

Preface

Notice

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Manual version 1.0

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About this manual

Congratulations on your selection of the ACS-61100. 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 users to configure a RAID array without using the RAIDGuard X GUI.

Chapter 5: The optional LCD panel provides another way to configure the card BIOS and EFI.

PART FIVE: Appendices

Appendix A: **Specifications** lists the technical details of the ACS-61100 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

Chapter 1**Introduction**

This chapter introduces the features and capabilities of ACS-61100. 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

Overview

The ACS 61100 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 24 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 its future is guaranteed.

Key Features

ACS-61100 features the following:

- Multiple RAID levels: 0, 1, 0+1, 5, 6, and JBOD
- Up to 4 independent disk arrays
- Support 12~24 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-61100 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 additional advantages over parallel ATA regarding the cables used: they are thinner, so airflow within computer cases is less impeded, and they can be up to one meter in length (compared to 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 of up to 2.5 Gbits/sec in each direction of a pair of wires. The 8 refers to the number of pairs of wires, so PCI-Express X 8 therefore allows a maximum of 20 Gbits/sec transfer.

FIRMWARE

Appropriate firmware must be loaded into the card for it to function. The ACS-61100 is 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-61100 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 for upgrades.

SGPIO

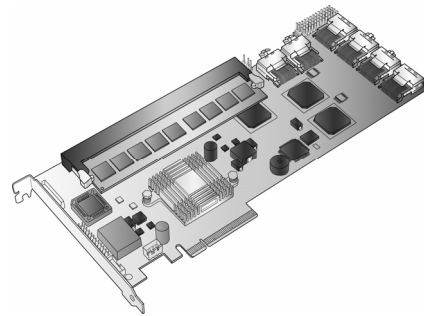
The ACS-61100 uses the SGPIO (Serial General Purpose Input Output) bus to monitor drive status and control LEDs efficiently. The SGPIO standard is maintained by the SFF Committee.

Before you begin

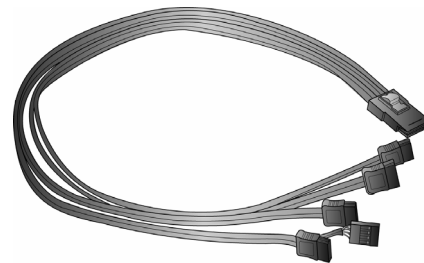
WHAT'S IN THE BOX

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

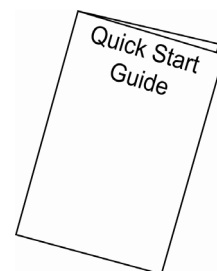
- 1 x ACS-61100 PCI-Express to SATA RAID Card



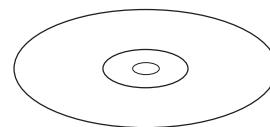
- 6 x Mini Multi-Lane iPass cables (50cm), including SGPIO connector.



- Quick Start Guide

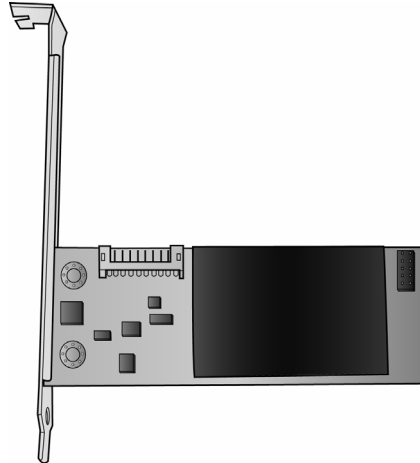


- Installation CD (includes Application Software and Hardware user manuals)

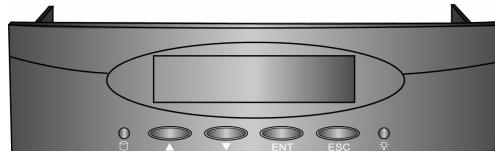


OPTIONAL ITEMS

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



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

**WHAT ELSE YOU NEED**

- LBA 48 bit Hard disk drives (HDDs) (different RAID levels require 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**

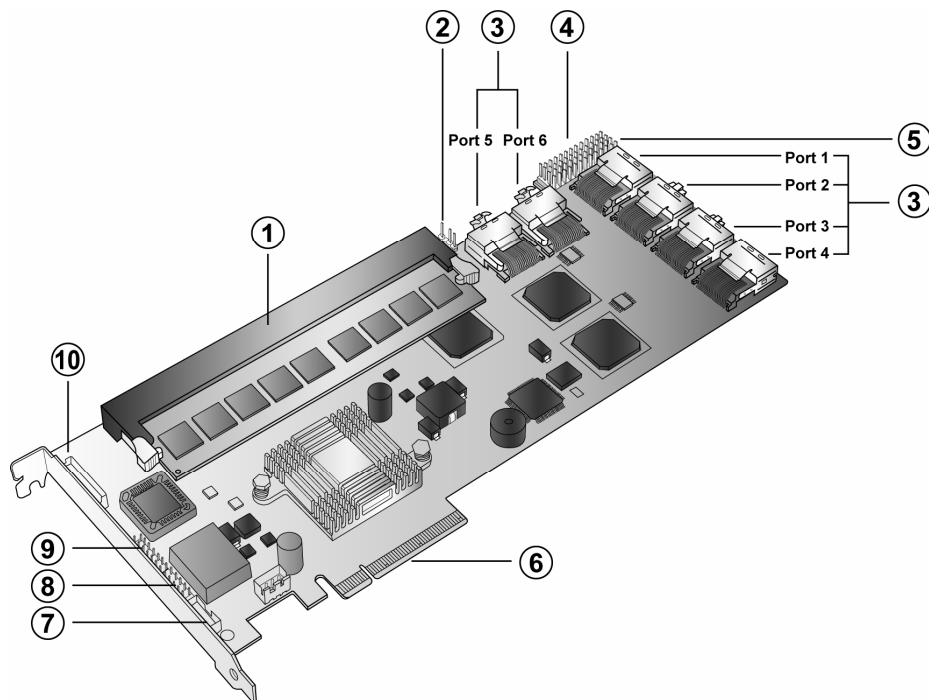
The hard drives in a RAID should match in size and speed. All drives in any array should be identical models with the same firmware versions. Arrays can use a minimum of 1GB HDDs, however, the smallest drive will determine the size of the array.

**Caution**

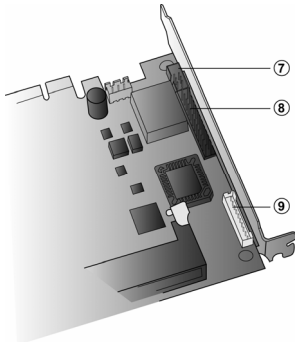
The PCI-e slot on some motherboards is for graphics cards only. Check with the motherboards vendor for compatibility.

Familiarizing yourself with the RAID card

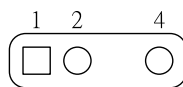
OVERVIEW



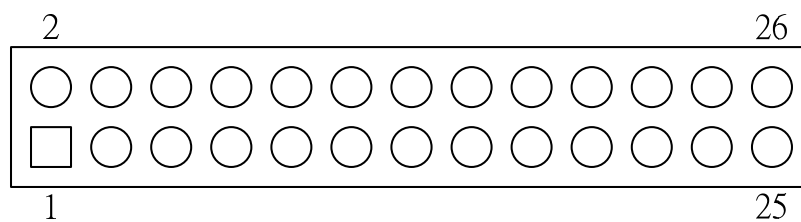
1. DDRII memory connector
2. I2C connector
3. Mini SAS connectors
4. Disk access LED connector
5. Disk fault LED connector
6. PCI-Express x 8 connector
7. Serial port connector
8. Button port connector
9. LCD panel connector
10. Battery module connector

PIN SETTINGS

The pin settings on the card are as follows:

I2C Connector (2)

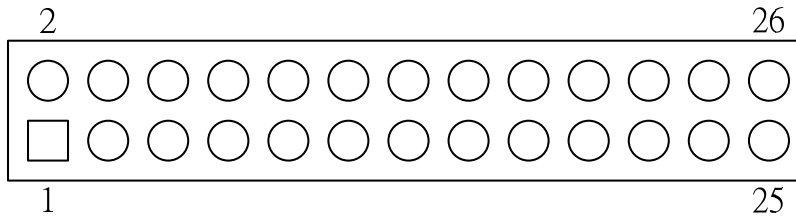
Pin definition:	Pin 1	SCL
	Pin 2	SDA
	Pin 3	NC
	Pin 4	GND

Disk Access LED Connector (4)

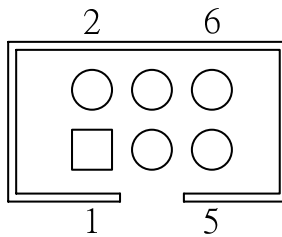
Pin definition:	Pin 1	GND
	Pin 2	GND
	Pin 3	HD_ACC_LED#0
	Pin 4	HD_ACC_LED#1
	Pin 5	HD_ACC_LED#2
	Pin 6	HD_ACC_LED#3
	Pin 7	HD_ACC_LED#4
	Pin 8	HD_ACC_LED#5
	Pin 9	HD_ACC_LED#6
	Pin 10	HD_ACC_LED#7
	Pin 11	HD_ACC_LED#8
	Pin 12	HD_ACC_LED#9
	Pin 13	HD_ACC_LED#10
	Pin 14	HD_ACC_LED#11
	Pin 15	HD_ACC_LED#12
	Pin 16	HD_ACC_LED#13
	Pin 17	HD_ACC_LED#14
	Pin 18	HD_ACC_LED#15

	Pin 19	HD_ACC_LED#16
	Pin 20	HD_ACC_LED#17
	Pin 21	HD_ACC_LED#18
	Pin 22	HD_ACC_LED#19
	Pin 23	HD_ACC_LED#20
	Pin 24	HD_ACC_LED#21
	Pin 25	HD_ACC_LED#22
	Pin 26	HD_ACC_LED#23

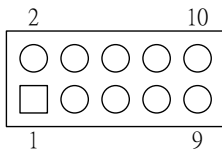
Disk fault LED Connector (5)



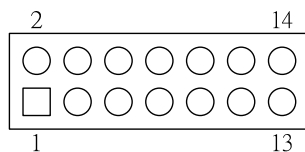
Pin definition:	Pin 1	GND
	Pin 2	GND
	Pin 3	HD_FAULT_LED#0
	Pin 4	HD_FAULT_LED#1
	Pin 5	HD_FAULT_LED#2
	Pin 6	HD_FAULT_LED#3
	Pin 7	HD_FAULT_LED#4
	Pin 8	HD_FAULT_LED#5
	Pin 9	HD_FAULT_LED#6
	Pin 10	HD_FAULT_LED#7
	Pin 11	HD_FAULT_LED#8
	Pin 12	HD_FAULT_LED#9
	Pin 13	HD_FAULT_LED#10
	Pin 14	HD_FAULT_LED#11
	Pin 15	HD_FAULT_LED#12
	Pin 16	HD_FAULT_LED#13
	Pin 17	HD_FAULT_LED#14
	Pin 18	HD_FAULT_LED#15
	Pin 19	HD_FAULT_LED#16
	Pin 20	HD_FAULT_LED#17
	Pin 21	HD_FAULT_LED#18
	Pin 22	HD_FAULT_LED#19
	Pin 23	HD_FAULT_LED#20
	Pin 24	HD_FAULT_LED#21
	Pin 25	HD_FAULT_LED#22
	Pin 26	HD_FAULT_LED#23

Serial Port Connector (7)

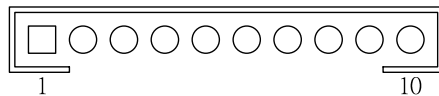
Pin definition:	Pin 1	U0_RXD
	Pin 2	U1_RXD
	Pin 3	U0_TXD
	Pin 4	U1_TXD
	Pin 5	GND
	Pin 6	GND

Button Port Connector (8)

Pin definition:	Pin 1	VCC
	Pin 2	GND
	Pin 3	PAN3
	Pin 4	PAN1
	Pin 5	PAN4
	Pin 6	PAN2
	Pin 7	NC
	Pin 8	GND
	Pin 9	NC
	Pin 10	GND

LCD Panel Connector (9)

Pin definition:	Pin 1	GND
	Pin 2	VCC
	Pin 3	LCD_RS
	Pin 4	LCD_VO
	Pin 5	LCD_E
	Pin 6	LCD_RW
	Pin 7	LCD_D1
	Pin 8	LCD_D0
	Pin 9	LCD_D3
	Pin 10	LCD_D2
	Pin 11	LCD_D5
	Pin 12	LCD_D4
	Pin 13	LCD_D7
	Pin 14	LCD_D6

Battery Module Connector (10)

Pin definition:	Pin 1	BAT_V
	Pin 2	NC
	Pin 3	BAT_DETECT#
	Pin 4	SDA
	Pin 5	SCL
	Pin 6	+12V
	Pin 7	GND
	Pin 8	GND
	Pin 9	GND
	Pin 10	+12V

PART TWO

Installing the Card

Chapter 2

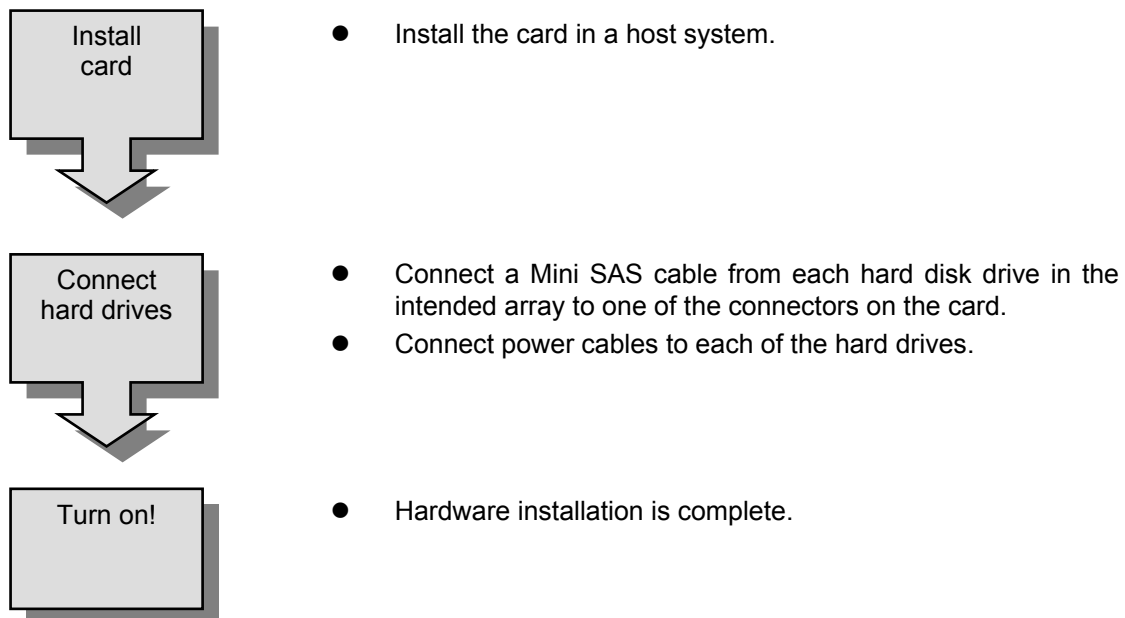
Installation

This chapter presents:

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

Installation flowchart

Installation of ACS-61100 is simple. This chapter will lead you through the steps:



Note

This manual provides full installation and setup instructions for the ACS-61100 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-61100 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: 5°C to 50°C (41°F to 122°F)

Storage Temperature: -40°C to 70°C (-40°F to 158°F)

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

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

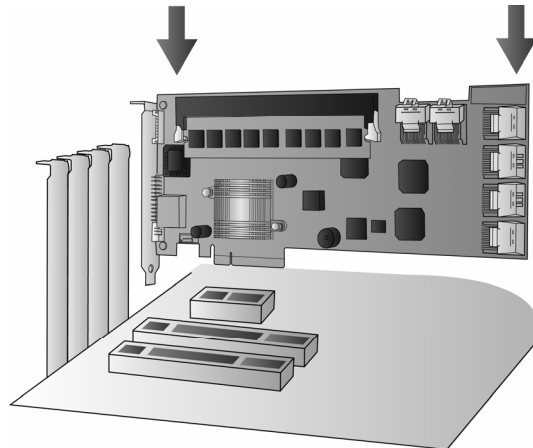
Card Installation



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**.

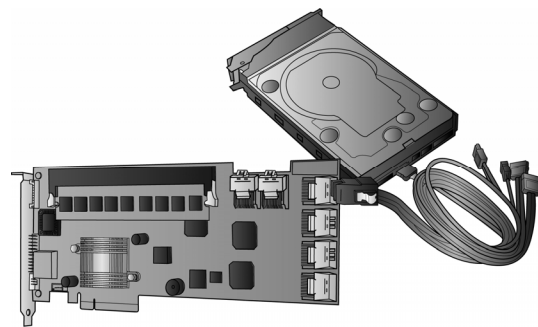


Note

Many mother boards only come with one 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, for example 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.



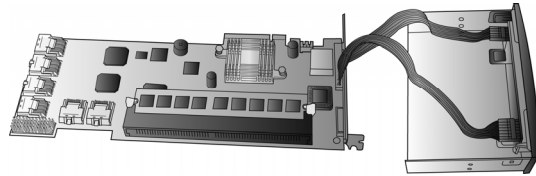
LCD Panel (optional) Installation



Caution

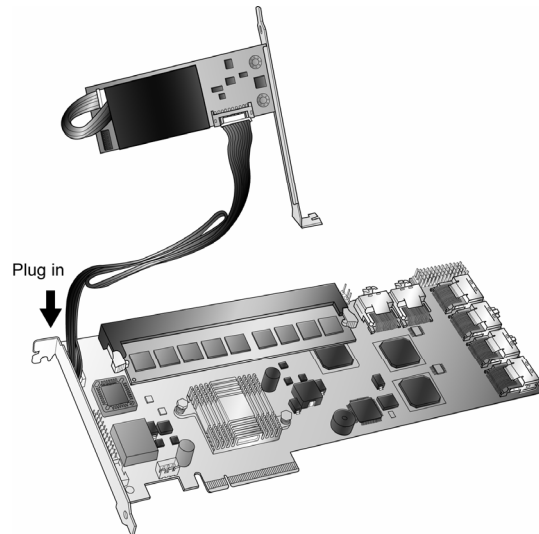
Read the pre-installation notices earlier in this chapter before proceeding.

1. Remove or open the system case to allow access to the 5 1/4" 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 61100 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

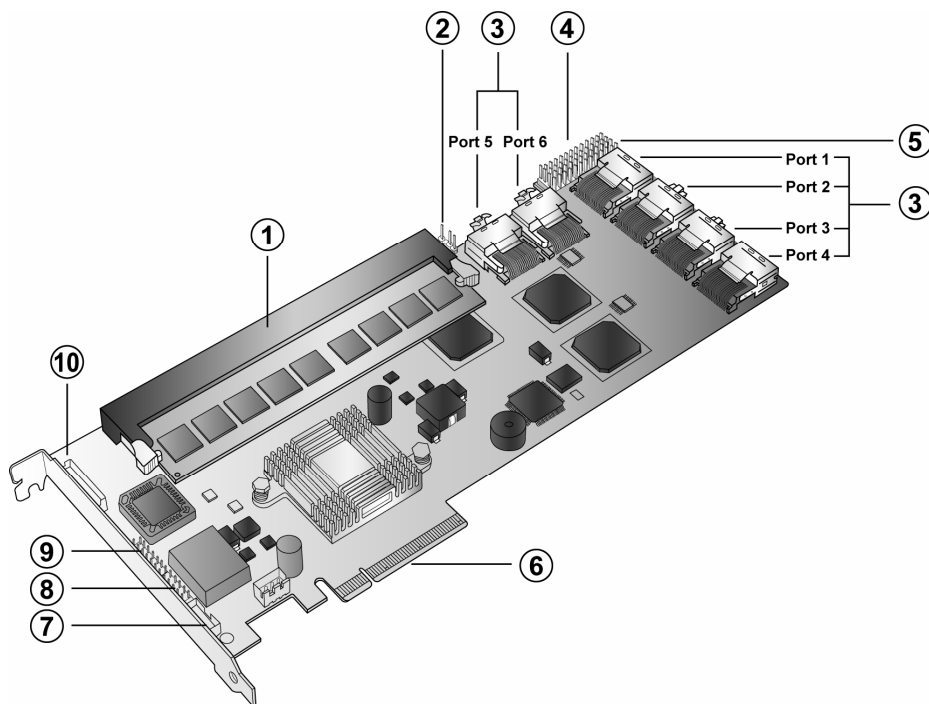
Card Configurations

Chapter 3

Card Connections

This chapter details the usage of the connectors on the ACS-61100 cards.

In addition to the ports used for connecting to HDDs, the ACS-61100 also includes connectors for external devices.



1. DDRII memory connector
2. I2C connector
3. Mini SAS connectors
4. Disk access LED connector
5. Disk fault LED connector
6. PCI-Express x 8 connector
7. Serial port connector
8. Button port connector
9. LCD panel connector
10. Battery module connector

DDRII MEMORY CONNECTOR (1)

The DDR memory connector accepts a DDRII memory module.

MINI SAS CONNECTORS (3)

Used for connecting the interface cables to hard disk drives. See **Part 2 Hard Drive Connection**.

DISK ACCESS LED CONNECTOR (4)

The disk access LED connector enables connection of a front panel LED to display the disk access status. When the card is accessing a disk, the corresponding LED flashes. The SGPIO bus disk access signal works in the same way.

DISK FAULT LED CONNECTOR (5)

The disk fault LED connector enables connection of a front panel LED to show whether there is a disk fault. When a hard disk drive fails or is removed, the corresponding LED is lit. When a drive is rebuilding, the LED flashes. The SGPIO bus disk fault signal works in the same way.

PCI-EXPRESS X 8 CONNECTOR (6)

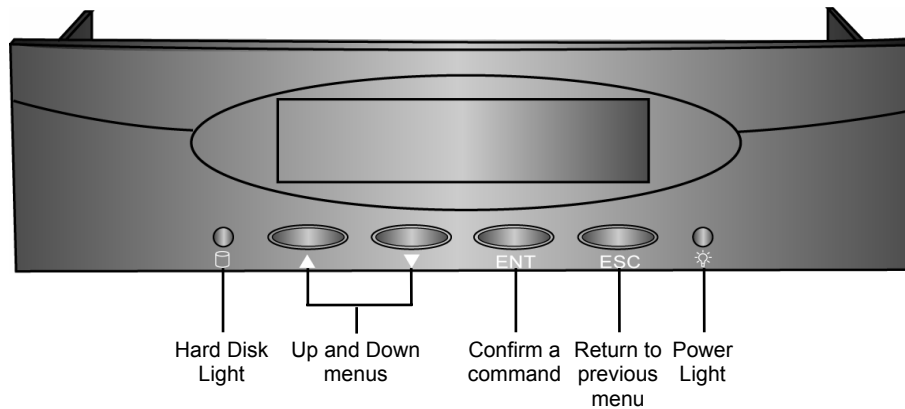
Used for connecting the card into the server. See **Part 2 Card Installation**.

SERIAL PORT CONNECTOR (7)

The serial connector allows 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 (9)

The LCD panel (not supplied) enables 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.

The button port is used for command selection and setting during the system configuration stage.

BATTERY MODULE CONNECTOR (10)

The battery module connector is used to attach an ACS-1163 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 resumes its work. The BBM occupies 1 rear blanking slot. Once charged, the BBM will last for more than 72 hours (on board memory).

PART FOUR

Card BIOS and EFI

Chapter 4

Configuring the BIOS

This chapter details the usage of the BIOS on the ACS-61100.

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

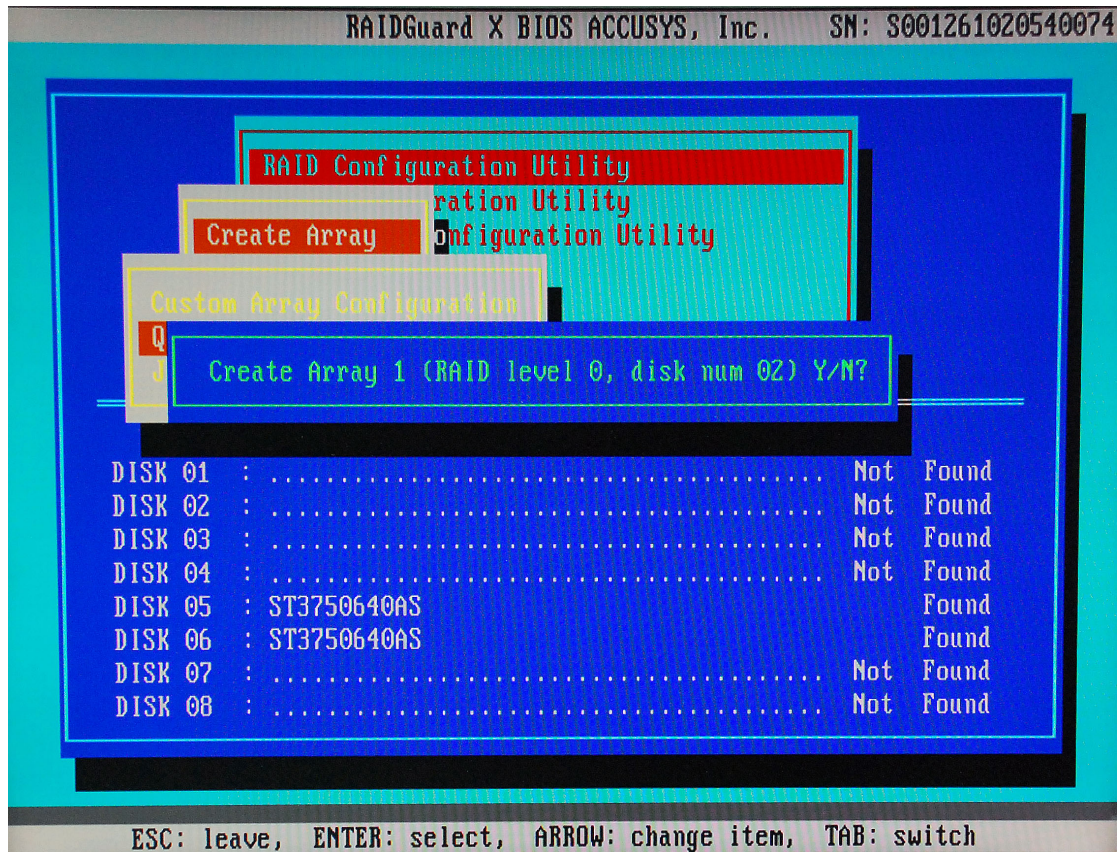
1. Start the server and watch the screen. When it gets to the position shown below press **Enter**.

```
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 R0 (striping).
2. If there are more than 2 disks the default RAID array is R5 (Data protection).

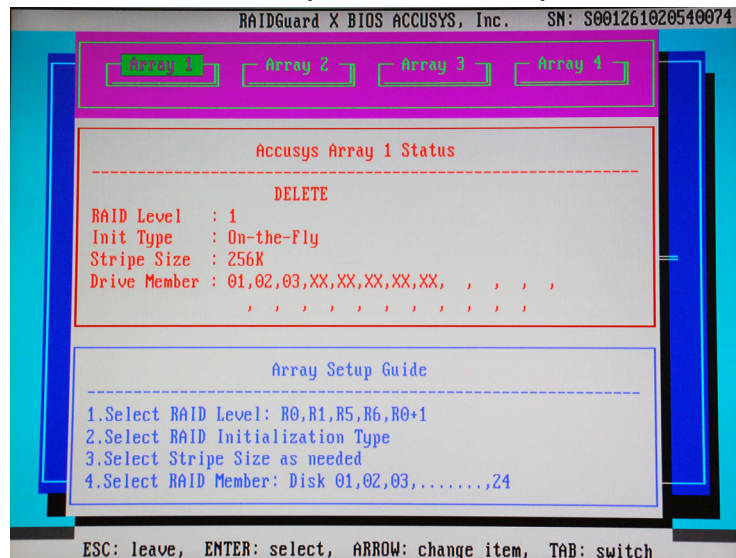
CUSTOM ARRAY CONFIGURATION

1. Go to custom RAID Config.
2. Select Array.

- 
3. Enter the RAID Level, Init Type, Stripe Size and Disks.

4. Go up to CREATE.

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 **←→** arrow keys to select the array. Press **Enter**.



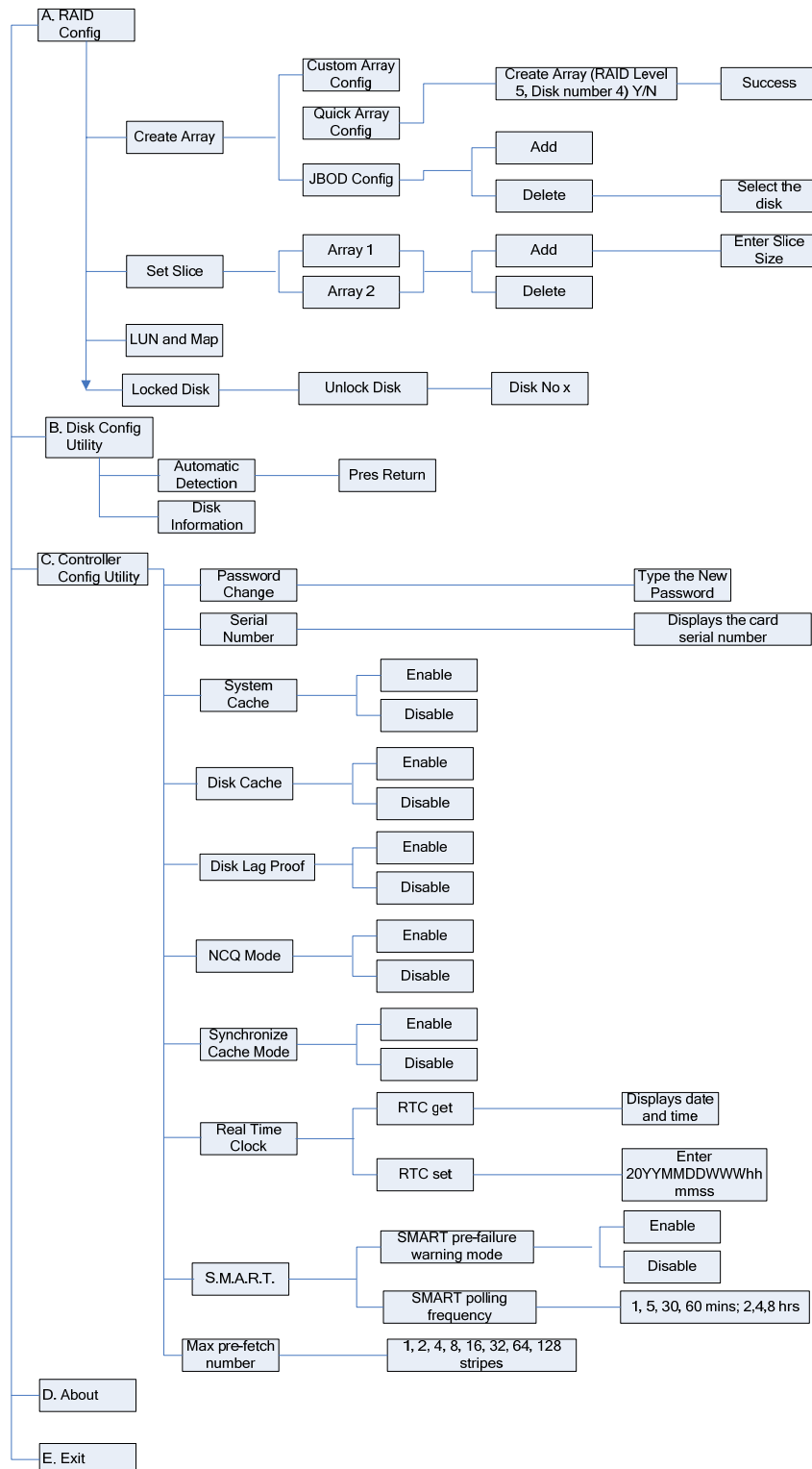
3. Use **↓** to select:
 - 3.1 RAID Level. Press **Enter**.
 - 3.1.1 Use **↓↑** to select the RAID Level between 0,1,5,6, 0+1. Press **Enter**.
 - 3.2 Init Type. Press **Enter**.
 - 3.2.1 Use **↓↑** to select On-The-Fly or Evaluation. Press **Enter**.

Note: On-The-Fly is the recommended type as it contains parity.
 - 3.3 Stripe Size. Press **Enter**.
 - 3.3.1 Use **↓↑** to select between 8k, 16k, 32k, 64k, 128k or 256k.

Note: The recommended stripe size is 256k.
 - 3.4 Drive Member. Press **Enter**.
 - 3.4.1 Use **↓↑** to select **Add**.
 - 3.4.2 Use **↓↑** to select the disk to add. Press **Enter**.
 - 3.4.3 Repeat step 3.4 as necessary to add all required disks.
4. Use **↓↑** to go to **CREATE**. Press **Enter**.

BIOS Menu Structure

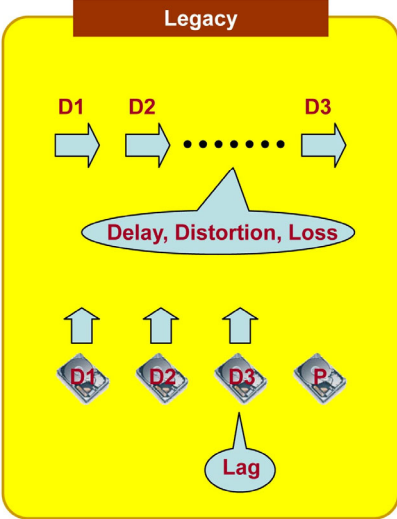
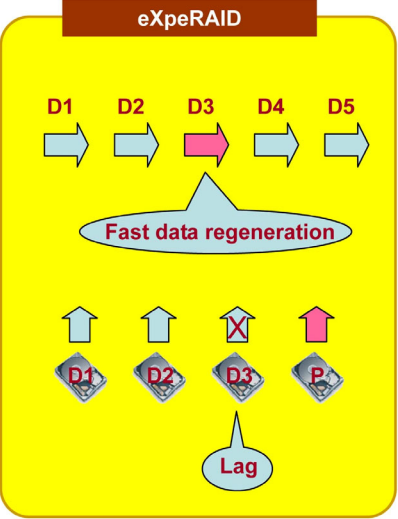
The BIOS menu structure details how the commands in the BIOS relate to each other. The BIOS manages the same information as the RAIDGuard X application, see its user manual for further details on these functions.

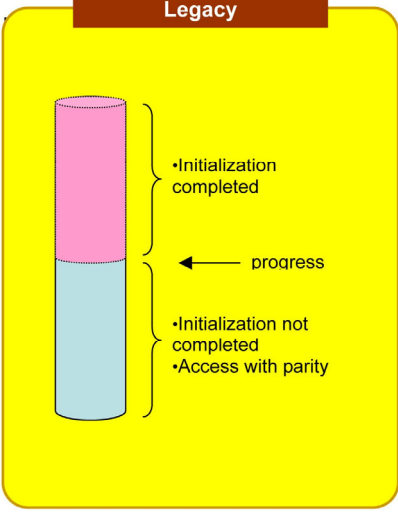
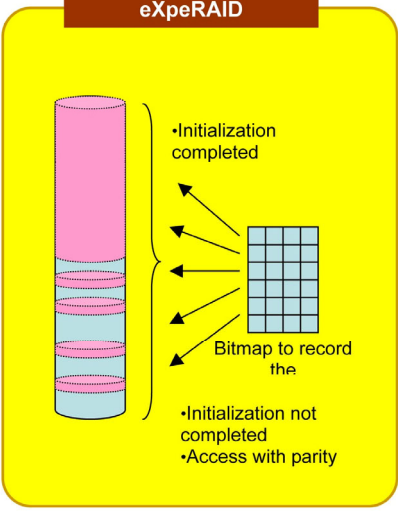


BIOS Menu

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

A. RAID Config	
Create Array	Quickly create and array, administer the details of a current and array and configure a JBOD. A collection of disks from one or more commonly accessible disk controllers, combined with a body of Array Management Software. Array Management Software controls the disks and presents them to the array operating environment as one or more virtual disks.
Set Slice	Add and delete slices. Unlike striping, slicing allows the creation of arrays from a single disk without a loss of speed as the disk fills up. This is because when striping across disks the center of the disk fills up and when it's being written to it slows down. Slicing creates new disk partitions with similar characteristics, therefore keeping the speed the same.
LUN and Map	Display details and sets LUNs and Maps. A LUN (Logical Unit Number) is a unique identifier used on a SCSI bus that enables it to differentiate between up to eight separate devices (or logical unit). Each LUN is a unique number that identifies a specific logical unit, which may be an end user, a file, or an application.
Locked Disk	Unlock locked disks. Disks that have been locked because of an error can be unlocked.
B. Disk Config Utility	
Automatic Detection	Detects installed disks. Before a new disk can be added to an array it first needs to be detected.
Disk Information	Displays manufacturer and speed details of the installed disks.

C. Controller Config Utility	
Password Change	Change the BIOS password.
Serial Number	Display the serial number of the RAID card.
System Cache	Activate and disable the system cache. Controller memory used to speed up data transfer to and from a disk.
Disk Cache	Activate and disable disk caching. Controller memory used to speed up data transfer to and from a disk.
Disk Lag Proof	Activate and disable disk lag proof mode. Disk Lag Proof ensures streaming continuity and lossless recording.
	Legacy  Legacy RAID algorithms read only data stripes and wait for slow reads. It reads parity stripe and regenerates only when read fails. eXpeRAID  eXpeRAID reads both data and parity stripes concurrently. It bypasses the slow reads and returns data to host by the regenerated data.
NCQ Mode	Activate and disable NCQ mode. NCQ allows several outstanding commands to be given to the drives at one time. The commands are carried out in sequence instead of the order they are given. Rather like pressing buttons in a lift, the lift goes to the next floor in the list not the order that the buttons are pressed. This speeds up the disk access and reduces the load on the drives.

On-The-Fly	Legacy  Legacy RAID algorithms only record the progress. Sectors having been initialized might have to be initialized again and accessed with resync overhead. eXpeRAID  eXpeRAID records the initialized sectors in bitmap. All sectors are initialized only once. The whole initialization will be done faster and performance will be better during the initialization.
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.
D. About	
Displays the BIOS version and company information.	
E. Exit	
Exits the BIOS.	

Chapter 5

Configuring the LCD Menu

This chapter details the usage of the LCD on the ACS-61100.

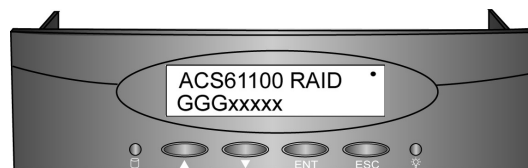
RAID PARAMETER CONFIGURATION

1. Turn on the chassis.
2. Go RAID Editor.

3. Select the following:
 - RAID Level
 - Stripe Size
 - Disk Members
 - RAID Type

4. Confirm creation.

1. Turn the RAID chassis on.
2. Press **Enter**.



Note: The GGGxxxxx at the bottom of the panel it indicates that an array has not been setup.

G=>Globe spare

1~4=>Array 1~4

X=>Disk not exist

L=>Lock disk

R=>Remove disk

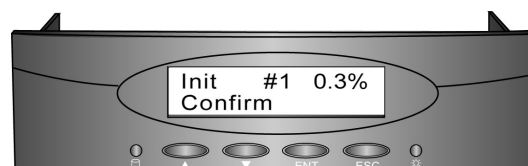
3. RAID Param. Press **Enter**.
4. RAID Editor. Press **Enter**.
5. Use ↓↑ to Select an Array between 1 and 4. Press **Enter**.
6. RAID Level. Press **Enter**.
 - 6.1 Use ↓↑ to select between 0,1,5,6, 0+1. Press **Enter**.
7. Stripe Size. Press **Enter**.
 - 7.1 ↓↑ to select between 8k, 16k, 32k, 64k, 128k or 256k. Press **Enter**.

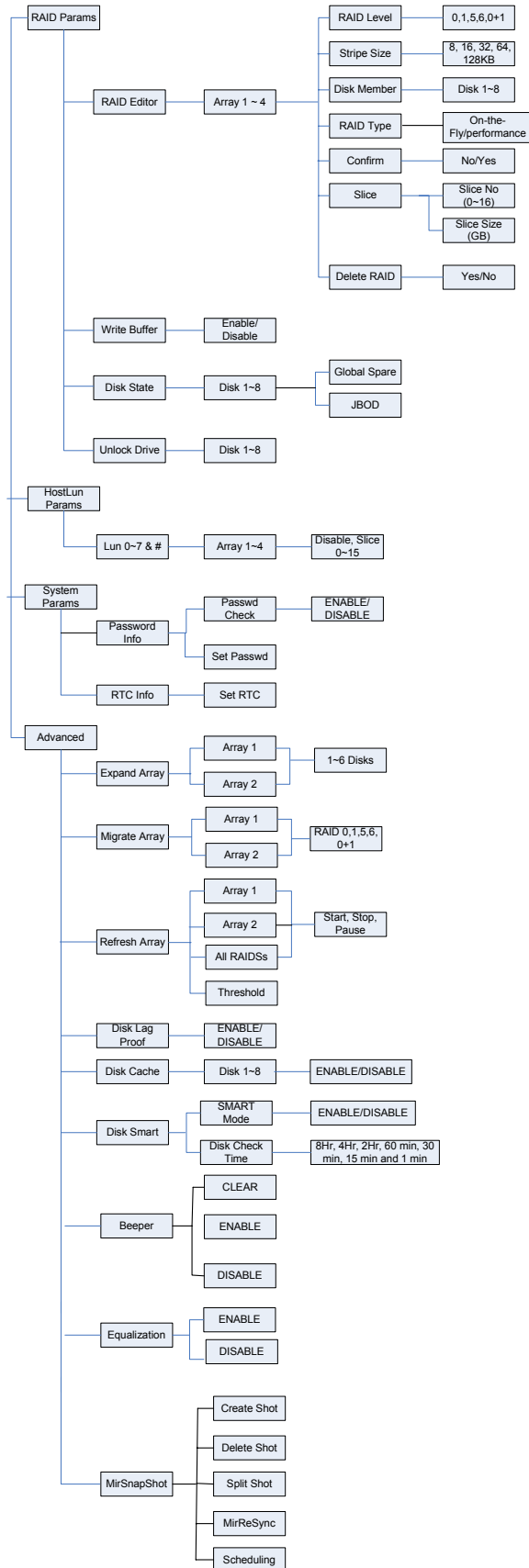
Note: The recommended stripe size is 256k.

8. Disk Member. Press **Enter**.
 - 8.1 Use ↓↑ to select the disk to add. Press **Enter**.
 - 8.2 Repeat step 8.1 as necessary to add all required disks.
9. RAID Type. Press **Enter**.
 - 9.1 Use ↓↑ to select On-The-Fly or Evaluation. Press **Enter**.

Note: On-The-Fly is the recommended type as it contains parity.

10. Confirm. Press **Enter**.
 - 10.1 Use ↓↑ to select Yes or No. Press **Enter**.





PART FIVE

Appendices

Appendix A

Specifications

CPU	Intel IOP341 800MHz
PCI Express	One PCI-e x 8
PCI	64-bit PCIX-133
R6 support	Yes
Disk	
Disk Interface	SATA II/SATA
Disk Channel	SATAII x 24 (ACS-61100-24) SATAII x 16 (ACS-61100-16) SATAII x 12 (ACS-61100-12)
Disk Interface	Chip Marvell 6081 x 3
Host	
Host Channel	PCI-e x 4 or x 8 lane from PC.
Memory	DIMM socket for DDRII Module w/ ECC
User Interface (option)	
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
Battery backup interface (option)	Yes, one on-board connector support
Disk status LED	For disk fail and access LEDs
Connector	Two 2x13 pin connectors without housing
Dimensions	
Board size	253.7mm (L) x 111.1mm (H)
PCB thickness	1.6 mm
Operating parameters	
Operating Temperature	5°C-50°C
Operating Humidity	5%-85%, Non-condensing
Storage Humidity	5%-95%
Storage Temperature	-40°C-70°C

Appendix B

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