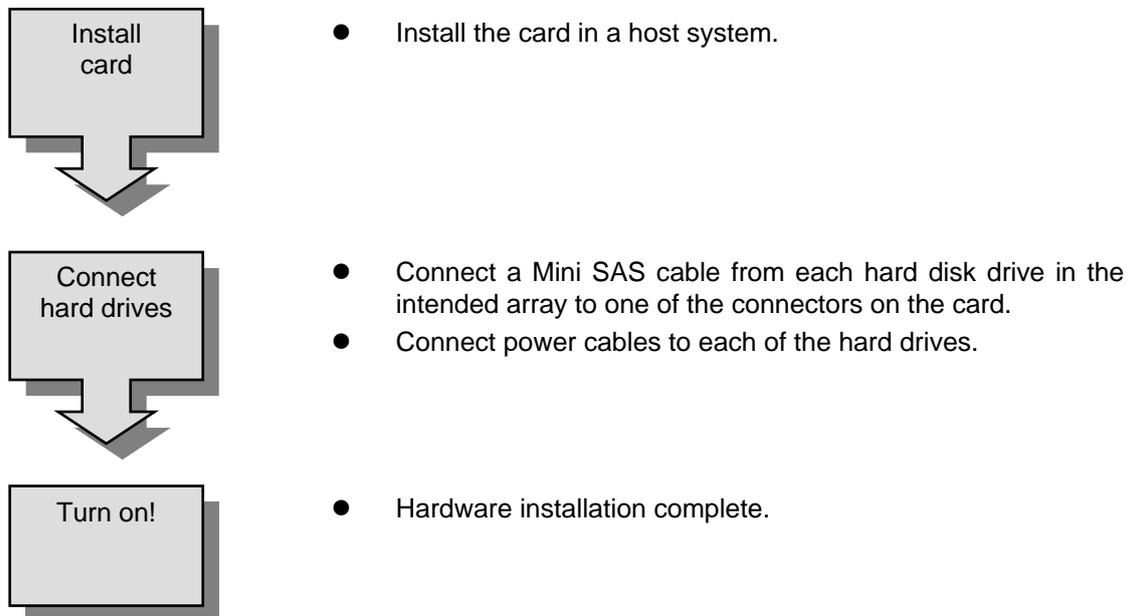
# Installation

This chapter presents:

- ⇒ Instructions on installing the card in the host system.
- ⇒ Instructions on installing hard drives.

## Installation flowchart

Installation of ACS-61000/61010 is simple. This chapter will lead you through the steps:



### Note

*This manual provides full installation and setup instructions for the ACS-61000/61010 RAID card.*

## Pre-installation notices



### Caution

*Before starting any kind of hardware installation, please ensure that all power switches have been turned off and all power cords disconnected to prevent personal injury and damage to the hardware.*



### Caution

*To avoid overheating, ACS-61000/61010 should be installed in a well-ventilated area and in such a way that sufficient airflow is maintained across the card chips.*



### Caution

*Static electricity can damage electronic components. To guard against such damage:*

*Work in a static-free environment*

*Wear a grounded anti-static wrist strap*

*Store uninstalled components in anti-static bags*

*Handle PCBs by their edges and avoid touching chips and connectors.*



### Caution

*Environmental requirements*

*Operating Temperature: 0°C to 50°C (32°F to 122°F)*

*Storage Temperature: -20°C to 70°C (-4°F to 158°F)*

*Operating Humidity: 5-85%, non-condensing*

*Storage Humidity: 5-95%, non-condensing*

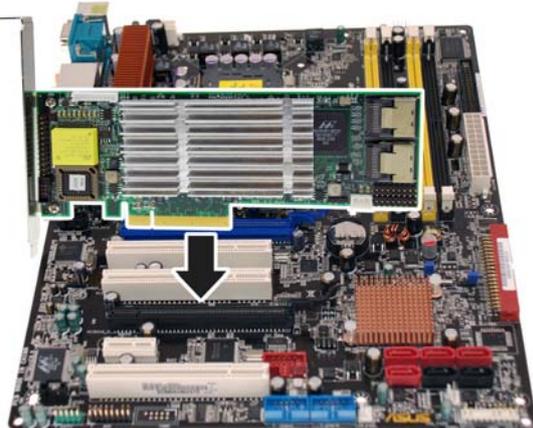
## Card Installation



### Caution

*Read the pre-installation notices earlier in this chapter before proceeding.*

1. Remove the blanking plate from the PCI-e slot.
2. Position the connector of the card over the expansion slot.
3. Press the connector of the card gently but firmly into the expansion slot until it is correctly and securely seated.
4. Secure the metal bracket of the card to the system case with a screw.
5. Go to the **Hard drive connection**.



### Note

*Many mother boards only come with 1 PCI-Express interface, before installation ensure there is one free.*

## Hard Drive Connection

1. Attach Mini SAS cables to the connectors on the card. One cable can control a maximum of 4 HDDs.
2. Install the disks in the desired location eg within the system case or within an independent disk rack.
3. Connect the other end of each cable to the connectors on each of the hard drives.
4. Attach a power connector to each drive, either from the host system or from an independent power source.



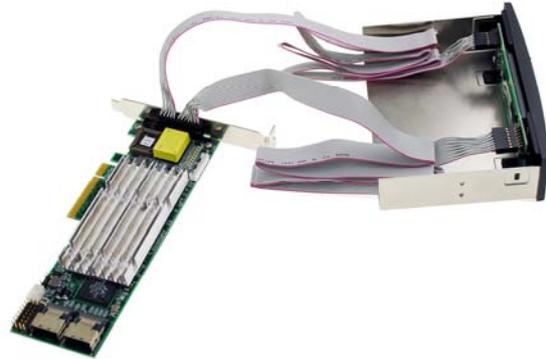
## LCD Panel (optional ) Installation



### Caution

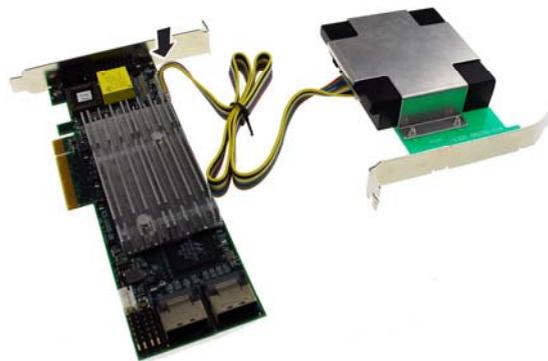
*Read the pre-installation notices earlier in this chapter before proceeding.*

1. Remove or open the system case to allow access to the 5<sup>1/4"</sup> drive bay you are going to use for the LCD panel.
2. Remove the blanking plate from this slot.
3. With the cables connected to the back of the LCD panel, slide the panel into the system case.
4. Secure the LCD panel using screws on either side.
5. Connect the cables to the card.
6. Go to the **Card Installation**.



## Battery Backup Module (Optional) Installation

1. Open the case of the host computer and remove a blanking plate from the rear.
2. Connect the cables of the BBM to the 61000/61010 card, as shown.
3. Secure the BBM to the space left by the blanking plate.
4. Close the case.



### Note

*The BBM is approximately 2cm high; ensure that your computer case has sufficient room.*

# PART THREE

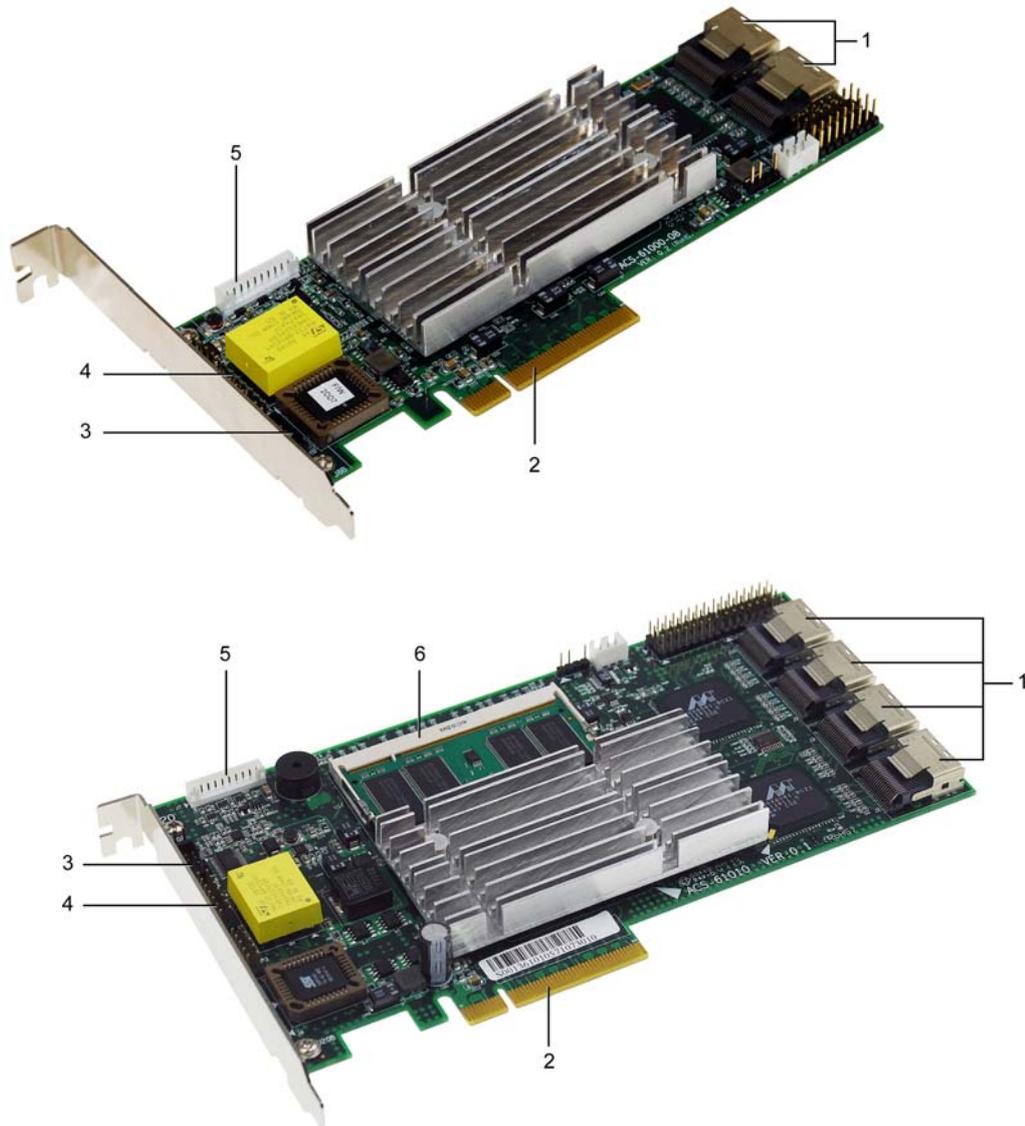
**Card Configurations**

Chapter 3

# Card Connections

This chapter details the usage of the connectors on the ACS-61000/61010 cards.

In addition to the ports used for connecting to HDDs; the ACS-61000/61010 also includes connectors for external devices.



1. Mini SAS connectors
2. PCI-Express x 8 connector
3. Serial cable connector
4. LCD panel connector
5. Battery backup module connector
6. DDR memory connector

### MINI SAS CONNECTORS (1)

Used for connecting the interface cables to Hard Disk Drives. See **Part 2 Hard Drive Connection**.

### PCI-EXPRESS X 8 CONNECTOR (2)

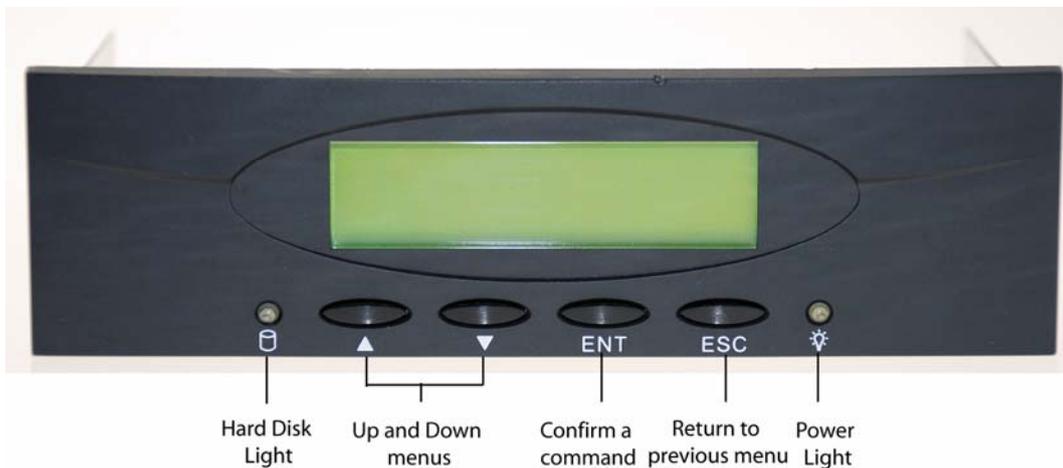
Used for connecting the card into the server. See **Part 2 Card Installation**.

### SERIAL CONNECTOR PORT (3)

The serial connectors (2 supplied) allow engineers to configure the card from a terminal connection. Since this requires specialized knowledge it is recommended that the included GUI is used.

### LCD PANEL CONNECTOR (4)

The LCD Panel and connector (not supplied) enable you to configure the card without using the BIOS or RAIDGuard X GUI.



Follow the instructions below to use the LCD panel:

1. Use the up and down buttons to cycle through the menus.
2. Press the **ENT** button to access the menus and confirm a command.
3. Press the **ESC** button to return to the previous menu.

### BATTERY CONNECTOR PORT (5)

The battery connector port is used to attach a ACS-1161 or ACS-1162 battery backup module (optional). In the event of the PSU failing on the server during saving and transmission of data the module will keep the data in the cache memory until the card resume its work. The BBM occupies 1 rear blanking slot and once charged the BBM will last for more than 72 hours (on board memory).

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# PART FOUR

Card BIOS and EFI

## Chapter 4

## BIOS

This chapter details the usage of the BIOS on the ACS-61000/61010.

The BIOS functionality is similar to that of the RAIDGUARD X application. Below is a menu tree detailing the menu structure of the BIOS.

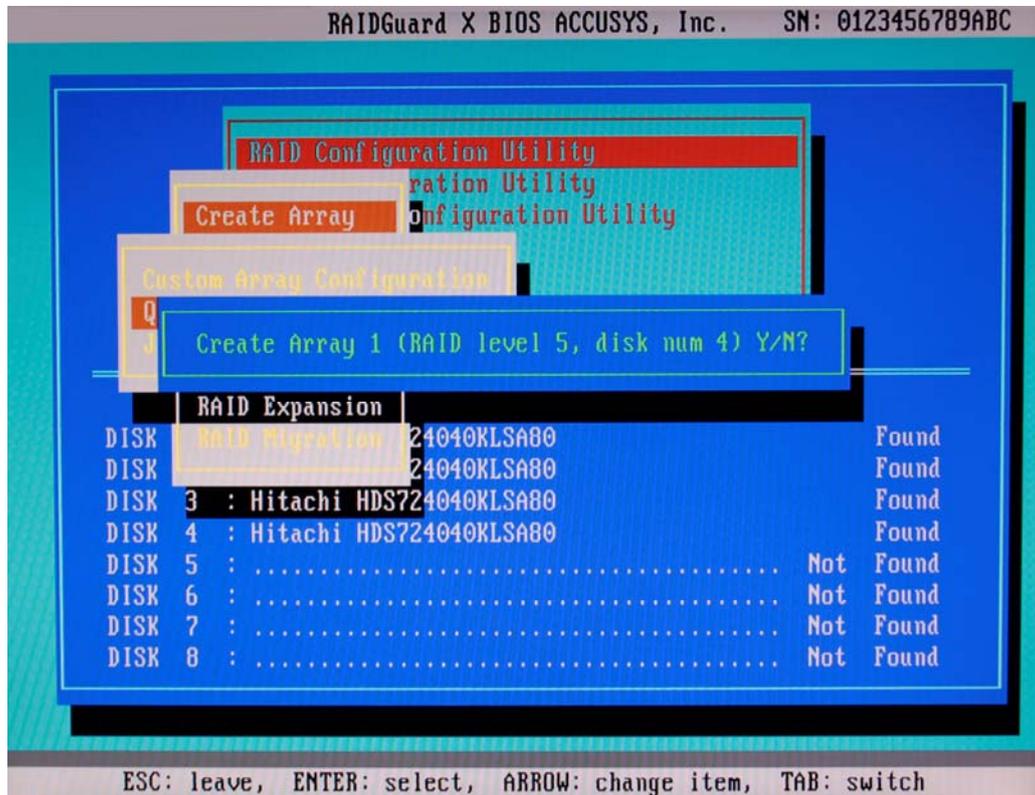
1. Start the server and watch the screen. When it gets to the position shown below press **Enter**.

```
Copyright 1996-2007 Accusys, Inc. All rights reserved.
RAIDGuard X BIOS ver B.11
Waiting for the controller to be ready!
-----
ACS6xxxx(Lun 0) ... found
Press < Enter> to enter BIOS menu .....
...._
```

2. Enter the password (the default is 00000000 (8 zeros) and press **Enter**.

## QUICK ARRAY CONFIGURATION

1. For first time use go **RAID Configuration > Create Array > Quick Array Configuration**. The BIOS will recognize how many drives are installed and provide the best solution. Type **Y** to begin configuration.

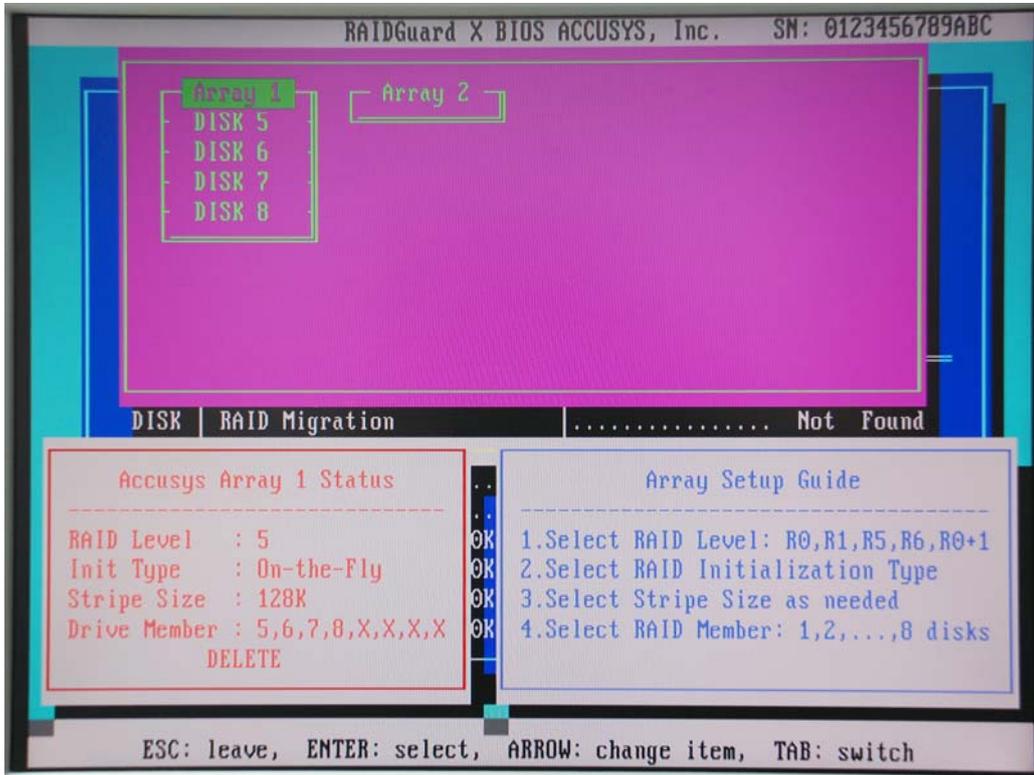


### Note

1. If there are only 2 disks installed the default RAID array is 0 (zero).
2. If there are more than 2 disks the default RAID array is 5.

### CUSTOM ARRAY CONFIGURATION

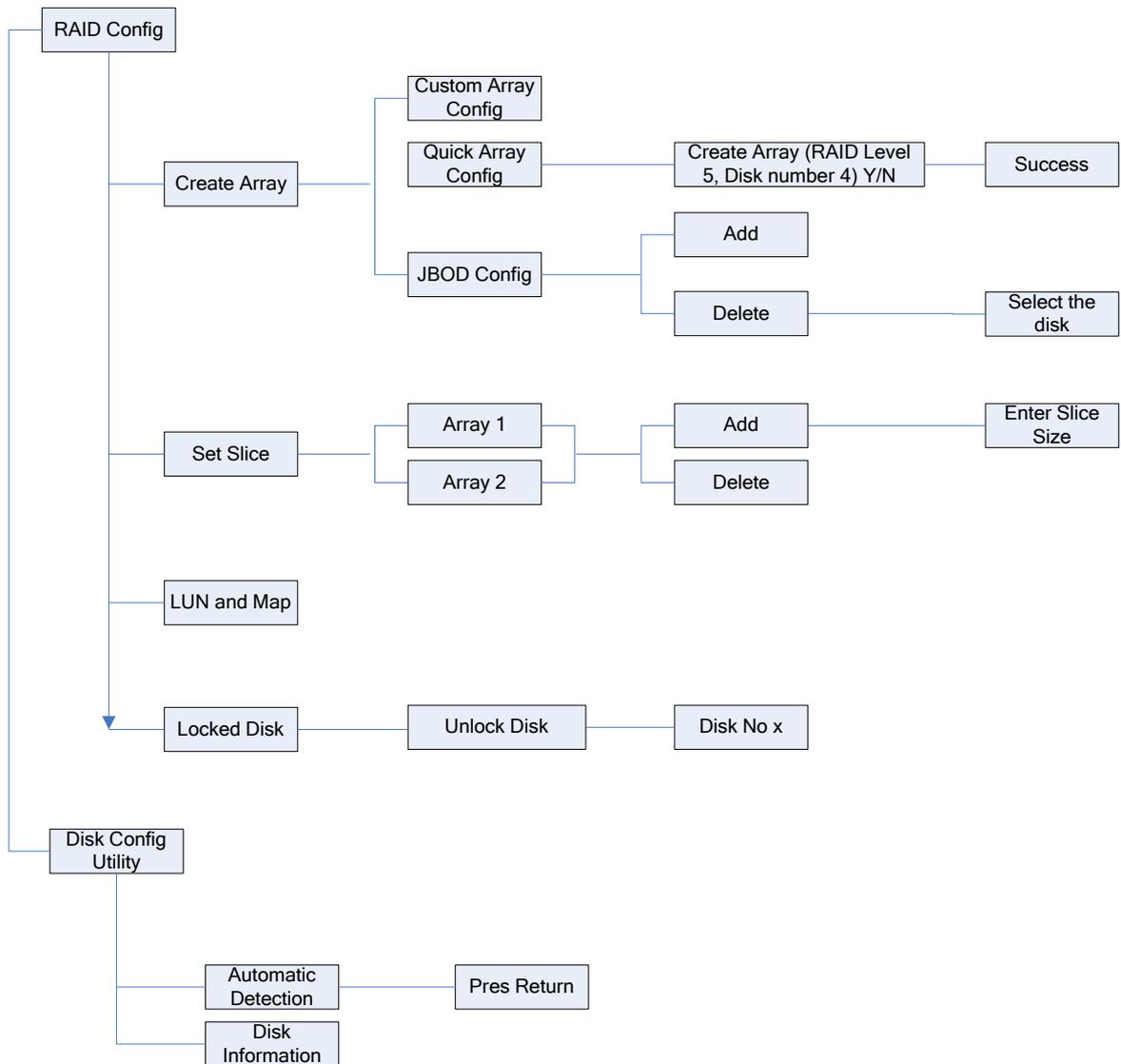
1. To change the details of an Array go to **RAID Configuration > Create Array > Custom Array Configuration**. See the screen below for configuration details.
2. Use the **Tab** button to switch between windows.

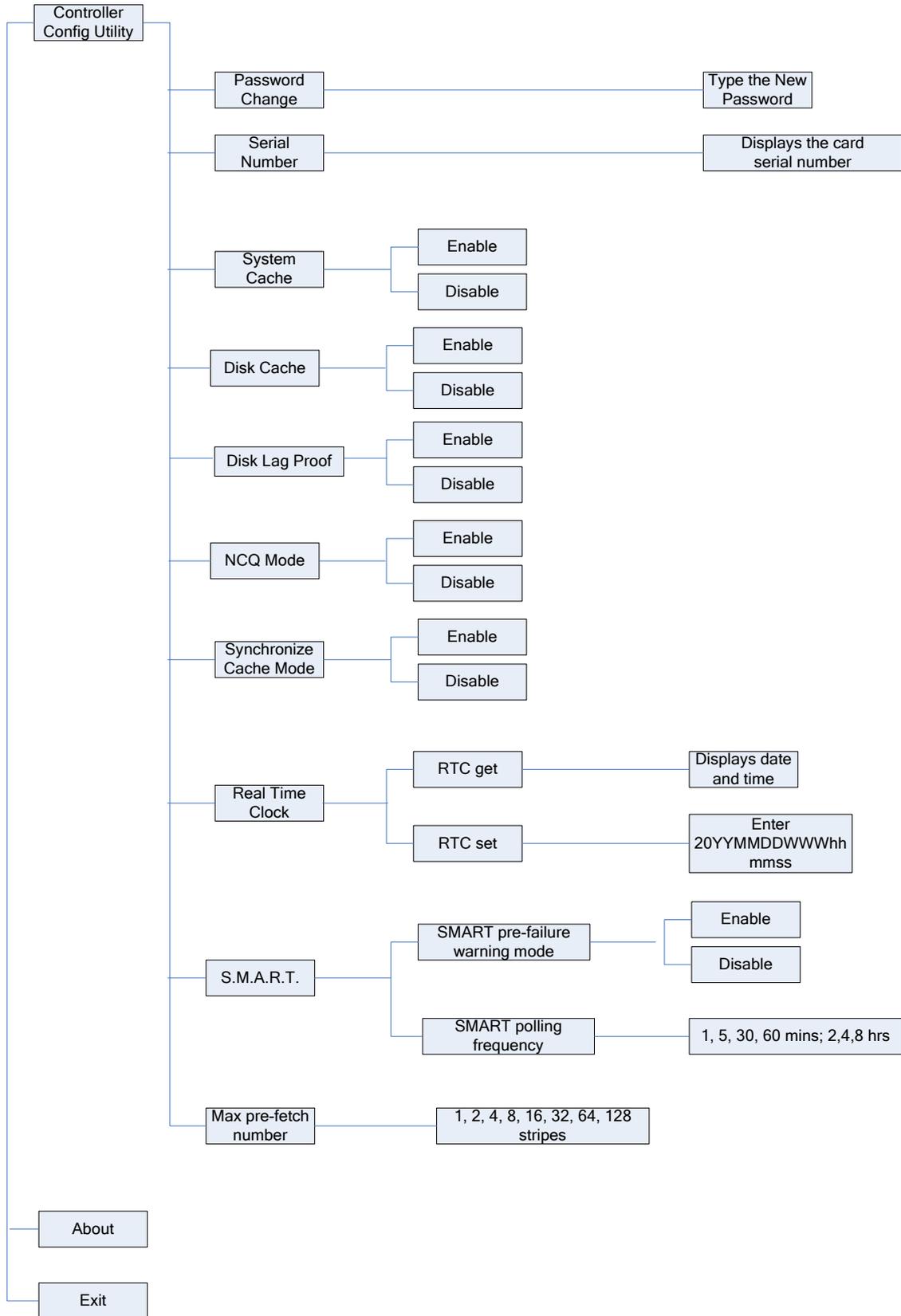


All other features are accessible through the RAIDGuard X application supplied with the card. See the supplied manual for details on how to use these functions.

## BIOS Menu Structure

The BIOS menu structure details how the commands in the BIOS relate to each other. The BIOS manages the same information as the RAIDGuard X application, see it's user manual for further details on these functions.





## BIOS Menu

The menu below gives brief information about the functions of the BIOS menu, for further details see the RAIDGuard X user manual.

<b>RAID Config</b>	
Create Array	Quickly create and array, administer the details of a current and array and configure a JBOD
Set Slice	Add and delete slices
LUN and Map	Display details and sets LUNs and Maps
Locked Disk	Unlock locked disks
Refresh Array	Refresh an array to improve performance
RAID Checking	Check that the RAID is functioning correctly
RAID Expansion	Expand the disks of an array
RAID Migration	Migrate an array from one RAID type to another eg from RAID 5 to RAID 1
<b>Disk Config Utility</b>	
Automatic Detection	Detects installed disks
Disk Information	Displays manufacturer and speed details of the installed disks
<b>Controller Config Utility</b>	
Password Change	Change the BIOS password
Serial Number	Display the serial number of the RAID card
System Cache	Activate and disable the system cache
Disk Cache	Activate and disable disk caching
Disk Lag Proof	Activate and disable disk lag proof mode
NCQ Mode	Activate and disable NCQ mode
Synchronize Cache Mode	Activate and disable synchronize cache mode
Real Time Clock	Display and set the BIOS clock
S.M.A.R.T.	Activate and disable S.M.A.R.T. warnings and polling frequency
Max pre-fetch number	Set the maximum number of stripes that can be pre-fetched by the array
<b>About</b>	Displays the BIOS version and company information
<b>Exit</b>	Exits the BIOS

# PART FIVE

Appendices

## Appendix A

## Specifications

<b>CPU</b>	Intel 80333
PCI Express	One PCI-e x 8
PCI	64-bit PCIX-133
R6 support	Yes
<b>Disk</b>	
Disk Interface	SATA II/SATA
Disk Channel	4~16 HDDs, 1~4 internal mini SAS connector
Disk Interface	Chip Marvell 6081 x 1~2
<b>Host</b>	
Host Channel	PCI-e x 4 or x 8 lane from PC.
<b>Memory (ACS-61000)</b>	
Memory type	<b>On board</b> DDR 2 memory chip
Memory size	256MB with 64-bit DDR II 400 with ECC
<b>Memory (ACS-61010)</b>	
Memory type	DDR SODIMM
Memory size	64MB ~ 2 GB (with or without ECC)
SDRAM type	128/256/512 Mbit and 1Gbit chip density
<b>User Interface (option)</b>	
LCD Interface	One LCD panel - 2 lines by 16 characters, one connector on HBA card.
Button Interface	UP, Down, ESC, Enter, one connector on HBA card
<b>Battery backup interface (option)</b>	Yes, one on-board connector support
Fan support	Yes, 1 fan connector, support +12V fan
<b>Terminal Port</b>	For users messages, out-band API
<b>Disk status LED</b>	For disk fail and access LED
Connector	Two 2x8 pin connector without housing
<b>Dimensions</b>	Board size 187.7mm(L) x 68.9mm(H)
PCB thickness	1.6 mm
<b>Operating parameters</b>	
Operating Temperature	0°C ~50°C
Operating Humidity	5%~85%, Non-condensing
Storage Humidity	5%~95%
Storage Temperature	-20°C ~70°C

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