

ACS-8930 Controller User Manual



SCSI/FIBRE to IDE Controller

ACS-8930 User Manual

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Preface

Notice

Product features and specifications described in this manual are subject to change without notice.

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This manual version 2.0b

Regulatory information



This drive is in conformity with the EMC directive.

Federal Communications Commission (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.

Those limits are designed to provide reasonable protection against harmful 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. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antennas.

- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.

Warning:

A shielded-type power cord is required in order to meet FCC emission limits and also to prevent interference to the nearby radio and television reception. It is essential that only the supplied power cord be used.

Use only shielded cables to connect I/O devices to this equipment.

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

About this manual

Intended user

This manual is designed and written for users of the ACS-8930 RAID controller. The user should ideally be familiar with RAID planning and data storage operations and have experience in electronic or computer engineering.

Organization of the manual

This manual contains the following sections:

- Chapter 1: **Introduction** provides details of key features, checklists of package contents and user requirements, and an overview of the controller box and its features.
- Chapter 2: **Installation** guides you through process of installing DRAM in ACS-8930 and integrating the controller into a system. This chapter also details procedures for replacing components.
- Chapter 3: **Quick Setup** explains how to set up a RAID in seconds.
- Chapter 4: **Accessing the Monitor Utility** tells you how to access and start using the firmware-based Monitor Utility on the host terminal.
- Chapter 5: **Configuration** details and explains the rich configuration options available for ACS-8930 arrays, using either the control panel or Monitor Utility.

- Appendix A: **Troubleshooting** helps you deal with encountered problems in the form of Q&A.
- Appendix B: **Introduction to RAID levels** contains all the information you need to understand the features of different RAID levels.
- Appendix C: **Control Panel Messages** defines the status and error messages of the control panel LCD display.
- Appendix D: **Glossary** defines relevant technical terms used in this manual.
- Appendix E: **Specifications** list technical specification of ACS-8930.
- Appendix F: **Contact Us** lists contact details of Accusys business units around the world.

Using this manual

This guide contains all the information you need to set up and start using your RAID controller and to monitor its performance in real time. It is intended to be read in a linear manner, though some instructions may not be applicable to all users. Users may also prefer to skip more familiar sections, but each of the steps below must be completed.

The setup process will follow these steps:

Step 1

- Prepare:**
- ◆ Familiarize yourself with the features and capabilities of ACS-8930 (**Chapter 1**)
 - ◆ Make sure you have everything (**Chapter 1**)

Step 2

- Install:**
- ◆ Install SODIMM cache memory and attach the necessary cables (**Chapter 2**)
 - ◆ Turn on (**Chapter 2**)

Step 3

- Configure:**
- ◆ Perform Quick Setup (**Chapter 3, optional**)
 - ◆ Open Monitor Utility (**Chapter 4, recommended**)
 - ◆ Configure (**Chapter 5**)



Note

ACS-8930 is available in a 16 channel and an 8 channel configuration. Each configuration has two versions offering different host interfaces:

- ⇒ SCSI to IDE
- ⇒ Fibre to IDE

This manual contains the information necessary to set up both configurations and all four versions. Where procedures for the two configurations differ, they are described separately and clearly marked.

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 controller.

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

Screen text is given in **screen** font.

Table of Contents

PREFACE 1

 NOTICE..... 1

 TRADEMARKS 1

 REGULATORY INFORMATION..... 2

 ABOUT THIS MANUAL..... 3

Intended user..... 3

Organization of the manual 3

 USING THIS MANUAL 4

 GUIDE TO CONVENTIONS 5

CHAPTER 1 - INTRODUCTION TO ACS-8930..... 10

 OVERVIEW 10

 KEY FEATURES 11

Three Operating modes..... 11

Self-Diagnostic Mode..... 11

Configuration Mode..... 12

Operation Mode 12

Three Configuration Utilities..... 12

Control Panel..... 12

Monitor Utility 12

GUI 12

Array Management 13

Hard Drive Hot Swapping 13

Automatic Global Hot Spare..... 13

Automatic Drive Rebuild..... 13

Fax Notification 13

UPS Support 13

 BEFORE YOU BEGIN 14

What's in the box 14

What else you need 14

 FAMILIARIZING YOURSELF WITH THE RAID CONTROLLER..... 16

Overview 16

Control Panel..... 16

Rear view 18

SUPPLIED ACCESSORIES.....	19
<i>IDE Cable</i>	19
<i>3-in-1 Combo Cable</i>	19
<i>DB9 Cable</i>	19
CHAPTER 2 - INSTALLATION	20
INSTALLATION FLOWCHART	20
PRE-INSTALLATION NOTICES	21
HARDWARE CONFIGURATIONS	22
<i>SCSI to IDE</i>	22
<i>Fibre to IDE</i>	23
CABLING – 16 CHANNEL CONFIGURATION	24
<i>HDD, function and power cable connection</i>	24
<i>Host cable connection</i>	25
CABLING – 8 CHANNEL CONFIGURATION	27
<i>Host cable connection</i>	27
<i>HDD, function and power cable connection</i>	28
INSTALLING / UPGRADING SODIMM	30
<i>SODIMM specifications</i> :.....	30
<i>Architecture of supported SODIMM</i> :.....	30
<i>Installing SODIMM – 16 channel configuration</i>	31
<i>Removing SODIMM – 16 channel configuration</i>	32
<i>Installing SODIMM – 8 channel configuration</i>	33
<i>Removing SODIMM – 8 channel configuration</i>	33
TURNING ON FOR THE FIRST TIME.....	34
TURNING OFF	34
RESTARTING.....	34
CHAPTER 3 - QUICK SETUP	35
QUICK SETUP WITH THE CONTROL PANEL	36
QUICK SETUP WITH THE MONITOR UTILITY	37
CHAPTER 4 - ACCESSING THE MONITOR UTILITY	38
ESTABLISHING A TERMINAL CONNECTION	38
USING THE MONITOR UTILITY	40
<i>Monitor utility control keys</i>	41
<i>Menu area controls</i>	41
<i>Output area controls</i>	41

CHAPTER 5 - CONFIGURATION..... 42

 CONFIGURATION OVERVIEW 42

System configuration..... 42

RAID configuration..... 43

How to configure ACS-8930 44

 FINDING YOUR WAY AROUND THE MENUS 45

 ACCESSING THE MAIN MENU 46

Using the Monitor Utility..... 46

Using the Control Panel 47

 SETTING ARRAY PARAMETERS 48

RAID params menu..... 48

 SETTING SCSI PARAMETERS 51

SCSI params menu..... 51

 SETTING FIBRE PARAMETERS..... 53

Fibre params menu..... 53

 SETTING PORT PARAMETERS 55

RS232 Params menu 55

Modem Port menu..... 56

Terminal Port menu..... 56

 PASSWORD SECURITY 57

Password Info menu..... 57

 ENTERING AND EDITING ALERT SETTINGS 57

 PAGER ALERT SETTINGS 58

Pager Info menu..... 58

 FAX ALERT SETTINGS 59

Fax Info menu 59

Company Info menu..... 60

 MODEM SETTINGS 60

Modem Init St menu 60

 SAVING CONFIGURATIONS..... 61

NVRAM menu 61

 ADVANCED SETTINGS..... 62

RAID Functions menu..... 62

 UPDATING THE FIRMWARE..... 64

APPENDIX A - TROUBLESHOOTING	66
APPENDIX B - INTRODUCTION TO RAID LEVELS	69
<i>RAID 0</i>	70
<i>RAID 1</i>	71
<i>RAID 0+1</i>	72
<i>RAID 3</i>	73
<i>RAID 30</i>	74
<i>RAID 5</i>	75
<i>RAID 50</i>	76
APPENDIX C - CONTROL PANEL MESSAGES	77
APPENDIX D - GLOSSARY	82
APPENDIX E - SPECIFICATIONS	84
APPENDIX F - CONTACT US	85
ACCUSYS, INC.	85
ACCUSYS U.S.A., INC.	85
ACCUSYS GERMANY	85
ACCUSYS KOREA, INC.	85
ACCUSYS CHINA, INC.	86

Chapter 1

Introduction to ACS-8930

This chapter introduces the features and capabilities of ACS-8930.

You will find:

- ⇒ A full introduction to your ACS-8930 controller
- ⇒ Details of key features and supplied accessories
- ⇒ A checklist of package contents
- ⇒ A checklist of what else you need to start installation

Overview

Congratulations on your selection of the Accusys 8930 (ACS-8930) – a high-performance and extremely flexible RAID (Redundant Array of Independent/Inexpensive Disks) controller. RAID is a storage technology used to improve the processing capabilities of the storage system, providing a combination of reliability and performance.

ACS-8930 is designed to meet today's demand for higher storage solutions. Ideally suited for integration with databases, e-mail, web servers and imaging systems, ACS-8930 provides maximum data protection and exceptional performance. ACS-8930 is designed for easy integration, smooth data expansion and server migration.

ACS-8930 is the ultimate flexible RAID solution. It can manage seven different RAID levels, providing functions including

- Striping (RAID 0)
- Mirroring with Striping (RAID 0+1)
- Mirroring and Duplexing (RAID 1)
- Striping with Parity on Dedicated Disk (RAID 3)
- RAID 3 with Striping (RAID 30)
- Striping with Interspersed Parity (RAID 5)
- RAID 5 with Striping (RAID 50)

As a result, the ACS-8930 offers a higher range of choices and better security.

**Note**

ACS-8930 is available in a 16 channel and an 8 channel configuration. Each configuration has two versions offering different host interfaces:

- ⇒ SCSI to IDE
- ⇒ Fibre to IDE

This manual contains the information necessary to set up both configurations and all four versions. Where procedures for the two configurations differ, they are described separately and clearly marked.

Key Features

ACS-8930 features the following:

- Support for RAID Levels 0, 1, 0+1, 3, 30, 5 and 50
- Independence from host system
- Independence from operating system
- Intel i80303 64-bit RISC High performance processor
- Supports Dual Ultra160 SCSI channel
- Supports 8 or 16 ATA-100/133 IDE channels (depending on configuration purchased)
- Superior Accusys Array Management Firmware
- Flexible cache size of up to 512MB
- Supports up to 16 logical units
- Supports on-line capacity expansion.
- Automatic Hot Swap, Hot Spare and Drive Rebuild Support
- Bad sector reassignment
- Programmable FAX event notification
- Remote monitoring through RS232 terminal interface
- UPS support through standard UPS interface

Three Operating modes

ACS-8930 operates in three modes: Self-Diagnostic Mode, Configuration Mode and Operation Mode.

Self-Diagnostic Mode

To ensure flawless operation, ACS-8930 has a built-in self-diagnostic utility. Self-diagnostic Mode is entered automatically upon power up, or after the ACS-8930 has been reset. In this mode, all components are tested, and any potential problems are reported. Once the tests are complete, ACS-8930 switches automatically to Operation Mode.

Self-Diagnostic Mode runs three major tests. The first diagnostic test covers the CPU and supporting core logic chips, the internal bus, memory, SCSI controller, enhanced IDE controllers, and RS-232 controllers. The second diagnostic test checks for the presence of disks on each individual disk channel and the functionality of each disk found. The final diagnostic test checks RAID functionality.

Configuration Mode

Configuration Mode enables the RAID administrator to configure and modify the settings of ACS-8930 and fine-tune the configuration. Configuration Mode is entered from Operation Mode:

When the Enter button on the controller box is pressed

When the Monitor Utility is invoked from the remote terminal.



Caution

ACS-8930 should be off-line and not being accessed by any application when Configuration Mode is run.



Note

ACS-8930 will automatically switch from Configuration Mode to Operation Mode after 3 minutes if no buttons are pressed on the controller box control panel and no action is taken on the Monitor Utility

Full details on changing configurations are given in Chapter 5

Operation Mode

Operation Mode is the default state of ACS-8930. In this mode, the controller box front panel LCD continuously displays the current status of ACS-8930. A typical display looks like the following:

```
ACS-8930
OOOOOOOS
```

A full explanation of control panel LCD messages is given in Appendix C.

Three Configuration Utilities

There are three ways to configure ACS-8930:

Control Panel

ACS-8930 can be configured directly using the control panel.

Monitor Utility

This embedded menu-based configuration utility is accessed through the host computer terminal.

GUI

ACS-8930 can also be bundled with a GUI, such as ACS Utility, enabling real-time, remote monitoring and reconfiguration. Contact your vendor for details.

Array Management

The unique ACS-8930 array management firmware utilizes multitasking real-time kernel technology to manage the controller. Additional features are real-time I/O load analysis, on-line diagnostics, event logging and broadcasting, and device inventory management. These features can be accessed locally or via modem to allow centralized monitoring and control of the ACS-8930.

Hard Drive Hot Swapping

Hot Swapping allows for the removal and installation of disk drives without interruption of data access while the ACS-8930 system is in use. This is usually performed when there is no Hot Spare drive configured. There is no need to power down the system.



Note

The Hard Drive Hot Swapping facility is not supported by all brands of disk rack. Contact your vendor for details

Automatic Global Hot Spare

Hot Spare allows for the automatic replacement of a failed drive without requiring intervention from the administrator. When a disk fails the ACS-8930 will automatically replace the faulty drive with the configured hot spare disk.

The Global Spare Drive does not serve only a specified logical drive. When a member drive from any of the logical drives fails, the Global Spare Drive will join that logical drive and automatically start to rebuild.

Automatic Drive Rebuild

If a member drive in a logical drive fails, the controller will first check whether there is a **Local Spare Drive** assigned to this logical drive. If yes, it will automatically start to rebuild.

If there is no Local Spare Drive available, the controller will search for a **Global Spare Drive**. If there is a Global Spare Drive, it will automatically rebuild the logical drive.

Fax Notification

ACS-8930 supports but does not require additional software for system monitoring and analysis. The ACS-8930 array management firmware continuously monitors the system activity and immediately launches the fax event notification feature if any failure occurs. Up to two pager numbers and two fax numbers can be notified instantaneously and repeatedly for extra insurance.

UPS Support

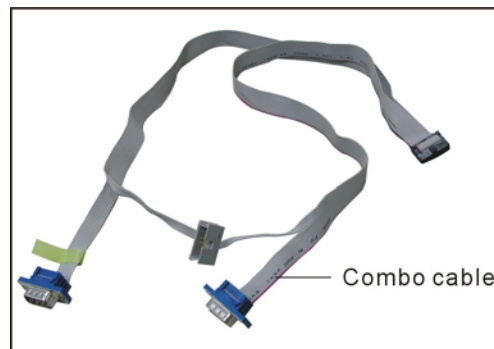
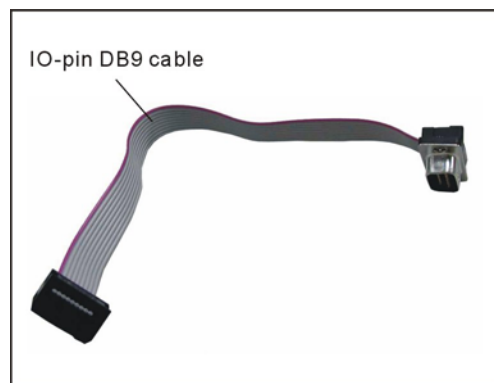
ACS-8930 supports the use of an uninterruptible power supply. In the event of a power breakdown, a UPS will keep the RAID controller online long enough for its internal cache memory to be saved to a hard drive.

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:

- ACS-8930 Controller Box ×1
- ACS-8930 Controller User's Manual ×1
- IDE Cables ×8 / ×16 (depending on configuration purchased: 8 or 16 IDE channels)
- 10-pin DB9 cables ×2 (one for RS232 connection, one for modem connection / 16 channel configuration only)
- 3-in-1 Combo Cable ×1 (8 channel configuration only)
- Mounting screws (bag) ×1



What else you need

- Hard disk drives (different RAID levels requires different numbers of HDDs. Turn to Appendix B to determine how many HDDs you require)
- Enclosure
- Two SCSI cables (SCSI to IDE configuration only)
- Two Fibre cables (fibre to IDE configuration only)
- SODIMM memory module

- Host computer with SCSI interface (SCSI to IDE configuration)
- Host computer with Fibre interface (Fibre to IDE configuration)
- External power connector (4-pin DC power connector)
- Static grounding strap or electrostatic discharge (ESD) safe work area
- Dedicated terminal or PC with third party communication software that supports ANSI terminal emulation (required for viewing Monitor Utility)



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 any size drive, however the smallest drive will determine the size of the array.



Note

There's no set formula to determine how much cache memory to use, but as a general rule, a workstation, with mostly very large files, such as for audio or video editing and playback, graphics or CAD files, can benefit from a large cache. File servers, with multiple random access of varying file size, generally have little or no performance improvement with additional cache.



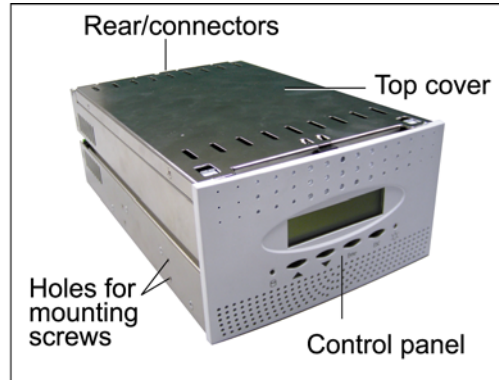
Note

ACS-8930 disk arrays do not require the installation of different drivers for use with different operating systems. ACS-8930 is independent and transparent to the host operating system.

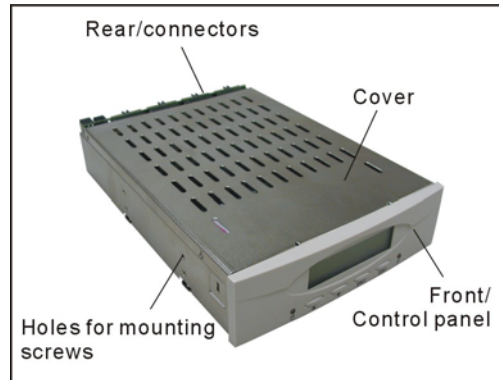
Familiarizing yourself with the RAID controller

Overview

16 channel configuration:

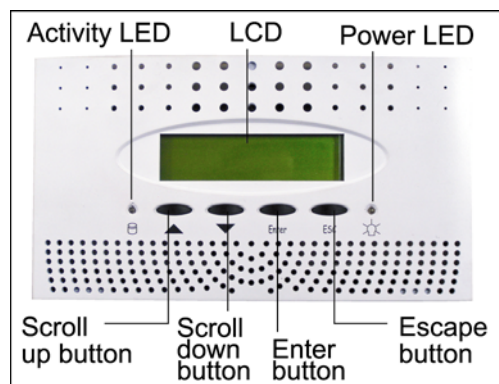


8 channel configuration:



Control Panel

16 channel configuration:



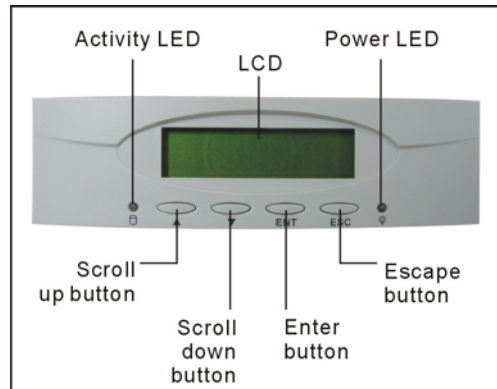
The two-line, 16-character **LCD** displays the status and configuration information for ACS-8930.

8 channel configuration:

The **Scroll buttons** are used to scroll through screens and highlight menu items

The **Enter button** is used to select an option

The **Escape button** is used to cancel a selection or return to the previous menu



The **Power LED** lights solid when power is on

The **Activity LED** indicates that the RAID is being accessed:

Activity LED status	Controller status
▪ Flashing	▪ Data being accessed
▪ Solid	▪ Unprocessed data still cached in memory
▪ Unlit	▪ No activity

Full details on configuring with the control panel are given in Chapter 5.

A full list of LCD display messages is given in Appendix C

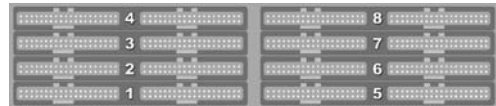
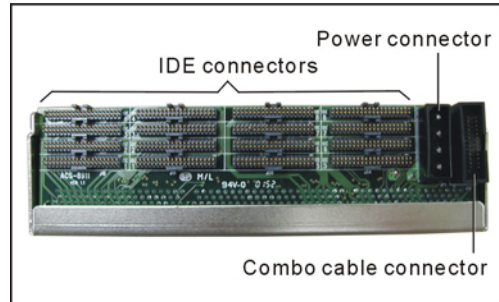
Rear view

All ports are located on the rear panel of the controller.

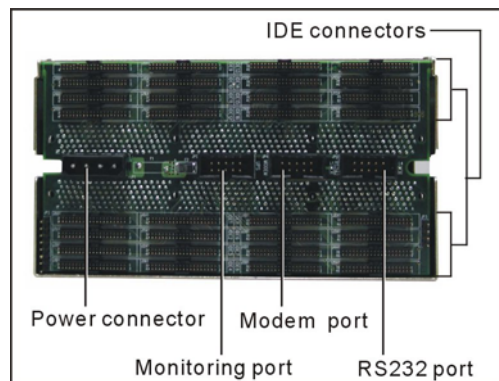
ACS-8930 is available in two configurations, supporting the insertion of up to eight or up to 16 IDE cable sets. The rear views of each are shown on the right.

The figure beneath each of the rear panel views shows how the channels (1 to 8 or 1 to 16) map onto the IDE connectors.

8 channel configuration:



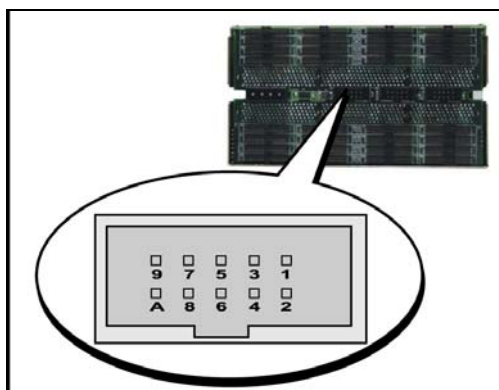
16 channel configuration:



The monitoring port on the rear of the 16 channel configuration enables various monitoring facilities. The default pin assignments are:

- Pins 1+3: Fan failure
- Pins 2+4: Temperature failure
- Pins 5+7: Power source failure
- Pins 6+8: UPS warning
- Pins 9 and A are unassigned

The same facilities can be accessed on the 8 channel configuration using the combo cable described on the next page.



Supplied accessories

IDE Cable

Either 8 cables or 16 cables included, depending on configuration purchased.



3-in-1 Combo Cable

The combo cable supplied with the 8 channel configuration includes the following connectors:

- An RS232 connector to link to the host terminal COM port enabling use of the monitor utility
- A modem connector enabling the automatic dispatch of alert faxes
- A monitor connector enabling various monitoring facilities. The default pin assignments are:

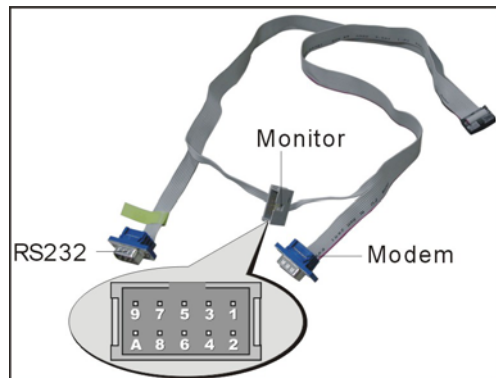
Pins 1+3: Fan failure

Pins 2+4: Temperature failure

Pins 5+7: Power source failure

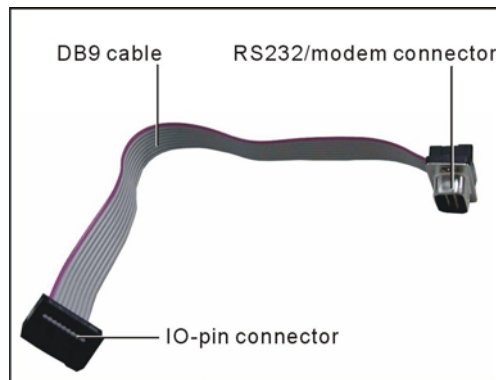
Pins 6+8: UPS warning

Pins 9 and A are unassigned



DB9 Cable

Two cables (supplied with the 16 channel configuration only) for modem and RS232 connection.



Chapter 2

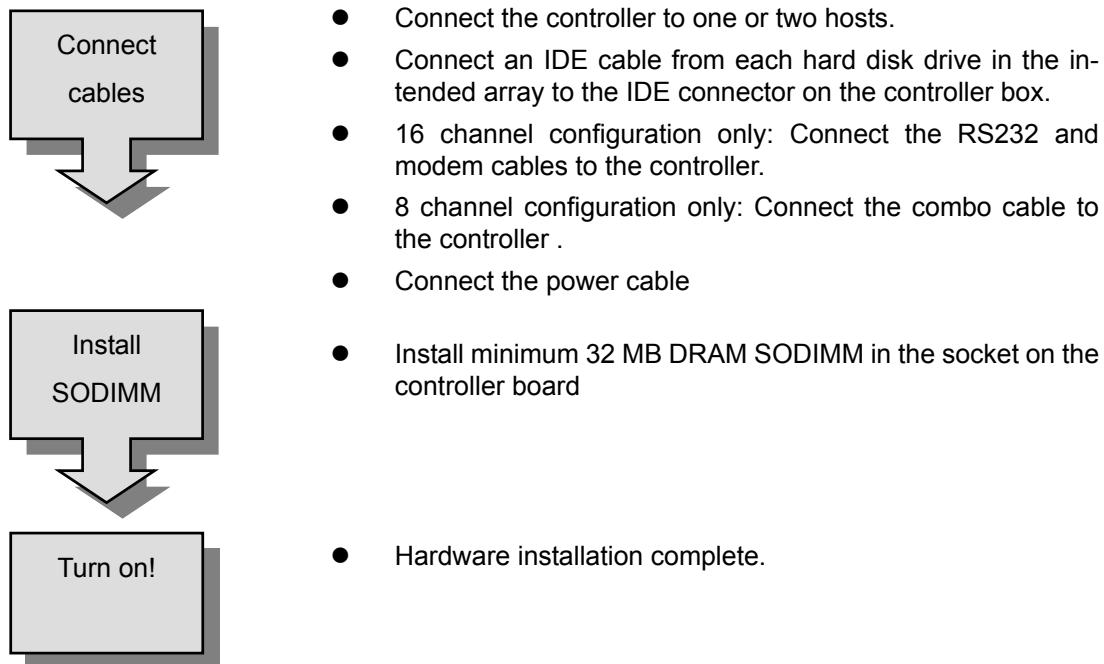
Installation

This chapter presents:

- ⇒ An overview of the different hardware configurations available
- ⇒ Full instructions on cabling
- ⇒ Instructions on how to install and upgrade DRAM
- ⇒ Instructions on turning on

Installation flowchart

Installation of ACS-8930 is simple. This chapter will lead you through the following steps:



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-8930 should be installed in a well-ventilated area and in such a way that sufficient airflow is maintained across the controller 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 Temperature: 0C to 50C (32°F to 122°F)

Humidity: 10-75%, non-condensing

Altitude: Sea level to 10,000 ft

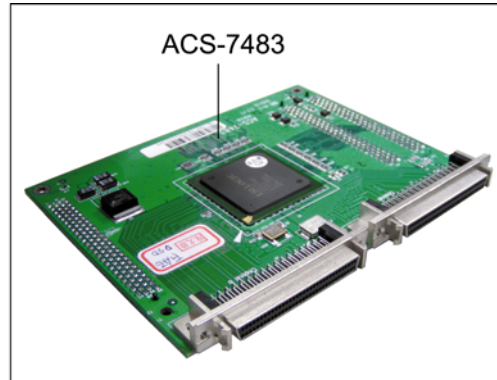
Hardware configurations

The two configurations of ACS-8930 (16 channel and 8 channel) are each available with either a SCSI or a fibre interface provided through a customized daughterboard.

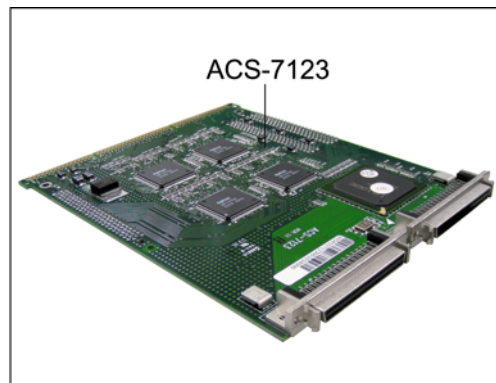
SCSI to IDE

The SCSI to IDE package contains either the ACS-7483 or ACS-7123 daughterboard.

ACS-7483 The SCSI daughterboard ACS-7483 is for use with the 8-disk-channel version of ACS-8930. ACS-7483 provides two SCSI host channels.



ACS-7123 The SCSI daughterboard ACS-7123 is for use with the 16-disk-channel version of ACS-8930. ACS-7123 provides two SCSI host channels.



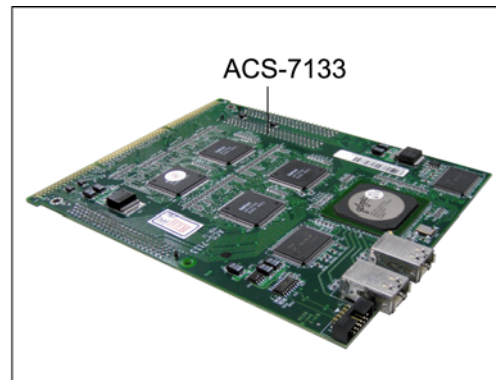
Fibre to IDE

The fibre to IDE package contains either the ACS-7143 or ACS-7133 daughterboard.

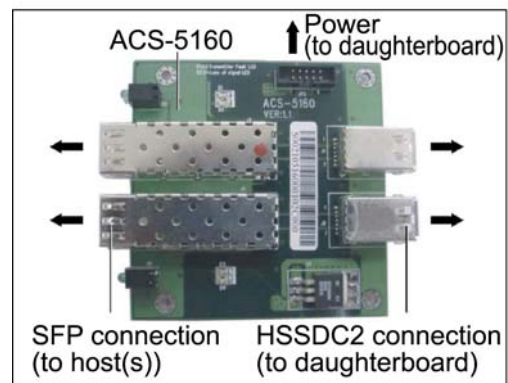
ACS-7143 The fibre daughterboard ACS-7143 is for use with the eight-disk-channel version of ACS-8930. ACS-7143 provides two fibre host channels. ACS-7143 requires the use of an additional bridge board, ACS-5160, which acts as the host interface.



ACS-7133 The fibre daughterboard ACS-7133 is for use with the 16-disk-channel version of ACS-8930. ACS-7133 provides two fibre host channels. ACS-7133 requires the use of an additional bridge board, ACS-5160, which acts as the host interface.



ACS-5160 The bridge board ACS-5160 requires a separate power cable as indicated. The bridge board links to the host(s) through a small form-factor pluggable (SFP) cable (a separate cable is required for each of the two host channels) The bridge board links to the daughterboard with HSSDC2 cables.



Cabling – 16 channel configuration

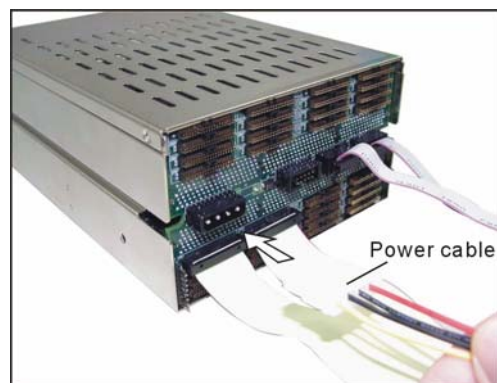
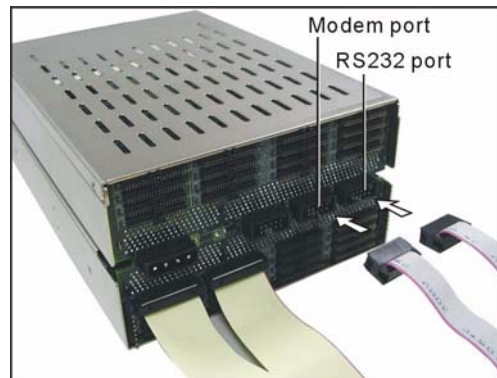
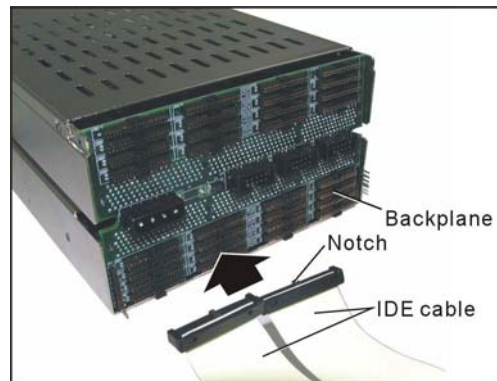


Caution

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

HDD, function and power cable connection

1. Connect an IDE cable from each hard disk drive in the intended array to the IDE connector on the backplane. A notch on the upper side of the IDE cable connector guides correct insertion.
2. Connect the DB9 cables to the modem and RS232 ports on the backplane. The notch on the DB9 cable connectors should be aligned with the corresponding slot on the backplane port to ensure correct insertion. A 10-pin monitoring cable may also be connected to the monitoring port on the backplane. See the *Rear View* section of chapter 1 for the default pin assignments of the monitoring port.
3. Finally , connect a power cable to the connector on the backplane.
4. The RAID controller can now be mounted in your chosen location.



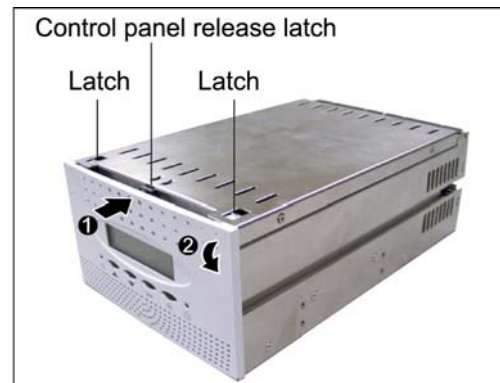
Host cable connection



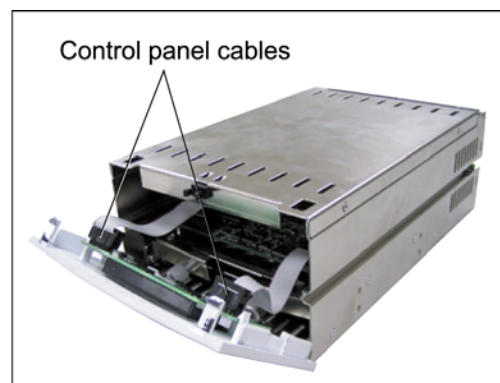
Note

The 16 channel configuration of ACS-8930 is designed so that host cables can be connected while ACS-8930 is mounted inside a case. For clarity, ACS-8930 is shown unmounted in this section.

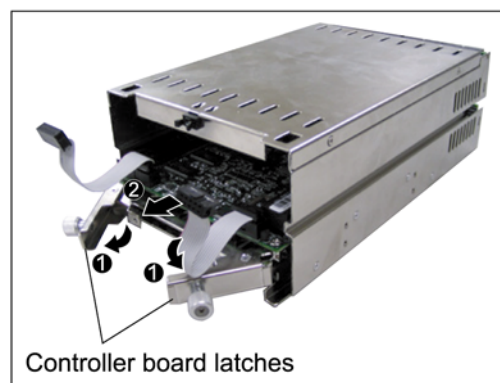
1. Press the control panel inward as indicated to release the control panel release latch.
2. Ease open the other two latches so that the control panel pivots forward.



3. Release the two control panel cables and remove the control panel.

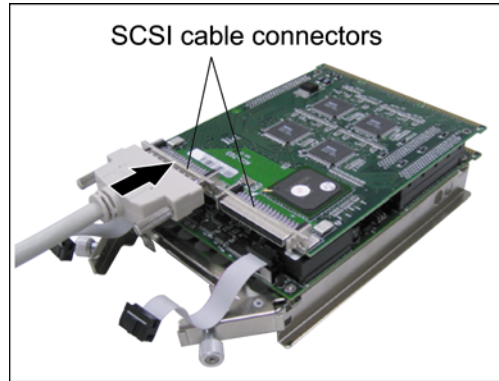


4. Release the controller board latches and slide the daughterboard and controller board (still connected to each other) out from the case.



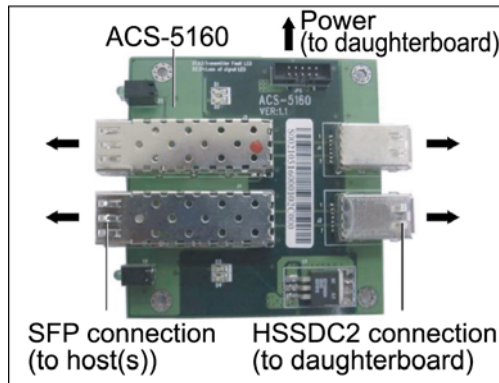
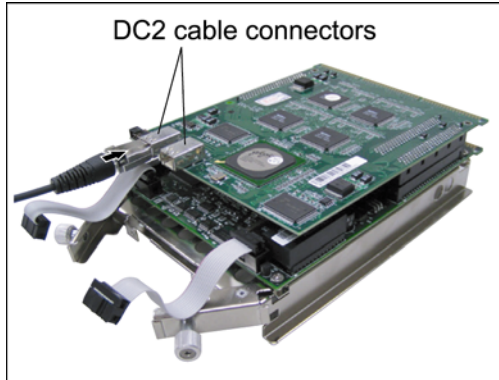
5. **SCSI to IDE configuration**

Connect a SCSI cable from the host system SCSI card to one of the SCSI connectors on the daughterboard. Users setting up a dual host configuration should connect two SCSI cables – one linking to each host.



Fibre to IDE configuration

Slot the connector of the HSSDC2 cable into a connector on the daughterboard. Users setting up a dual host configuration should connect two HSSDC2 cables each linking via the ACS-5160 bridge board to the appropriate host. The power connector on ACS-5160 should link to the 10-pin power connector on the daughterboard.



- 6. Push the daughterboard and controller board into place in the controller box and lock in position by closing the controller board latches.
- 7. Reattach the control panel cables and replace the control panel.

Cabling – 8 channel configuration



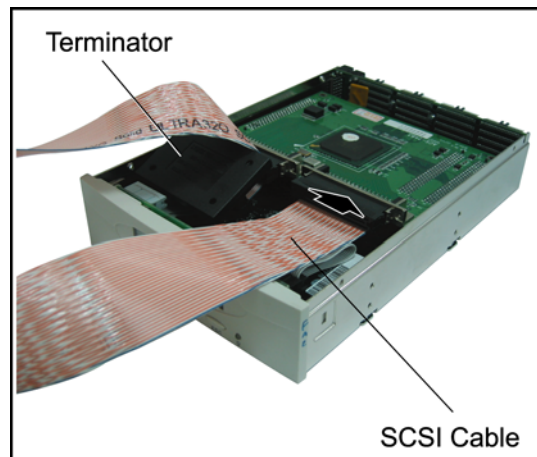
Caution

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

Host cable connection

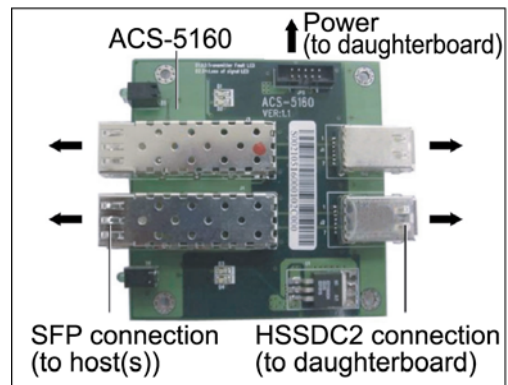
1. Remove the controller box cover by sliding it back and lifting off.
2. **SCSI to IDE configuration**

Connect a SCSI cable from the host system SCSI card to the SCSI connector on the daughterboard. Users setting up a dual host configuration should connect two SCSI cables – one linking to each host.



Fibre to IDE configuration

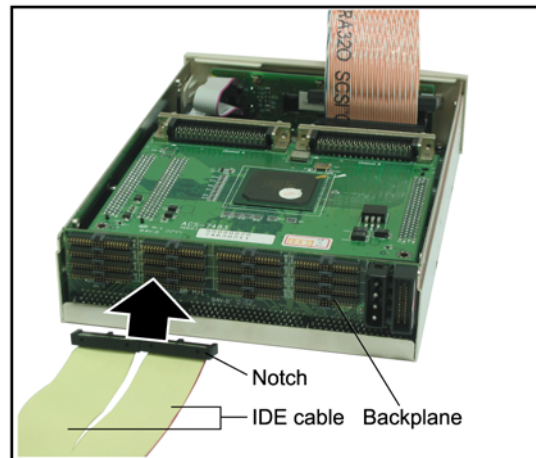
Slot the connector of the HSSDC2 cable into a connector on the daughterboard. Users setting up a dual host configuration should connect two HSSDC2 cables each linking via the ACS-5160 bridge board to the appropriate host. The power connector on ACS-5160 should link to the 10-pin power connector on the daughterboard.



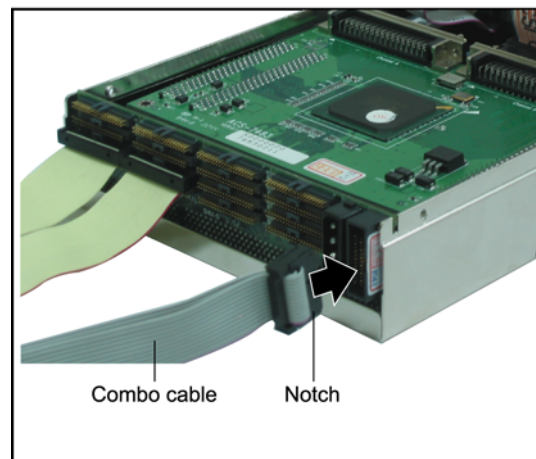
3. Replace the controller box cover

HDD, function and power cable connection

1. Connect an IDE cable from each hard disk drive in the intended array to the IDE connector on the backplane. A notch on the upper side of IDE cable connector guides correct insertion.



2. Connect the combo cable to the connector on the backplane. The notch on the combo cable connector should be aligned with the corresponding slot on the backplane connector to ensure correct insertion.



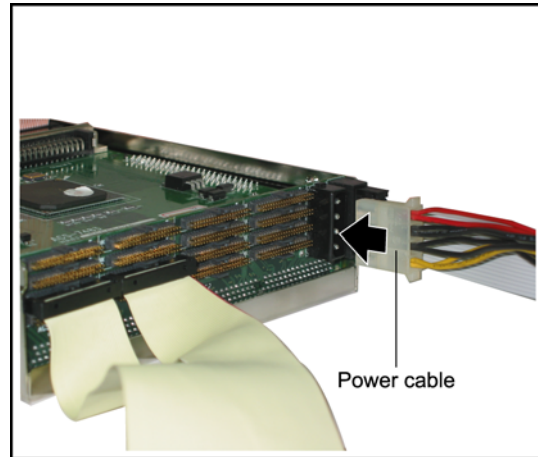
Note

The combo cable provides a variety of monitoring options:

- ⇒ *The RS232 cable is required for the use of the Monitor Utility*
- ⇒ *The modem connector enables the automatic dispatch of alert faxes*
- ⇒ *The monitor connector enables simultaneous monitoring of a subsystem fan, temperature gauge and UPS (uninterruptible power source)*

See Supplied accessories in Chapter 1 for more on the combo cable.

3. Connect a power cable to the connector on the backplane.



Installing / Upgrading SODIMM



Caution

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

ACS-8930 is normally supplied without any DRAM installed. The ACS-8930 controller requires a minimum 32 MB DRAM SODIMM installed in the socket on the controller board in order to operate.



Note

There is no set formula to determine how much cache memory to use, but as a general rule, a workstation, with mostly very large files, such as for audio or video editing and playback, graphics or CAD files, can benefit from a large cache. File servers, with multiple random access of varying file size, generally have little or no performance improvement with additional cache.

SODIMM specifications:

Minimum	Recommended
<ul style="list-style-type: none"> 144-pin SDRAM SODIMM module (PC-100, 60~80 ns). 	<ul style="list-style-type: none"> SDRAM
<ul style="list-style-type: none"> SODIMM, with or without parity 	<ul style="list-style-type: none"> With parity, for security
<ul style="list-style-type: none"> Minimum of one SODIMM with 32 MB. The memory card socket can support 32, 64, 128, 256 or 512 MB of memory. 	<ul style="list-style-type: none"> Minimum of 32 MB. More memory (up to 512MB) equals better performance: the size of the memory module defines the cache writing space available to the ACS-8930.

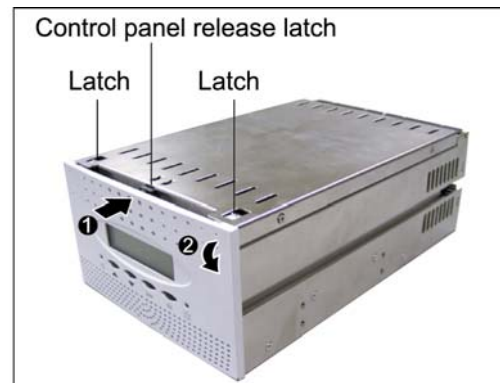
Architecture of supported SODIMM:

SDRAM Architecture	
<ul style="list-style-type: none"> 512 MB 	<ul style="list-style-type: none"> 16 (32M x 8)
<ul style="list-style-type: none"> 256 MB 	<ul style="list-style-type: none"> 16 (16M x 8) or 8 (32M x 8)
<ul style="list-style-type: none"> 128 MB 	<ul style="list-style-type: none"> 16 (8M x 8), 8 (16M x8), 8 (8M x16) or 4 (16M x 16)
<ul style="list-style-type: none"> 64 MB 	<ul style="list-style-type: none"> 8 (8M x 8), 8 (4M x 16) or 4 (8M x 16)
<ul style="list-style-type: none"> 32 MB 	<ul style="list-style-type: none"> 4 (4M x 16)

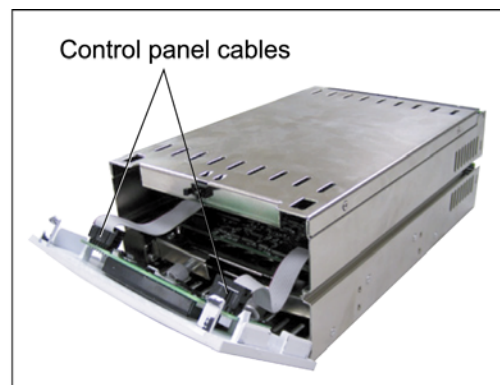
Installing SODIMM – 16 channel configuration

To install a SODIMM, ensure the system power is off and disconnected. Then:

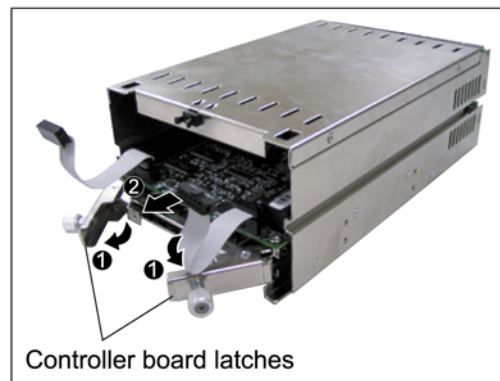
1. Press the control panel inward as indicated to release the control panel release latch.
2. Ease open the other two latches so that the control panel pivots forward.



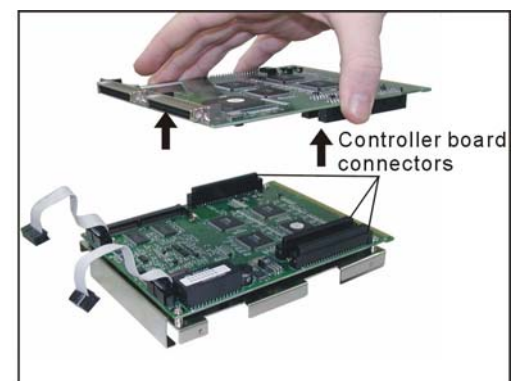
3. Release the two control panel cables and remove the control panel.



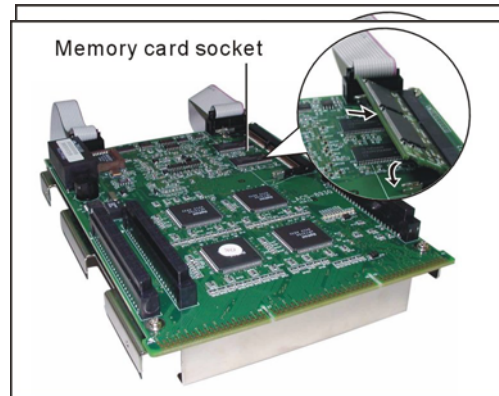
4. Release the controller board latches and slide the daughterboard and controller board (still connected to each other) out from the case.



5. Lift the daughterboard gently but firmly to disconnect it from the controller board connectors.

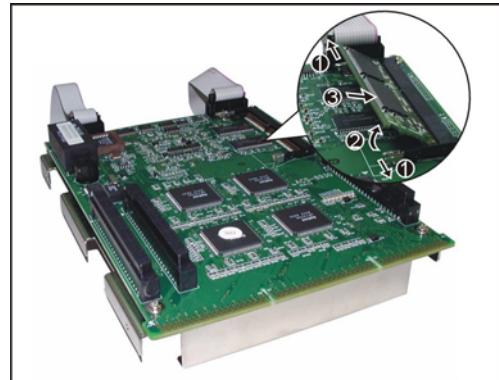


6. Insert a memory card at a 45-degree angle into the memory card socket on the controller board so that the gold teeth of the card are no longer visible.
7. Press the card down firmly until the latches lock it into place.
8. Replace the daughterboard: Line the daughterboard connectors up with the controller board connectors and press down firmly.
9. Slide the connected controller board and daughterboard into position in the controller box and lock in place with the controller board latches.
10. Reattach the control panel cables and replace the control panel.



Removing SODIMM – 16 channel configuration

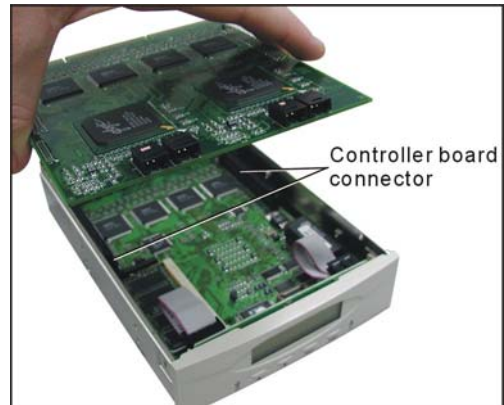
1. Follow the steps above to access the SODIMM socket on the controller board.
2. Release the latches securing the SODIMM to the controller board. The SODIMM will pop up.
3. Lift the SODIMM gently out of the memory card socket.



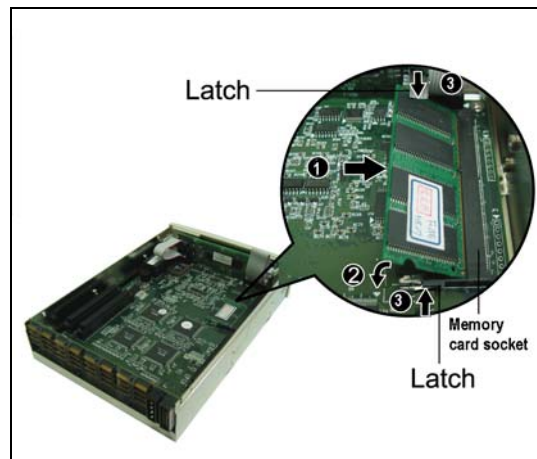
Installing SODIMM – 8 channel configuration

To install a SODIMM, ensure the system power is off and disconnected. Then:

1. Remove the controller box cover by sliding it back and lifting off.
2. Remove the daughterboard by lifting gently but firmly to disconnect it from the controller board connectors.

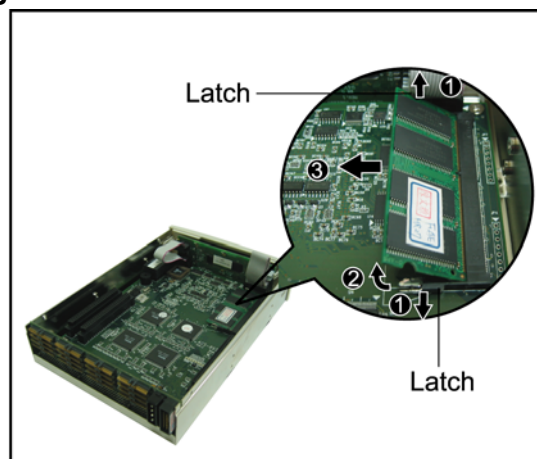


3. Insert a memory card at a 45-degree angle into the memory card socket so that the gold teeth of the card are no longer visible.
4. Press the card down firmly until the latches lock it into place.
5. Replace the daughterboard: line the daughterboard connectors up with the controller board connectors and press down firmly.
6. Replace the controller box cover.



Removing SODIMM – 8 channel configuration

1. Follow the steps above to access the SODIMM socket on the controller board.
2. Release the latches securing the SODIMM to the controller board. The SODIMM will pop up.
3. Lift the SODIMM gently out of the memory card socket.



Turning on for the first time

When cabling is complete and SODIMM has been installed, ACS-8930 can be turned on. This should be done in the following order:

1. First turn on the power source
2. Then boot the host computer(s)

When ACS-8930 is running, you are ready to configure one or more arrays. You have the following options:

1. Turn to Chapter 3 to perform a quick setup of a single RAID using the control panel.
2. Turn to Chapter 4 to access the Monitor Utility. Once the Monitor Utility is accessed, you can perform a Quick Setup (Chapter 3) or complete configuration (Chapter 5) with either the control panel or Monitor Utility.
3. Turn to Chapter 5 to perform a full configuration using the control panel.

Turning off

When turning off ACS-8930, users are advised to first shut down the server, then power off ACS-8930.

Restarting

When restarting ACS-8930, users are advised to first restart the server, then power on ACS-8930.

Chapter 3

Quick setup

Once ACS-8930 is set up and connected, the RAID should be initialized. The initialization process is automatic.

By performing Quick Setup, users can establish a RAID in seconds. There are two ways to perform Quick Setup:

- ⇒ Using the control panel
- ⇒ Using the embedded Monitor Utility

Both methods are explained in this chapter. The control panel can be accessed immediately, so Quick Setup can be completed very quickly using this method. Use of the Monitor Utility requires a connection to be established first between the host terminal and ACS-8930.



Note

Quick Setup can only be used to establish a single array. To establish a multiple array, turn to Chapter 5.



Note

Quick Setup cannot be used to reconfigure an existing array. To do this, turn to Chapter 5.

Quick Setup with the control panel

1. Turn on ACS-8930. The controller will enter self-diagnostic mode and automatically enter Operation Mode. A typical operation mode screen is shown.

```
ACS-8930 □
xxx111xx
```



Note

Full explanation of the control panel messages is given in Appendix C.

NOTE: Instructions on using the control panel are given in the section **Control Panel** in Chapter 1

2. Press **Enter** to enter configuration mode. You enter the main menu. The first item on the main menu is the Quick Setup submenu. Press **Enter** to select.

```
Main menu
0 Quick Setup
```



Note

The contents of other submenus are explained in detail in Chapter 5.

3. The Quick Setup submenu lists the RAID levels available (0, 1, 0+1, 3, 30, 5, and 50). Scroll through the list until the appropriate level for the RAID you want to set up is showing. Press **Enter**.

```
0 Quick Setup
Level 0+1
```



Note

Full explanation of the different RAID levels available is given in Appendix B.

Quick Setup with the monitor utility



Note

This section is intended as a Quick Setup guide only. Full instructions on accessing and using the Monitor Utility are given in Chapter 4.

Users wishing to perform Quick Setup via the monitor utility must first establish a connection between the host terminal and ACS-8930. Follow the instructions in Chapter 5, *Accessing the Monitor Utility*. Then:

1. Press **Ctrl** and **D** together to launch the Monitor Utility.
2. Press **Enter**. The Main Menu will appear.
3. Use the arrow keys to select **0 Quick Setup**. Press **Enter**.
4. The Quick Setup submenu lists the RAID levels available (0, 1, 0+1, 3, 30, 5, and 50). Scroll through the list until the appropriate level for the RAID you want to set up is highlighted. Press **Enter**.
5. You will be prompted for confirmation of your selection. Select **Yes** and press **Enter**.

```

..... RAID 8930-16 Monitor Utility .....
LCD                                     OUTPUT
RAID 8930-16   xxxxxxxxxxxxxxxx  Testing disk connection 13 14 OK.
-----Main Menu-----  Testing disk connection 15 16 OK.
Testing disk connection 10 11 OK.
0 Quick Setup  Use LBA Mode
11 +-Quick Setup--+  DISK: #11 not installed |
12 |               |  DISK: #16 not installed |
13 |Level 3        |  DISK: #14 not installed |
14 |Level 1        |  DISK: #12 not installed |
15 |Level 0        |  DISK: #1 not installed  |
16 |Level 1+0     |  DISK: #5 not installed  |
+-Level 3+0     |  DISK: #7 not installed |
|Level 5+0     |  DISK: #3 not installed |
|               |  DISK: #10 not installed |
|               |  DISK: #15 not installed |
|               |  DISK: #13 not installed |
|               |  DISK: #9 not installed  |
|               |  DISK: #2 not installed  |
|               |  DISK: #8 not installed  |
|               |  DISK: #6 not installed  |
|               |  DISK: #4 not installed  |
.....
AZ:Move Cursor, ESC:Exit, Enter:Enter, Tab:Switch to Output Area

```

Chapter 4

Accessing the Monitor Utility

Configuration of ACS-8930 can be accomplished using either the control panel or the embedded Monitor Utility, a convenient menu-based configuration utility, which is accessed through a dedicated terminal or host computer.

This chapter explains how to establish a connection between ACS-8930 and the host computer so that the Monitor Utility can be used. If you do not intend to access the Monitor Utility, this chapter can be ignored.

Establishing a terminal connection

The Monitor Utility can be accessed from a dedicated terminal or a host PC with third party communication software that supports ANSI terminal emulation.

To use a dedicated terminal, simply connect the terminal to the RS232 head of the RAID controller's combo cable.

To access the Monitor Utility from a host PC, ensure that the RS232 head of the RAID controller's combo cable is attached to the host computer's COM port before. A connection must then be established between the host computer and the ACS-8930 RAID controller. This is done by means of a terminal program, such as HyperTerminal. This section outlines the process to set up a HyperTerminal connection.

Other terminal programs may be used in place of HyperTerminal to communicate with the RAID controller. However, the setup process for other terminal software may differ from that outlined in this chapter.



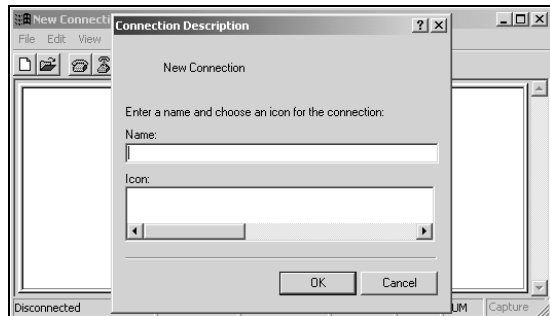
Note

HyperTerminal is bundled as standard with Microsoft Windows operating systems. It will be found in the Communications folder. The program can also be downloaded from Hilgraeve Software at <http://www.hilgraeve.com/htp/>

1. Launch HyperTerminal from the desktop of the host computer (**Start > Programs > Accessories > Communications > HyperTerminal**).



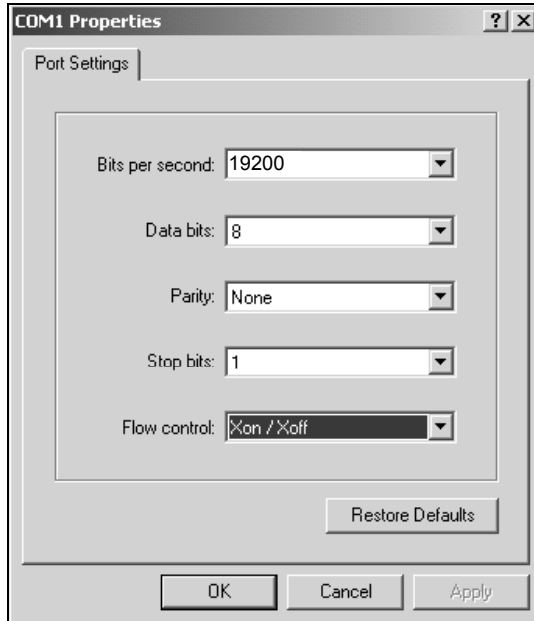
2. The **Connection Description** dialog box will appear (if this is the first time you have run HyperTerminal, you will first be prompted to enter information about your location). Enter a name to identify the RAID controller connection (e.g. **Accusys** or **8930**) and select an icon to represent the connection. Press **OK**.



3. The **Connect to** dialog box appears. Select **COM1** or **COM2** from the **Connect using:** dropdown menu, depending on which port is linked to ACS-8930. Click **OK**.



4. The **COM Properties** dialog box will appear. Set the following values:
 - Bits per second: 19,200
 - Data bits: 8
 - Parity: None
 - Stop bits: 1
 - Flow Control: Xon/Xoff



5. Click **OK**. The HyperTerminal connection to ACS-8930 is now established.

Using the Monitor Utility

Once a connection has been set up between ACS-8930 and the host computer:

1. Make sure ACS-8930 is turned on.
2. Press the Ctrl and D keys together to launch the Monitor Utility.

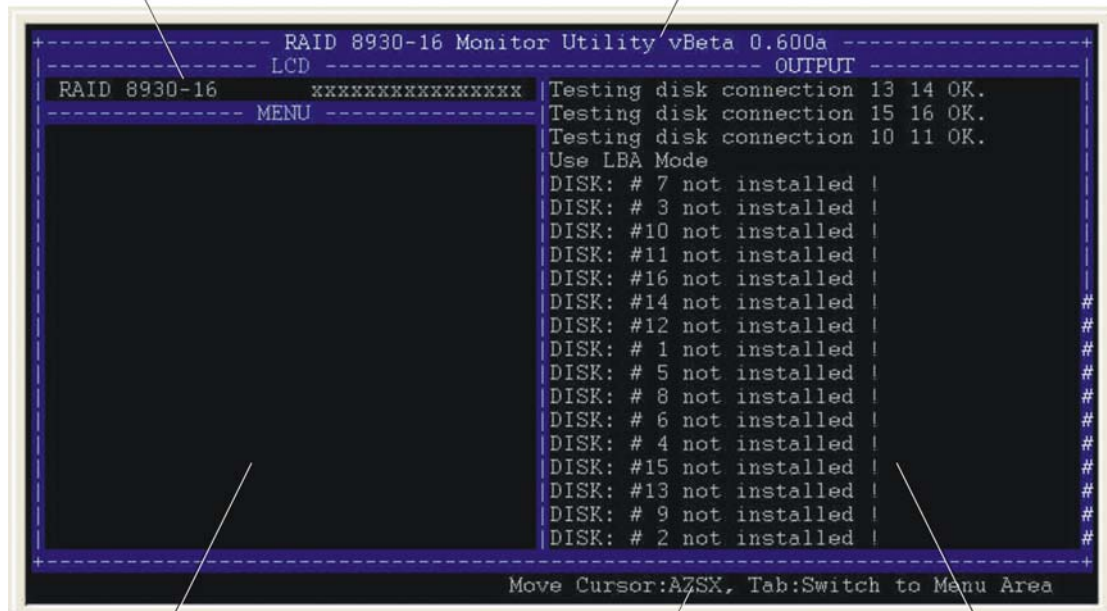


Note

To enlarge the size of the Monitor Utility window in HyperTerminal, select *Font...* from the *View* menu and increase the font size.

RAID controller and Monitor Utility firmware model numbers

Control Panel LCD output



Menu window

Control keys

Output window

The Monitor Utility has four sections:

The **Top Bar** lists the RAID controller model number and the firmware (Monitor Utility) model number.

The **Control Panel LCD Output** panel mirrors the appearance of the controller box LCD. Full explanation of LCD messages is given in Appendix C.

The **Menu window** is the space into which menus are called up. Full instructions on navigating through the menus are given in Chapter 4.

The **Output window** displays the current status of the RAID controller and array.

The **Control keys** enable the user to navigate through and between the output and menu areas.

Monitor utility control keys

The monitor utility control keys differ depending on which area is active: Menu area or Output area. The control keys are listed at the bottom of the Monitor Utility screen.

Menu area controls

- A / ↑ Move cursor up
- Z / ↓ Move cursor down
- Esc Cancel a selection / return to previous menu
- Enter Select an option
- Tab Switch to Output area

Output area controls

- A / ↑ Move cursor up
- Z / ↓ Move cursor down
- S / ← Scroll to top of output list
- X / → Scroll to bottom of output list
- Tab Switch to Output area



Note

The Monitor Utility and control panel cannot be used at the same time.

Chapter 5

Configuration

This chapter explains how to access and implement the complete suite of ACS-8930 configuration options using either the Monitor Utility or control panel. It contains:

- ⇒ An outline of the configuration process
- ⇒ An explanation of the configuration menu structure
- ⇒ Instructions on accessing the configuration menus
- ⇒ Diagrams of all menu options
- ⇒ Explanations of menu options
- ⇒ Instructions on how to update the ACS-8930 firmware

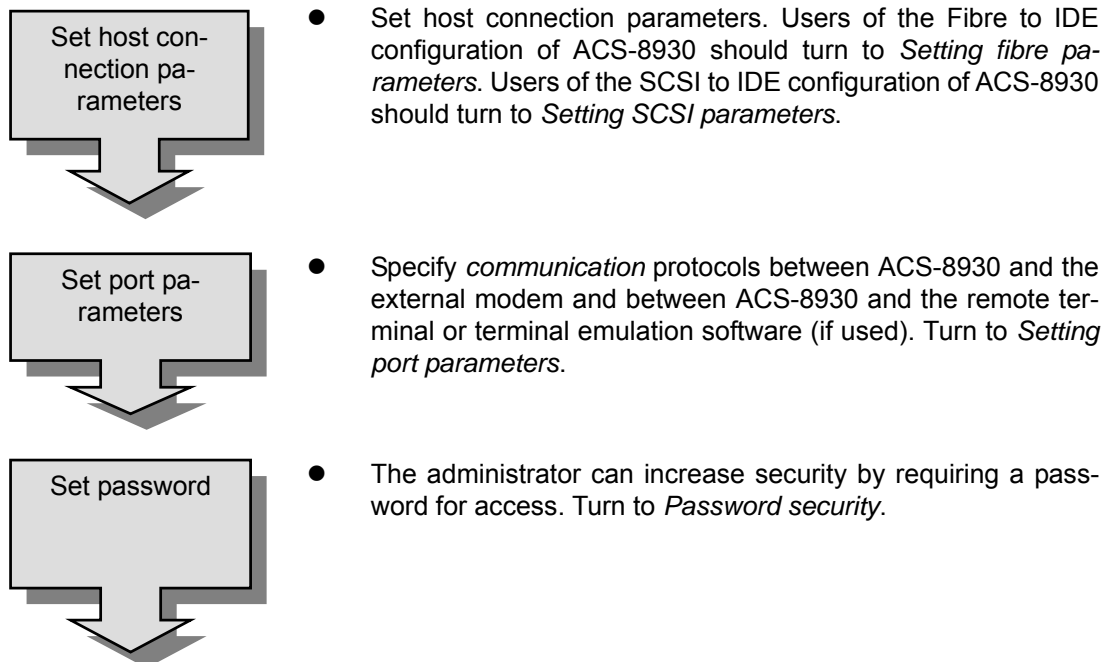
Configuration overview

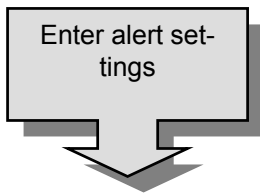
There are two aspects to configuration:

- Configuration of the RAID system and communication parameters
- Setting up and configuration of arrays within the RAID system

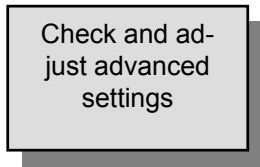
Users are advised to attend first to the system, then to the arrays.

System configuration



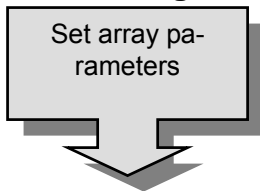


- The administrator can specify up to two fax numbers and two pager numbers to which alert messages will be sent in the event of an error with ACS-8930. Turn to *Entering and editing alert settings*.

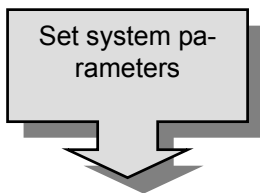


- The default settings are appropriate for most users. Turn to *Advanced settings*. Then proceed with RAID configuration.

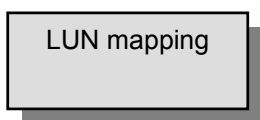
RAID configuration



- Set the following individual parameters for each array:
 - RAID level
 - Number of disks
 - Number and size of slices



- Set the following parameters for the RAID system:
 - Striping block size
 - Write buffer (enable/disable)
 - Writing method (Random / sequential)



- Map each slice to a LUN



Note

The Quick Setup option provides a convenient and rapid way to set up a simple array. See Chapter 3.

How to configure ACS-8930

There are two ways to configure ACS-8930:

- Using the Control Panel
- Using the Monitor Utility

These two methods are functionally identical. Only the interface differs. In each, the user scrolls through menus and submenus to locate and select the desired configuration option.



Note

*For instructions on navigating through menus using the control panel, turn to the section **Control Panel** in Chapter 1.*



Note

A full list of Control Panel LCD messages is given in Appendix C.



Note

*For instructions on using the Monitor Utility, turn to the section **Using the Monitor Utility** in Chapter 4.*



Note

The control panel cannot be used in configuration mode while a Monitor Utility connection is running. If you wish to configure using the control panel, first exit the remote terminal.

Finding your way around the menus

The main menu is the hub for all configuration choices. It consists of seven submenus and one hidden submenu. All configuration options are exercised from within these submenus. The main menus, as viewed from the Monitor Utility, for the two available hardware configurations of ACS-8930 are shown below:

```
+---Main Menu---+
|0 Quick Setup
|1 RAID Params
|2 SCSI Params
|3 RS232 Params
|4 System Params
|5 NVRAM
|6 RAID Funcs
+---+
```

SCSI to IDE configuration

```
+---Main Menu---+
|0 Quick Setup
|1 RAID Params
|2 FIBRE Params
|3 RS232 Params
|4 System Params
|5 NVRAM
|6 RAID Funcs
+---+
```

Fibre to IDE configuration

The table below is a quick reference resource to help you find your way around the submenus:

Name of submenu	Functions
▪ Quick setup	▪ Quickly establish a single RAID– see Chapter 3
▪ RAID params	▪ Set parameters for a single or multiple arrays
▪ SCSI params*	▪ Set SCSI parameters such as SCSI ID, speed and LUN mapping
▪ Fibre params**	▪ Set Fibre parameters, such as hard loop ID, connection mode, data rate and LUN mapping and enable/disable use of SAN masks
▪ RS232 params	▪ Set parameters for modem connection and RS232 connection to terminal
▪ System params	▪ Set / enable / disable password security ▪ Configure fax and pager alert settings
▪ NVRAM	▪ Save new configurations and restart RAID controller
▪ RAID funcs	▪ Initialize and check RAID 5 / 3 / 50 / 30 arrays ▪ Add and remove disks to existing arrays ▪ View system statistics ▪ Cancel error messages ▪ Alarm settings ▪ Expand array ▪ Update firmware

*SCSI to IDE configuration only

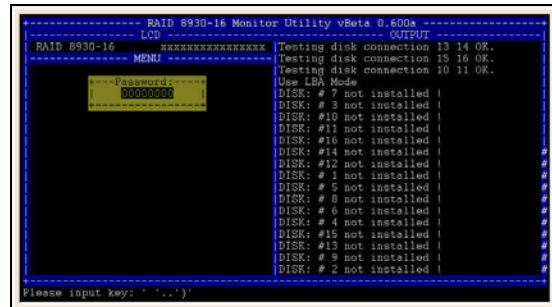
**Fibre to IDE configuration only

Accessing the main menu

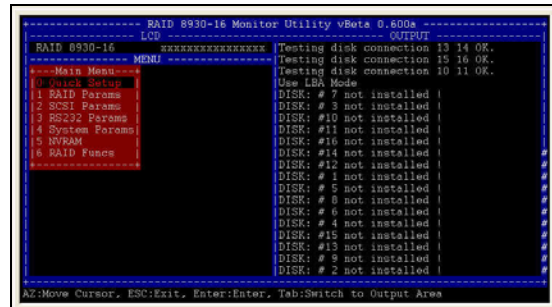
This section describes in detail the steps needed to call up the main menu using both the Monitor Utility and Control Panel.

Using the Monitor Utility

1. Run HyperTerminal (or the terminal program used to establish an RS232 connection with ACS-8930) and open the connection established with ACS-8930 in Chapter 4.
2. Press Ctrl D to launch the Monitor Utility. The menu area will be blank.
3. The Output area is active, press **Tab** once to switch to the Menu area.
4. With the Menu area active, press **Enter**. If password access has been enabled, you will be prompted to enter a password as shown. No password is required by default.



5. Press **Enter**. The **Main Menu** will appear.



Note

The main menu varies slightly depending on the hardware configuration of the model purchased. The main menu of the fibre to IDE configuration has a fibre params submenu. The main menu of the SCSI to IDE configuration has a SCSI params submenu. These submenus are dealt with separately in this chapter.

Using the Control Panel

ACS-8930
××111×××

Enter Passwd:
0 

Main menu
0 Quick Setup

1. Turn on ACS-8930. The controller will enter self-diagnostic mode and automatically enter Operation Mode. A typical operation mode screen is shown
2. Press **Enter** to enter configuration mode. If password access has been enabled, you will be prompted to enter a password. No password is required by default. Press **Enter** to submit a password.
3. You enter the main menu. Use the scroll keys to highlight the names of submenus and press **Enter** to select.

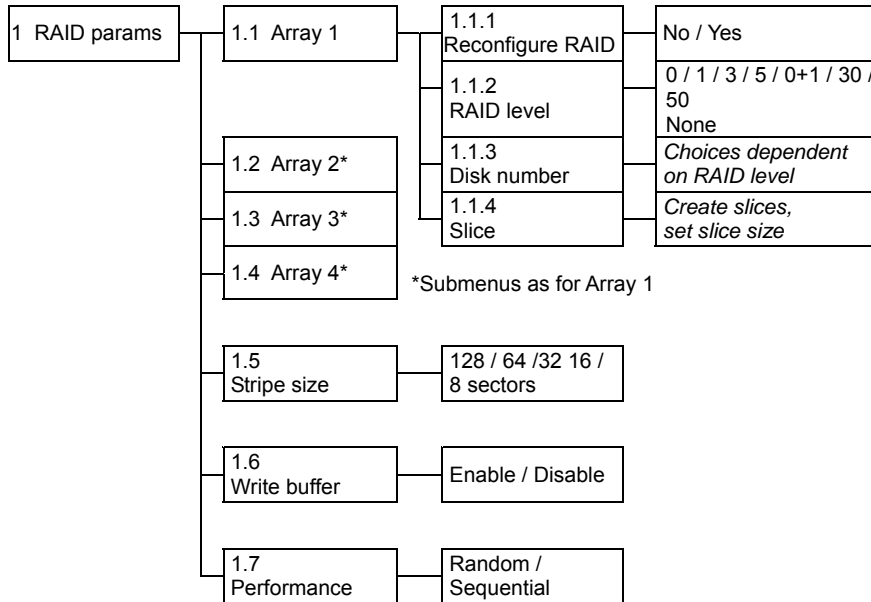


Note

The main menu varies slightly depending on the model purchased. The main menu of model ACS-8930F2 (fibre to IDE RAID) has a fibre params submenu. The main menu of model ACS-8930U3 (SCSI to IDE RAID) has a SCSI params submenu. These are dealt with separately in this chapter.

Setting array parameters

The parameters of the single or multiple ACS-8930 arrays are set and reconfigured from the **RAID params** submenu located at Main menu > RAID Params menu.



To set array parameters, follow these steps for each array individually:

1. Signal intent to re-configure RAID (1.1.1)
2. Choose a RAID level (1.1.2)
3. Indicate number of disks in array (1.1.3)
4. Partition the array into one or more slices (1.1.4)

Then, set these parameters for the arrays collectively:

5. Set the striping block size (1.1.5)
6. Enable or disable the buffer for write operations to memory (1.1.6)
7. Set writing method as random or sequential (1.1.7)


Finally,

8. Go to the NVRAM menu to save the new configuration (6.1)

RAID params menu


1.1 Array 1
Configure / reconfigure array 1

1.1.1 Re-configure RAID
Select **No** or **Yes**.



Note


To avoid accidental erasure of an existing RAID, Yes must be selected prior to saving of any RAID configuration

 **Caution**

Data lost during reconfiguration cannot be recovered. You are strongly advised to backup all data before reconfiguring.

1.1.2 RAID level


Select **0, 1, 0+1, 3, 30, 5, 50** or **None**.

 **Note**


*To remove an existing RAID, reconfigure the array with RAID level set to **None**.*

1.1.3 Disk number

Select the number of disks in the RAID.

 **Note**

Ensure the required number of disks for all arrays is connected before configuring an array. RAID Level 3 and 5 require a minimum of 3 disks, RAID Level 1 a minimum of 2 disks, RAID Level 0 a minimum of 1 disk, RAID 0+1 a minimum of 4 disks, and RAID 30 and RAID 50 a minimum of 6 disks. RAID 0+1, RAID 30 and RAID 50 also require an even number of disks.

 **Note**


The number of disks in the array does not include the “hot spare” disk.

1.1.4 Slice

Open this submenu to partition the RAID into different slices (identified as Slice 0, Slice 1 etc.). All RAID capacity is assigned by default to Slice 0 – i.e. to a single partition.

**1.1.4.1~
1.1.4.8 Slice 0~
Slice 7**

Input the size in MB of each slice. All RAID capacity is assigned by default to Slice 0. If the user reduces the size of Slice 0, all excess capacity will be assigned automatically to Slice 1, and so on through the list. Slices (partitions) are created in this way. If no capacity is allocated to a slice, that slice will not be created.

 **Note**

A slice must be mapped to a LUN before it can be accessed. After creating slices, users should go to the Fibre Params / SCSI Params menu (depending on ACS-8930 model) to map each to a LUN.

- 1.2 **Array 2**
- 1.3 **Array 3**
- 1.4 **Array 4**

Configure / reconfigure arrays 2, 3 and 4 (ignore if a single array is sufficient)

1.5 **Stripe size**

Set the striping block size, either **8**, **16**, **32**, **64** or **128** sectors (Default: 128 sectors).



Note

Stripe size is constant for any RAID system, whether it consists of a single or multiple arrays.



Note

Smaller stripe sizes provide faster access for small randomly-accessed files. Larger stripe sizes increase transfer rates for large sequentially-accessed files (such as video).

1.6 **Write buffer**

Enable or **Disable** buffer for write operations to memory (Default: Enable).

1.7 **Performance**

Set writing method as **Random** or **Sequential**.



Note

***Sequential** is best suited to saving large amount of data, **Random** to saving smaller amounts of data.*



Note

Configuration changes made in the RAID Params menu must be saved to the ACS-8930 non-volatile memory and ACS-8930 restarted for the changes to take effect. This is done in the NVRAM menu located at Main menu > NVRAM menu. See Saving Configurations later in this chapter.

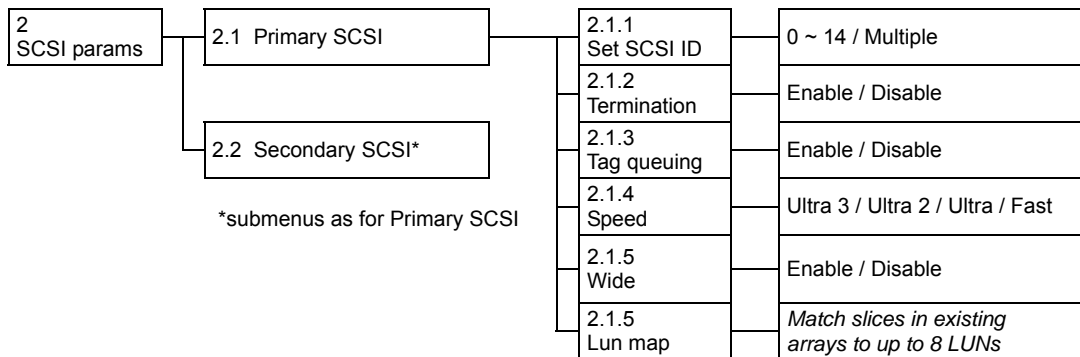
Setting SCSI parameters

The parameters of the SCSI connection(s) to the host(s) are set and reconfigured from the SCSI Params submenu located at Main menu > SCSI Params menu. The settings are needed to avoid conflict with the SCSI adapter or other SCSI devices



Note

ACS-8930 is available in two hardware configurations: With a fibre channel interface and with a SCSI interface. The SCSI Params menu is only present on the SCSI interface configuration. User of the fibre channel interface model should ignore this section.



SCSI params menu

2.1 Primary SCSI

Submenu for configuring Primary SCSI settings

2.1.1 Set SCSI ID

Select **0** to **14** or **Multiple** (Default: 0). ID 7 is reserved for the SCSI card.

2.1.2 Termination

Enable or **Disable** (Default: Enable). Disable termination is a terminator has been installed on each SCSI bus



Note

If ACS-8930 is the only SCSI device on the bus or is at the end of a daisy chain the termination should be enabled. If ACS-8930 is in the middle of a daisy chain the termination should be disabled.

2.1.3 Tag queuing

Enable or **Disable** (Default: Enable). Tag Queuing allows ACS-8930 to process multiple requests from the host without having to serialize the operations thus improving performance.

2.1.4 Speed

Ultra 3, Ultra 2, Ultra or Fast (Default: Ultra 3). See table below for settings.


2.1.5 Wide

Enable or Disable (Default: Enable).

SCSI Interface	Wide	Fast	Ultra	Ultra2	Ultra 3
SCSI-2	Disable	[ENT]			
Wide SCSI	Enable	[ENT]			
Ultra SCSI	Disable		[ENT]		
Ultra Wide SCSI	Enable		[ENT]		
Ultra 2 SCSI	Enable			[ENT]	
Ultra 160 SCSI	Enable				[ENT]

2.1.6 Lun Map

Select a *Logical Unit Number* (**LUN 0 to LUN 7**) and a corresponding slice on which to map it.




Note

A RAID may be divided into several logical units (that portion of a disk array seen by the host system as a single logical device). ACS-8930 can support up to eight logical units in total.

2.2 Secondary SCSI

Submenu for configuring Secondary SCSI settings for use in multiple host topology (submenu items as above)



Note

Configuration changes made in the SCSI Params menu must be saved to the ACS-8930 non-volatile memory and ACS-8930 restarted for the changes to take effect. This is done in the NVRAM menu located at Main menu > NVRAM menu. See Saving Configurations later in this chapter.

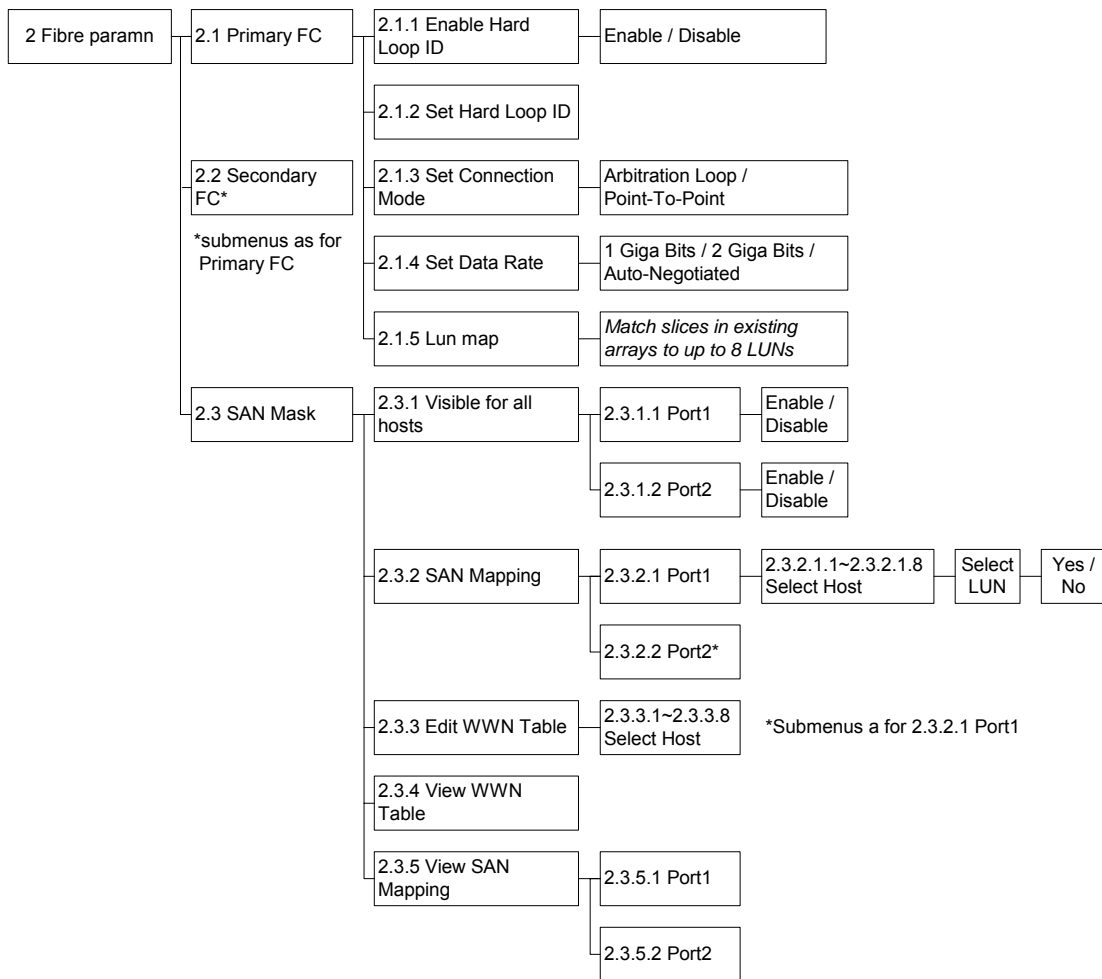
Setting fibre parameters

The parameters of the fibre channel connection(s) to the host(s) are set and reconfigured from the Fibre Params submenu located at Main menu > Fibre Params menu.



Note

ACS-8930 is available in two hardware configurations: With a fibre channel interface and with a SCSI interface. The Fibre Params menu is only present on the fibre channel interface configuration. User of the SCSI interface model should ignore this section.



Fibre params menu

2.1 Primary Fibre

Submenu for configuring Primary Fibre settings

2.1.1 Enable Hard Loop ID

Enable Hard Loop ID if you wish to enter the ID manually. **Disable** to have the ID set by the controller (Default: Disable).

2.1.2 Set Hard Loop ID

Enter the Hard Loop ID for this controller (only applicable if 2.1.1 is set to Enable).

2.1.3 Set Connection Mode

Arbitration Loop or **Point-to-Point** (Default: Arbitration Loop).

2.1.4 Set Data Rate

1 Giga-bits, **2 Giga-bits** or **Auto-negotiated** (Default: Auto-negotiated).

2.1.5 Lun Map

Select a LUN (**LUN 0** to **LUN 7**) and a corresponding slice on which to map it.

2.2 Secondary FC

Submenu for configuring Secondary Fibre Channel settings for use in multiple host topology (submenu items 2.2.1 to 2.2.5 as above)



Note

Configuration changes made in the Fibre Params menu must be saved to the ACS-8930 non-volatile memory and ACS-8930 restarted for the changes to take effect. This is done in the NVRAM menu located at Main menu > NVRAM menu. See Saving Configurations later in this chapter.

2.3 SAN Mask

SAN Mask (LUN Masking) is a differentiation tool for use on fibre networks based on the unique Worldwide Name (WWN) of each fibre card. SAN Masking allows an administrator to specify which hosts are able to see the RAID controller.

2.3.1 Visible For All Hosts

Use this submenu to select whether the RAID controller is visible to connected hosts.

2.3.1.1 / 2.3.1.2 Select Port

Port 1 or **Port 2**. The two ports are equivalent to the two host channels. Then choose **Enable** (to allow hosts on that channel to view ACS-8930) or **Disable** (to make ACS-8930 invisible to hosts on that channel).

2.3.2 SAN Mapping

SAN Mapping allows the administrator to map individual LUNs to a specified host thereby limiting access to certain slices to single hosts even in a dual host configuration.

2.3.2.1 / 2.3.2.2 Select Port

Port 1 or **Port 2**. The two ports are equivalent to the two host channels.

2.3.2.x.1 ~ 2.3.2.x.8 Select Host

Select **Host 1 ~ Host 8**, then select LUN (**LUN 0 ~ LUN 7**) and confirm selection.

2.3.3 Edit WWN Table

This submenu allows the administrator to enter individual host WWNs to the controller.

2.3.3.1 ~ 2.3.3.8 Select Host

Select **Host 1 ~ Host 8** and enter WWN value (Default: 0000000000000000).

2.3.4 View WWN Table

Select to view a list of host WWNs in the output window (this information cannot be viewed from the control panel).

2.3.5 View SAN Mapping

Use this submenu to view a table indicating mapping of LUNs to hosts in the output window (this information cannot be viewed from the control panel). In the table, **Y** signifies mapping and **N** signifies no mapping.

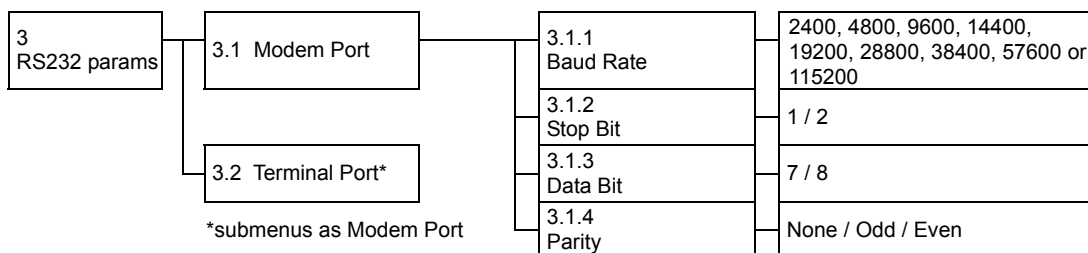
2.3.5.1 / 2.3.5.2 Select Port

Port 1 or **Port 2**. The two ports are equivalent to the two host channels.

Setting port parameters

RS232 Params menu

The administrator should specify the communication protocols between ACS-8930 and the external modem and between ACS-8930 and the remote terminal or terminal emulation software. This is done in the **Modem Port menu** located at Main menu > RS232 Params menu > Modem Port menu and the **Terminal Port menu** located at Main menu > RS232 Params menu > Terminal Port menu.



Modem Port menu

3.1 Modem port

Set the baud rate, Stop bit, data bit and parity parameters for the modem port to match those of the modem (see modem product documentation).

3.1.1 Baud Rate

2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600 or **115200** (Default: 19,200)

3.1.2 Stop Bit

1 or **2** (Default: 1)

3.1.3 Data Bit

7 or **8** (Default: 8)

3.1.4 Parity

None, Odd or **Even** (Default: None)

Terminal Port menu

3.2 Terminal Port

Set the baud rate, Stop bit, data bit and parity parameters for the terminal port to match those of the host.

3.2.1 Baud Rate

2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600 or **115200** (Default: 19,200; Recommended: 115,200)

3.2.2 Stop Bit

1 or **2** (Default: 1)

3.2.3 Data Bit

7 or **8** (Default: 8)

3.2.4 Parity

None, Odd or **Even** (Default: None)

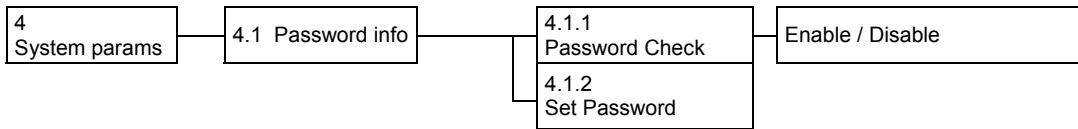


Note

The remote terminal settings and those of ACS-8930 must match. So, if the administrator increases the Baud rate of the ACS-8930 port, the baud rate of the terminal emulation software (e.g. HyperTerminal) connection must likewise be increased.

Password security

The administrator can enable password security and set the password from the **Password Info** submenu located at Main menu > System Params menu > Password Info



Password Info menu

4.1.1 Passwd check

Enable or **Disable** the Password security feature. When enabled, users will be asked to enter the password when first accessing the main menu (Default: Disable).

4.1.2 Set Passwd

Enter a password of up to eight alphanumeric figures.



Note

Configuration changes made in the Password Info menu must be saved to the ACS-8930 non-volatile memory to take effect. This is done in the NVRAM menu located at Main menu > NVRAM menu. See Saving Configurations later in this chapter.

Entering and editing alert settings

The administrator can specify two fax numbers and two pager numbers to which alert messages will be sent in the event of an error with ACS-8930. To configure alert settings, follow the instructions in succeeding sections to:

1. Configure pager settings
2. Configure fax settings
3. Configure modem
4. Update settings in the NVRAM submenu

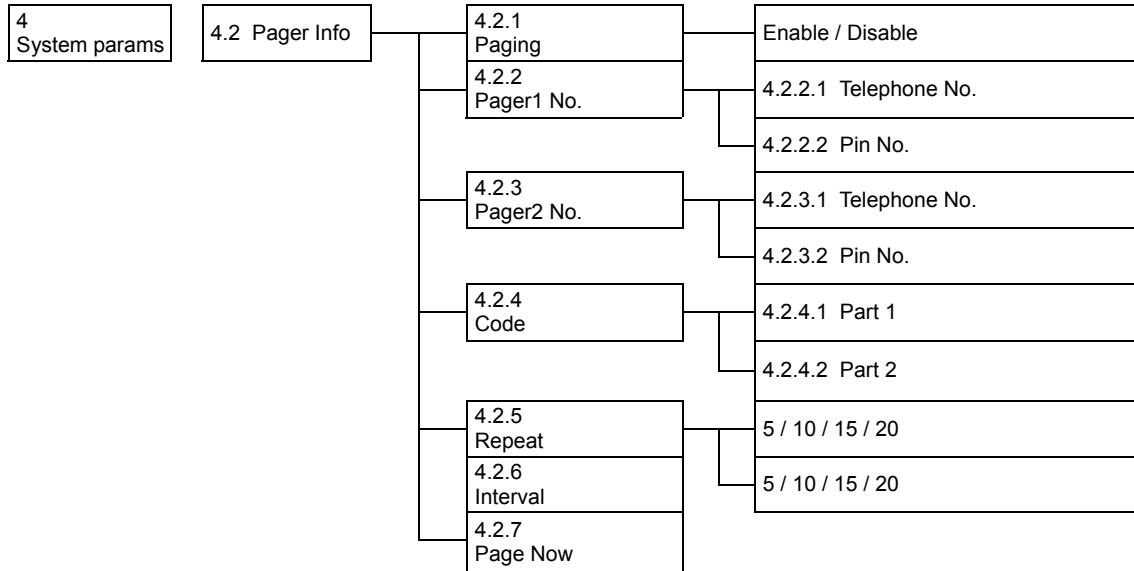


Note

A modem must be connected to ACS-8930 via the combo cable modem connector for the alert feature to work.

Pager alert settings

Pager alert settings are all entered and edited from the **Pager Info** submenu, located at Main menu > System Params menu > Pager Info



Pager Info menu

4.2.1 Paging

Enable or **Disable** the Pager alert function (Default: Disable)

4.2.2 Pager1 No.

Enter the first pager's terminal **telephone number** (also called the 'port number' or 'TAP port number') and the pager **pin number** (if required for pager). Maximum 16 characters.


4.2.3 Pager2 No.

Enter the second pager's terminal telephone number (also called the 'port number' or 'TAP port number') and the pager pin number (if required for pager). Maximum 16 characters.

4.2.4 Code

Enter the alert message for pager 1 under **Part 1**.

Enter the alert message for pager 2 under **Part 2**.



Note

Pager alert messages may be up to 16 alphanumeric characters in length.

4.2.5 Repeat


Select how many times the alert message(s) should be sent: **5, 10, 15** or **20** times (Default: 5).

4.2.6 Interval

Select the interval between dispatch of repeated alert messages: **5, 10, 15** or **20** minutes (Default: 5).

4.2.7 Page Now

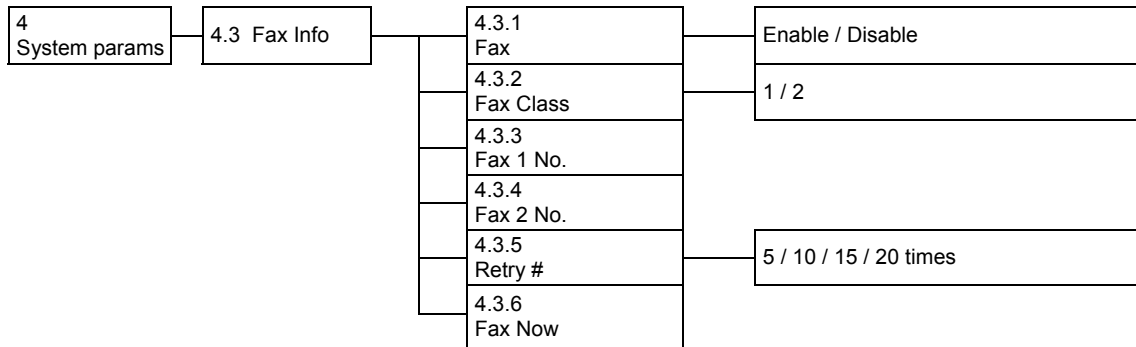
Instruct ACS-8930 to send a test pager alert immediately.

 **Note**

When the above data has been entered appropriately, go to the NVRAM submenu to update settings so that the configuration changes are saved.

Fax alert settings

Fax alert settings are entered and edited from the **Fax Info** submenu, located at Main menu > System Params menu > Fax Info



The fax content is the system data displayed from the **Statistic** submenu (7.7)

Fax Info menu

4.3.1 FAX

Enable or **Disable** the Fax alert function (Default: disable).

4.3.2 FAX Class

Define the Fax class supported by the modem, either **1** or **2**.

4.3.3 FAX1 No.

Enter the first fax number (two alert fax numbers can be input).

4.3.4 FAX2 No.

Enter the second fax number (two alert fax numbers can be input).

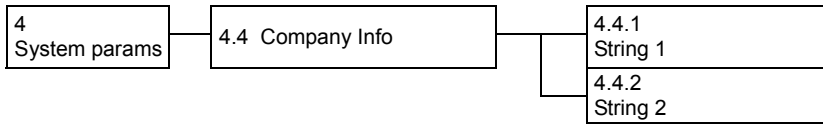
4.3.5 Retry #

Select how many times the alert message(s) should be sent: **5, 10, 15** or **20** times (Default: 5).

4.3.6 FAX Now

Instruct ACS-8930 to send a test fax alert immediately.

The alert fax header should be input in the **Company Info** submenu, located at Main menu > System Params menu > Company Info



Company Info menu

4.4.1 String 1

Enter the first line of information to be used as the alert fax header (up to 16 alphanumeric characters).

4.4.2 String 2

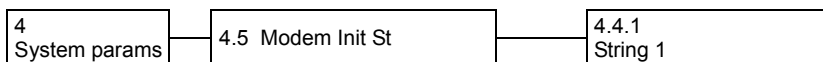
Enter the second line of information to be used as the alert fax header (up to 16 alphanumeric characters).

Note

When the above data has been entered appropriately, go to the NVRAM submenu to update settings so that the configuration changes are saved.

Modem settings

Before the fax and pager alerts are used the default Modem Initialization string should be confirmed or a new string entered. Do this in the **Modem Init St** submenu, located at Main menu > System Params menu > Modem Init St




Modem Init St menu

4.5 Modem Init St

Configures the modem you are using for the remote notification feature.

Note

The default string is a generic string compatible with most modems. Refer to your modem user's guide to check if your modem requires a different string.




Note

Configuration changes made in the System Params menu must be saved to the ACS-8930 non-volatile memory for the changes to take effect. This is done in the NVRAM menu located at Main menu > NVRAM menu. See Saving Configurations later in this chapter.

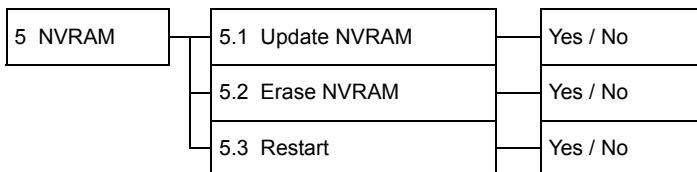
Saving configurations

Any configuration changes made by the administrator must be saved to the non-volatile memory (NVRAM). This is done in the **NVRAM menu** located at Main menu > NVRAM menu



Caution

Any changes made in this menu will cause data on the drives to be permanently erased. ACS-8930 should be offline before configuration changes are saved.



NVRAM menu

5.1 Update NVRAM


Yes or **No** (default: No)
 Select **Yes** to store latest configuration settings in NVRAM

5.2 Erase NVRAM

Yes or **No** (default: No)
 Select **Yes** to clear contents of NVRAM and restore configuration defaults

5.3 Restart

Yes or **No** (default: No)
 Select **Yes** to restart ACS-8930.



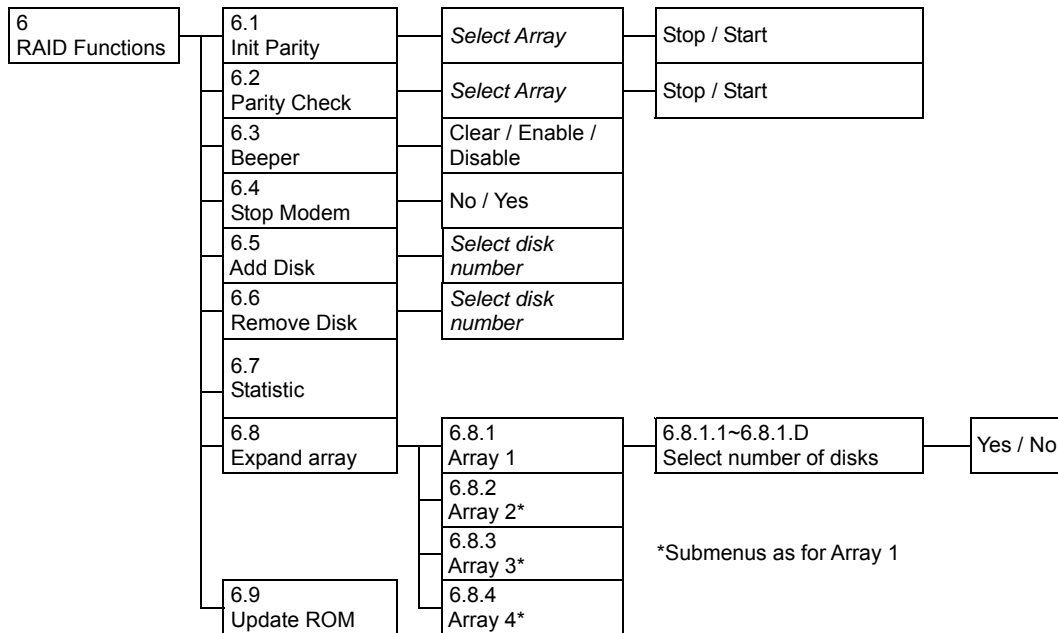
Note

ACS-8930 must be restarted for any configuration changes made within the Quick Setup, RAID params and SCSI//Fibre params menus to take effect.

Configuration changes made from the RS232, System Params and RAID Funcs menus do not require restart.

Advanced settings

RAID Functions menu




6.1 Init Parity

Select **Array 1, 2, 3** or **4** and then **Stop** or **Start** (Default: Stop)
Initialize an existing RAID 5, RAID 3, RAID 50 or RAID 30 array.

6.2 Parity Check

Select **Array 1, 2, 3** or **4** and then **Stop** or **Start** (Default: Stop)
Check a RAID 5, RAID 3, RAID 50 or RAID 30 array for errors.



Caution

Checking of an existing array will cause data to be permanently erased from the array.

6.3 Beeper

Clear (to silence a sounding beeper), **Enable** or **Disable** beeper function (Default: Enable).

6.4 Stop Modem

No or Yes

Select **Yes** to halt the transmission of subsequent alert faxes / pager messages when the message has been received and acknowledged (Default: No).

6.5 Add Disk

Select disk number (1 to 16 / 1 to 8 depending on configuration)
Add a disk to an existing configuration while ACS-8930 is online (Default: None).

6.6 Remove Disk

Select disk number (1 to 16 / 1 to 8 depending on configuration)

Remove a disk from an existing configuration while ACS-8930 is online. This function enables the administrator to shutdown a potentially faulty disk. If a spare drive is present, it will automatically be added (Default: None).


6.7 Statistic

Display system data in Monitor Utility Output window (this information cannot be viewed from the control panel). Data includes:

- Current settings saved in NVRAM
- Statistical analysis of read and write operations plus percentage of cache hits

6.8 Expand Array


Select array to be expanded (Array 1 to Array 4) and then the number of disks in the new array.



Note

Ensure that new disk capacity is equal to or larger than current on-line capacity. To expand an array. To expand disk capacity:

- ⇒ *Connect new disk*
- ⇒ *Use Expand Array menu to select the number of disks in the array*
- ⇒ *Go to the Slice menu (1.1.4). The new capacity will appear in a new slice. So if you have already set up Slice0, Slice1 and Slice2, the new capacity will form Slice3. If no slices have been formed before (i.e. there is only one partition: Slice0), the new capacity will be in Slice1.*




Caution

Expanding an array increases array capacity but data may sometimes be lost. You are strongly advised to make a system backup before proceeding.

6.9 Update ROM

Use this option to update the ACS-8930 programmable firmware. See *Updating the Firmware* later in this chapter.



Note

*Configuration changes made in the RAID Functions menu must be saved to the ACS-8930 non-volatile memory for the changes to take effect. This is done in the NVRAM menu located at Main menu > NVRAM menu. See **Saving Configurations** earlier in this chapter.*

Updating the Firmware

ACS-8930 is shipped with firmware installed. The user may however wish to download new or upgraded editions of the firmware to the controller. Ask your vendor about the latest firmware edition or refer to the website www.accusys.com.tw

A terminal emulation program, such as HyperTerminal, is required to download firmware.



Caution

Shutdown the host computer system(s) before downloading the new firmware.



Note

RAID data and configurations are not affected by updating of firmware.

To update the firmware:

1. Open the Update ROM submenu (69) located at Main menu > RAID funcs > Update ROM menu.

```

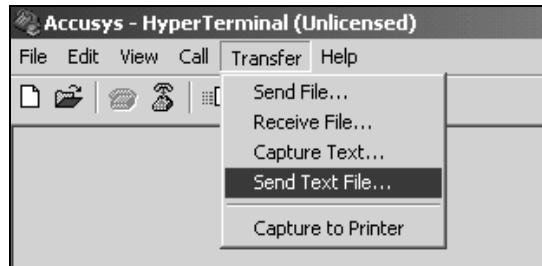
+---Main Menu---+
| 0 Quick Setup  |
| 1 RAID Params  |
| 2 SCSI Params  |
| 3 RS232 Params |
| 4 System Params|
| 5 NVRAM        |
| 6 +---RAID Funcs---+
+---+
| 61 Init R5/R3  |
| 62 R5/R3 Check|
| 63 Beeper      |
| 64 Stop Modem  |
| 65 Add Disk    |
| 66 Remove Disk |
| 67 Statistic   |
| 68 Expand Array|
| 69 Update ROM  |
+-----+
    
```

2. You will be asked: **Are you ready to download the new firmware?(Y/N)**. Type Y to continue.
3. When asked: **Are you sure? (Y/N)**, type Y to reconfirm.

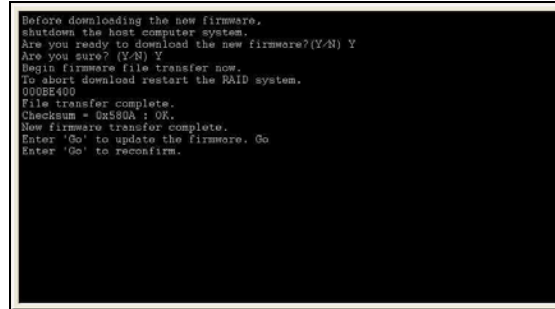
```

Before downloading the new firmware,
shutdown the host computer system.
Are you ready to download the new firmware?(Y/N) Y
Are you sure? (Y/N) Y
Begin firmware file transfer now.
To abort download restart the RAID system.
    
```

4. Locate the updated firmware file to send. If using HyperTerminal, go to the **Transfer** menu and select **Send Text File...**



5. Send firmware file as a text file. The file will start to download. When prompted, enter **Go** (case sensitive) to update the firmware.
6. When prompted, enter **Go** (case sensitive) to reconfirm. The firmware will start to update.



Appendix A

Troubleshooting**Problems setting up****Newly installed memory fails during Self-Test or is not detected.**

Possible Cause: The Memory SO-DIMM module may not be properly seated or may not be supported by ACS-8930.

Fix: Re-sit the memory module in the socket and retry. If it continues to fail try moving it to the other memory socket. Make sure the correct memory type is being installed. ACS-8930 supports 144-pin SO-DIMM SDRAM.

Unable to access ACS-8930 after the operating system boots up.

Possible Cause: ACS-8930 is not configured.

Fix: Make sure ACS-8930 is configured for a RAID level. If no RAID level is configured the operating system will not detect ACS-8930 as a disk drive.

ACS-8930 does not recognize the HDDs

Possible Cause: HDD jumper setting problem.

Fix: Make sure all drive jumpers are set to "master"

I try to set up an array using Quick Setup but fail. Why?

Possible Cause: If the error message Array1 Exists! appears, an array has already been configured. Quick Setup can only be used to create new arrays.

Fix: Reconfigure the array from the RAID params submenu

Problems during operation**The front panel LCD displays alternating "Zz" characters.**

Possible Cause: These characters are displayed when the cache is full with write request data that have not been processed. Requests from the host are halted to flush the data in the cache.

Fix: None needed.

The front panel LCD displays alternating "Ww" characters.

Possible Cause: These characters are displayed to indicate that write requests in the cache are being processed. When these characters are displayed, ACS-8930 will halt requests from the host (see above).

Fix: Make sure the *Write Buffer* option of the *RAID Params* menu is enabled. In addition, more cache memory may be required. By increasing the cache memory, the write buffer space increases and will be able to handle the higher write requests.

LCD display shows owoooos

Possible Cause: “W” means “warning” - there are many bad sectors on your HDD.

Fix: Change hard drives.

Invalid NVRAM message appears

Possible Cause: NVRAM error or malfunction.

Fix: Save settings and restart the controller. If the problem persists, contact your vendor.

Data loss for Windows 2000 during system shutdown

Possible Cause: RAID controller is a built-in host and some data is still in cache buffer during system shutdown.

Fix 1: Set *Cache Off*

Fix 2: To shutdown, select *Restart system* and wait for about 30 seconds, then turn off power.

Fix 3: Shutdown host OS after shutting down controller.

Remote terminal problems

Unable to access Configuration Mode using the remote terminal interface.

Possible Cause 1: The terminal communication settings do not match the settings of the ACS-8930 RS-232 interface.

Fix: The default settings for the RS-232 port are 19,200 Baud rate, 8 Data bits, 1 Stop bit, No Parity, and XON/XOFF Flow control. Make sure the terminal is configured for these settings. If the settings were changed in Configuration Mode, verify the settings of the ACS-8930 in the RS-232 Params, Terminal option and change the terminal settings accordingly.

Possible Cause 2: Incompatible RS232 cable.

Fix: Cross pins on the RS-232 cable as shown below (or use a null modem cable). The only pins used are 2 3 & 5.

1 2 3 4 5 6 7 8 9

X I

1 2 3 4 5 6 7 8 9

Alert message problems

I am unable to send a Page or FAX using the modem port.

Possible Cause 1: The Page and Fax options are not enabled.

Fix: Go to the Configuration Mode and enable Page and FAX notification via the System Params menu option.

Possible Cause 2: The default modem initialization string is not compatible with your modem.

Fix: Change the modem initialization string in the System Params option. Refer to your modem manual for its initialization string.

The following modem models require their own initialization strings.

Modem Model	Initialization String	Baud Rate	FAX Class
Motorola ModemSURFR V.34 28.8	AT&D\Q1E	Up to 38400	1 & 2
Multitech Multimodem 2834ZDX	AT&D0&E5E0	Up to 38400	2 only
Hayes Accura 288 V.34+FAX	AT&D0&K4E0	38400 only	1 & 2
Practical Peripherals PM144MT II	AT&K4	Up to 38400	2 only
GVC F-1128V/T2	AT&D0&B1&H2	38400 only	1 & 2
US Robotics Sportster 28800	AT&H2&I1&R1&B1	38400 only	1 only

SCSI problems

ACS-8930 is not properly identified by the SCSI adapter during initialization of the computer system.

Possible Cause: The SCSI ID set for the ACS-8930 is being used by another SCSI device attached to the same SCSI card.

Fix: Select the Set SCSI ID option from the SCSI Params menu and specify a different SCSI ID. Most SCSI host adapters provide an onboard ROM BIOS, or software utility, that displays the devices attached and their SCSI IDs. Disconnect ACS-8930 from the SCSI host adapter card and during the system boot, or by running the utility, note the SCSI IDs already in use.

The ACS-8930 is identified as all SCSI IDs.

Possible Cause: The SCSI ID set for ACS-8930 is identical to the reserved SCSI ID used by the SCSI card in your system.

Fix: Select the Set SCSI ID option from the SCSI Params menu and specify a different SCSI ID. Most SCSI host adapter cards reserve SCSI ID 7 for the card ID.

The SCSI host adapter card does not detect ACS-8930.

Possible Cause: Incorrect termination in a daisy chain configuration or a loose cable in a stand-alone configuration.

Fix: In a daisy chain configuration, verify that only the SCSI host adapter and the last SCSI device is terminated. To change termination settings of ACS-8930, use the SCSI Params menu SCSI Termination option to enable or disable termination.

Appendix B

Introduction to RAID levels

The ACS-8930 can support the following RAID levels: 0, 1, 0+1, 3, 30, 5 and 50.

Which is the right level for you? The answer depends on the application you use your RAID for.

RAID Level 0 offers high transfer rates, and is ideal for large blocks of data where speed is of importance. Computer Aided Design, Graphics, Scientific Computing, Image and Multimedia applications are all good examples. If one drive in a RAID 0 array fails however, the data on the whole array is lost.

RAID Level 1 may be an appropriate choice if cost and performance are of significantly less importance than fault tolerance and reliability.

RAID Level 3 is similar to the more commonly used level 5. Both offer a good level of fault tolerance and overall system reliability at a reasonable cost for redundancy overhead.

RAID Level 5 arrays offer high I/O transaction rates, and are the ideal choice when used with on-line transaction processing applications, such as those used in banks, insurance companies, hospitals, and all manner of office environments. These applications typically perform large numbers of concurrent requests, each of which makes a small number of disk accesses. If one drive in a RAID 5 array fails, the lost data can be rebuilt from data on the functioning disks.

RAID Levels 0+1, 30 and 50 offer a compromise between the reliability and tolerance of levels 1, 3 and 5 and the high transfer rates provided by level 0.

This appendix provides a summary of the features of each RAID level to enable users with differing requirements to make the best choice.

RAID 0

RAID 0 links each drive in the array as one huge drive. Storage capacity is determined by the smallest drive in the array. That capacity is then applied to format all other drives in the array. If using a 40 GB, 60 GB, and 50 GB drive in a RAID 0 array, your system will see one huge drive of 120 GB (40 GB×3).

RAID 0 offers double or more performance under sustained data transfers when one drive per ATA port is used. In such a configuration, unlike SCSI, ATA drives are always available to the system. SCSI requires more management of the SCSI bus.

RAID 0: *Striped disk array without fault tolerance*

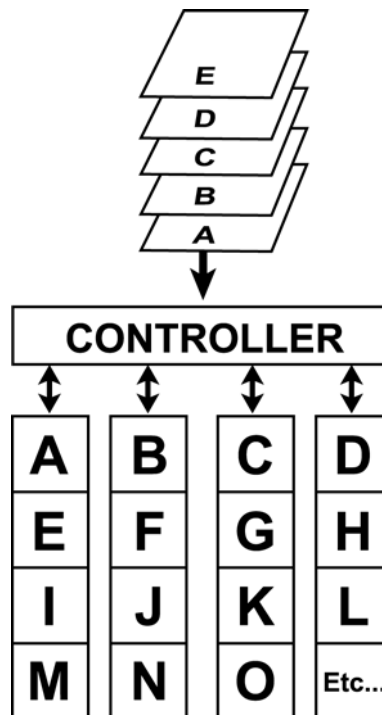
Characteristics:

- RAID 0 implements a striped disk array, the data is broken down into blocks and each block is written to a separate disk drive.
- I/O performance is greatly improved by spreading the I/O load across many channels and drives.
- Fastest and most efficient array type but offers no fault-tolerance.
- Storage capacity = (No. of disks) × (capacity of smallest disk)

Recommended use:

- Video production and editing
- Image editing
- Pre-press applications
- Any application requiring high bandwidth

The diagram below represents the writing of data on a RAID 0 array composed of four HDDS connected to the controller. Data blocks are distributed across all disks in the array.



Arrangement of data blocks saved on a Level 0 RAID

RAID 1

RAID 1 is commonly referred to as Disk Mirroring, Disk Shadowing or Disk Duplexing as all data is duplicated across both disks. As data is identical on both disks, storage capacity is that of the smaller disk. RAID1 has poor performance for write operations but very high performance for read intensive operations.

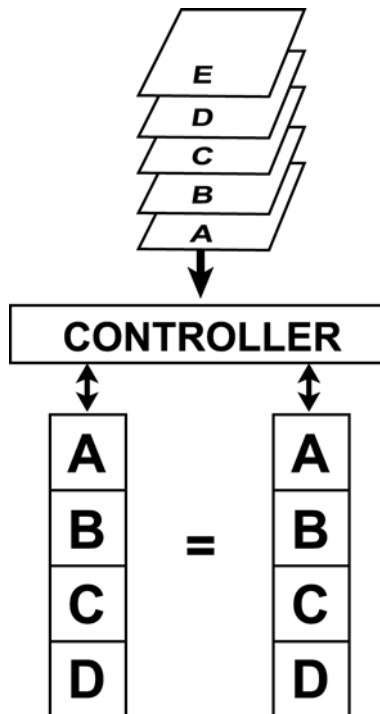
RAID 1: *Mirroring*

Characteristics:

- Better Read transaction rate than single disks, same Write transaction rate as single disks.
- 100% redundancy of data means no rebuild of data is necessary in case of disk failure, just a copy to the replacement disk.
- All the disks have the same data.
- Raid level 1 requires two drives.
- Storage capacity = Capacity of smaller disk

Recommended use:

- Accounting
- Payroll
- Financial
- Any application requiring high availability



Arrangement of data blocks saved on a Level 1 array

RAID 0+1

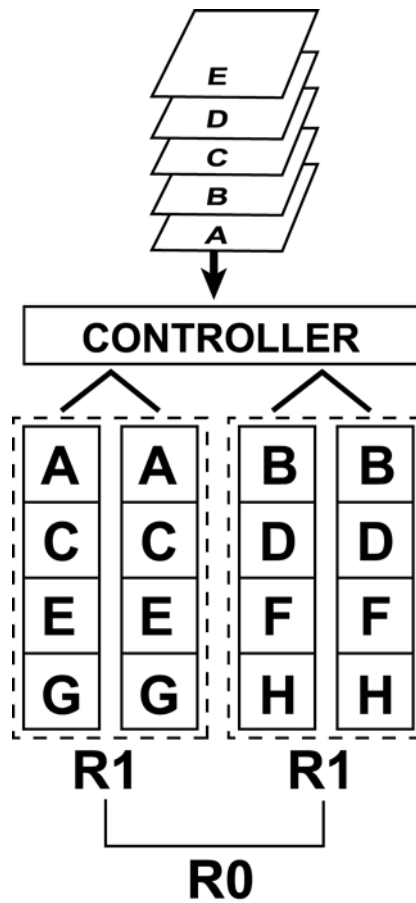
RAID 0+1 combines mirroring and striping functions on a minimum of four hard disks. Mirroring provides full redundancy and protects data in case of multiple drive failure (providing that data on one of each mirrored pair of drives is intact).

RAID 0+1: *Combination of striping and mirroring*

Characteristics:

- This configuration provides optimal speed and reliability.
- Requires even number of disks (minimum 4 disks)

The diagram below represents the writing of data on a RAID 0+1 array composed of four HDDS connected to the controller. The controller creates a RAID 0 array from two RAID 1 sub-arrays.



Arrangement of data blocks saved on a Level 0+1 array

RAID 3

RAID 3 uses a mathematical expression that compares data from two drives and calculates a third piece of data called “parity”. Should one of the drives fail, parity data can be used to rebuild the failed data. Under RAID 3, parity data is stored on a dedicated parity disk. If two or more disks were to fail however, data would be lost. Data on RAID 3 is byte-interleaved. While the low ratio of parity disks to data disks ensures high efficiency, the parity disk is accessed more than the others and so is also more likely to fail.

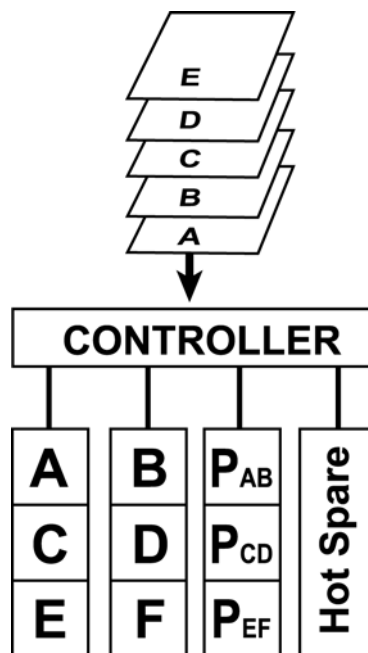
RAID 3: *Parallel transfer with parity*

Characteristics:

- The data block is subdivided, i.e. striped, and written on the data disks. Stripe activity is generated on Writes, recorded on the parity disk, and checked on Reads.
- Very high Read and Write data transfer rates.
- Disk failure has a low impact on throughput.
- Low ratio of ECC (Parity) disks to data disks means high efficiency.
- Requires a minimum of three drives.

Recommended use:

- Video production and live streaming
- Image editing
- Video editing
- Any application requiring high throughput



Arrangement of data blocks saved on a Level 3 array

RAID 30

RAID 30 stripes data, just as a RAID 0 array, but across RAID 3 arrays ("sub-arrays") rather than individual logical drives. ACS-8930 creates RAID 30 arrays from two RAID 3 sub-arrays.

The properties of a RAID 30 array are similar to those of a RAID 50 array but RAID 30 is better suited for use with large files. RAID 30 performance is better than RAID 3 performance. Speed is closer to RAID 3 than to RAID 0. A RAID 30 array can withstand a drive failure in each of the sub-arrays.

RAID 30: Striping with dedicated parity combined with block striping.

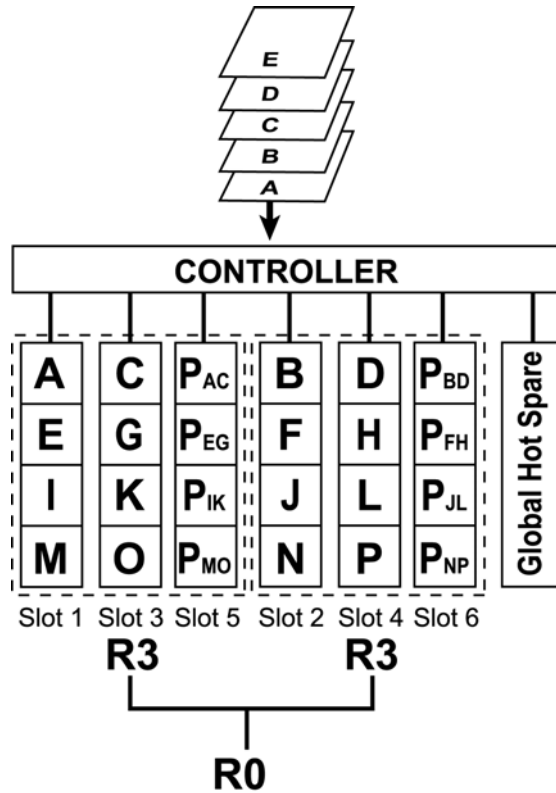
Characteristics:

- Very high Read and good Write data transfer rates.
- Disk failure has a low impact on throughput.
- Low ratio of ECC (Parity) disks to data disks means high efficiency.
- Requires a minimum of six drives. Total number of drives = number of drives on each RAID 3 array (min. 3) x 2 (number of RAID 3 sub-arrays)
- Capacity = (Size of small drive) x (Number of drives in each RAID 3 sub-array minus 1) x 2 (Number of sub-arrays)

Recommended use:

- Storage of critical multimedia data
- Database servers
- Large file servers

The diagram below represents the writing of data on a RAID 30 array composed of six HDDs connected to the controller (with an additional global hot spare drive configured). Parity blocks are represented by the letter P.



Arrangement of data blocks saved on a Level 30 array

RAID 5

RAID 5 uses a mathematical expression that compares data from two drives and calculates a third piece of data called “parity”. Should one of the drives fail, parity data can be used to rebuild the failed data. Under RAID 5, parity data is stored across all drives in the array. This maximizes the amount of storage capacity available from all drives in the array while still providing data redundancy. Data on RAID 5 is block-interleaved.

RAID 5: *Independent data disks with distributed parity blocks*

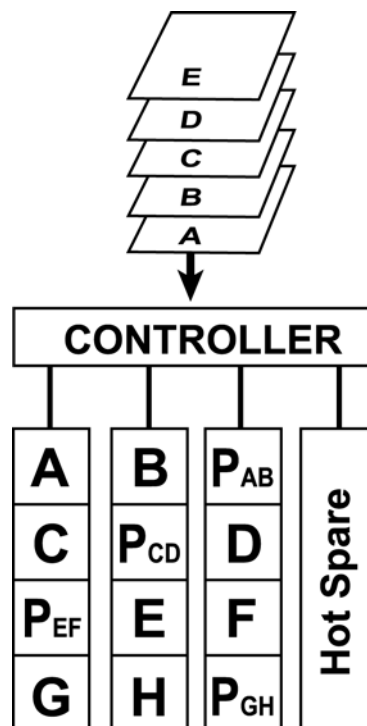
Characteristics:

- Each entire data block is written on a data disk. Parity for blocks in the same rank is generated on Writes, recorded in a distributed location and checked on Reads.
- Highest Read data transaction, medium Write data transaction rate.
- Relatively low ratio of ECC (Parity) disks to data disks means high efficiency (compared to other RAID levels).
- Good aggregate transfer rate.
- Storage capacity = (No. of disks – 1) × (capacity of smallest disk)

Recommended use:

- File and application servers
- Database servers
- WWW, E-mail and News servers
- Intranet servers
- Most versatile Raid level

The diagram below represents the writing of data on a RAID 5 array composed of four HDDS connected to the controller. Parity blocks are represented by the letter P.



Arrangement of data and parity blocks saved on a Level 5 RAID

RAID 50

RAID 50 have properties similar to RAID 30 arrays and are constructed by building a RAID 0 array from RAID 5 sub-arrays. ACS-8930 creates RAID 50 arrays from two RAID 5 sub-arrays so an even number of drives is required.

RAID 50 offers better performance than RAID 5. Properties are similar to those of RAID 30, though RAID 50 is better suited to dealing with smaller files. RAID 50 is ideal for applications requiring high fault tolerance and efficiency.

RAID 50: Block striping with distributed parity blocks combined with block striping.

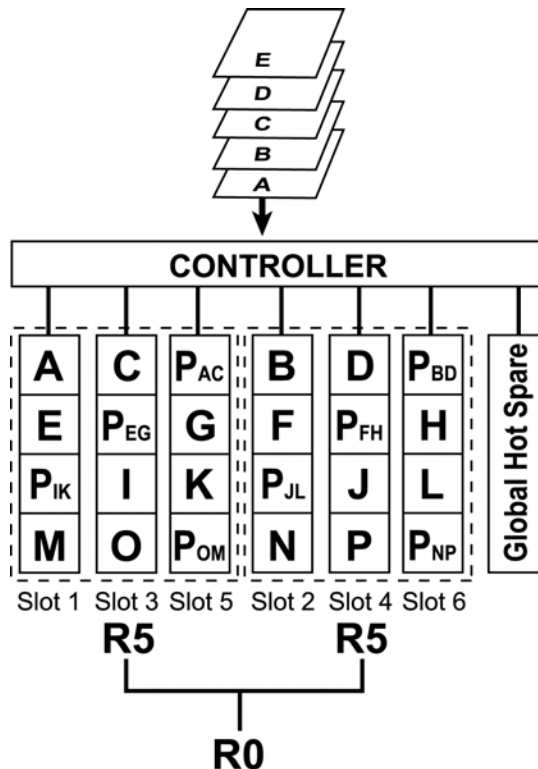
Characteristics:

- Very high Read and good Write data transfer rates.
- Disk failure has a low impact on throughput.
- Low ratio of ECC (Parity) disks to data disks means high efficiency.
- Requires a minimum of six drives. Total number of drives = number of drives on each RAID 3 array (min. 3) x 2 (number of RAID 5 sub-arrays)
- Capacity = (Size of small drive) x (Number of drives in each RAID 5 sub-array minus 1) x 2 (Number of sub-arrays)

Recommended use:

- Storage of critical multimedia data
- Database servers
- Large file servers

The diagram below represents the writing of data on a RAID 50 array composed of six HDDs connected to the controller (with an additional global hot spare drive configured). Parity blocks are represented by the letter P.



Arrangement of data and parity blocks saved on a Level 50 RAID

Appendix C**Control Panel Messages****Status messages**

When ACS-8930 is in operation mode, scroll buttons ▼ and ▲ can be used to display the following system data:

- Installed Memory
- RAID Capacity
- Firmware Version
- Serial Number
- CPU Type
- RAID Members
- RAID Level
- SCSI ID
- SCSI LUN

The table below explains the meaning of status messages:

Field / Symbol	Description
ACS-8930	The ACS-8930 model number.
OOOOOOOS	The 8 or 16 disks channel status. The first left O is channel 1. You can press [▼] button to view the next page. Other symbols are:
x	Disk not installed
A	Disk being Added
O	Disk On-line (Single array)
1	Array 1 Disk On-line (Multiple array)
2	Array 2 Disk On-line (Multiple array)
3	Array 3 Disk On-line (Multiple array)
4	Array 4 Disk On-line (Multiple array)
J	JBOD (Just Bundle of Disks)
S	Spare disk
R	Disk removed
I	Disk is being checked
R5	RAID level (0, 1,0+1,3, 30, 5, 50)
ID:0	SCSI ID (0 - 15)
	Alternating cursor indicating operational status.

Error Messages

The following is a listing of the error messages generated by ACS-8930 and their meaning.

- Legend:** x= Number of disk channel
 y= Total number of disks detected by the controller
 z= Number of disks specified in 1 RAID Params, 3 Disk Number menu option.

Error Message	Explanation
Number of disks found = y, needed = z	The number of disks found (y) does not match the number of disks configured for. The number of disks needed (z) is required.
Disk x not installed!	A disk drive (x) is not installed or is unable to be accessed.
Disk x previously removed!	A disk (x) was removed due to a failed disk or by the operator.
Too many RAID members failed!	The minimum number of disks required for the RAID configuration failed to initialize.
RAID not configured!	RAID cannot be configured due to too few good disks available or no RAID configuration has been performed.
Disk x is too small!	A disk capacity being added to an existing RAID configuration is less than the configured disks. To add a disk to an existing configuration the disk must be the equal size or greater.
Disk x format ERROR!	Disk (x) failed during the format. Possible bad disk.
Init RAID5 ERROR!	The RAID 5 initialization failed. Possible bad disk. Use Disk Check to identify faulty disk.
Disk x add ERROR!	Disk (x) being added failed. Possible bad disk. Use Disk Check to identify faulty disk.
Parity ERROR: blk ? !!	A parity byte was unable to be read/write. Blk ? is the block (sector) on the disks that failed. Possible bad disk.

Error Message	Explanation
RAID 5 Check ERROR!	The R5 Check function failed. Possible wrong RAID configuration or not initialized (Init RAID5).
UPS interrupt detected !	A power outage was detected by the UPS and notified the ProRAID via the UPS port
Param vendor ID ERROR!	The information in NVRAM has been erased. The configuration is lost.
Param checksum ERROR!	The information in NVRAM has been erased. The configuration is lost.
SCSI chip ERROR!	The SCSI interface of the ProRAID controller is faulty.
Testing Serial	The RS-232, Modem, or UPS port is faulty.
Do_IDE_Cmd: wait DRQ	The IDE interface is waiting for DRQ signal to go off in command phase.
Do_IDE_Cmd ERROR ? !	An error (?) occurred in IDE interface. Use Disk Check to identify faulty disk channel.
IDE_ISR: wait Master Int	IDE interface is waiting for an interrupt from a disk.
IDE_ISR: wait IDE Busy off	IDE interface is waiting for disk to be free.
IDE_ISR: status ?	IDE disk drive current status (?)
IDE_ISR: wait DRQ	To wait for disk drive to turn off DRQ in Interrupt phase.
IDE_ISR: DRQ ON	Indicates DRQ is not free in Interrupt phase.
DISK: status ?, error: ? !!	The status (status ?) and error (error: ?) returned by the disk based on the ATA-2 Specification.
DISK: #X type=?, blkno=?, resid=?	The disk (x) failed to respond to a request by the controller (type=?). The block number (blkno=?) where the request failed. The remaining sectors (resid=?)
DISK: Initialize #? ERROR!	The disk (x) was unable to be initialized by the controller. Possible bad disk.

Error Message	Explanation
DISK: #x is off-line!	Disk number (x) failed and was removed from the RAID configuration.
DISK: #x not installed!	The disk (x) has not been detected by the controller. Possible bad disk.
DISK: #x ERROR status ? !	The disk (x) caused an error. The status (?) returned by the disk per ATA-2 Specification.
ERROR: Not a hard disk!	The controller does not recognize the device installed.
ERROR: Disk parameters ERROR!	The controller was unable to read the disks parameters (Cylinder, Heads, Sectors, Multi-Sector). Possible bad disk.
ERROR: No multi-sector mode!	The disk does not support the ATA-2 multi-sector transfer function. The disk is an older IDE disk.
ERROR: IORDY not support!	Disk does not support IORDY. Possible older IDE disk that does not support ATA-2 Specification. Must replace disk.
DISK: #? Remap area overflow !	The area used to re-map bad sectors is full.
DISK: #? Blk no: ? is remapped.	Block number (?) is detected as a bad sector and has been re-mapped.
DISK: #? Remap area is empty!	No re-map sectors are available while the controller detected bad sectors.
Modem time-out!	The modem did not respond to the page or FAX notification request. Modem may be turned off or not connected.
All modem operations are canceled!	User stopped the modem from sending a page or FAX notification.
Training FAIL!	Fax Class 1 support -- modem fails in training phase.
Page transfers FAIL!	The page notification failed. Modem may be turned off or not connected.
FAX: Modem is busy!	The modem is currently is use and unable to send a FAX notification.

Error Message	Explanation
Paging: Modem is busy!	The modem is currently in use and unable to send a page notification.
Invalid NVRAM	The information stored in the NVRAM area is invalid and unable to be used.
No Configuration	The ProRAID is currently not configured for any RAID level.
Config ERROR	The current configuration failed to be verified. Possible fault disk or disk off-line.
Not enough Disk	Number of disks required for the RAID Level is missing. Possible faulty disks or disks off-line.
Fail Fan	The cooling fan of chassis is failed.
WARM Temp	The inside temperature of chassis is too high.
Fail Power	The redundant have occurred error.

Appendix D**Glossary****Array**

See Disk Array.

Array Management Software

The body of software that provides common control and management for a disk array. Array Management Software most often executes in a disk controller or intelligent host bus adapter, but may also execute in a host computer. When it executes in a disk controller or adapter, Array Management Software is often referred to as Firmware.

Cache

Controller memory used to speed up data transfer to and from a disk.

Disk Array

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.

Disk Striping

The practice of dividing data into blocks and writing the blocks across several drives for increased performance.

Disk Mirroring

The practice of duplicating data on different sets of disks in an array.

Firmware

See Array Management Software.

Host Computer

Any computer system to which disks are directly attached and accessible for I/O. Mainframes, and servers, as well as workstations and personal computers, can all be considered host computers in the context of this manual, as long as they have disks attached to them.

Hot Spare

A physical drive, not part of an array, on which the controller can rebuild data if an array drive malfunctions.

Hot Swap

The substitution of a (usually defective) unit by a replacement that takes place while the system is online.

Logical Unit

Disk storage space on one or more physical drives that appears to the host computer as a single drive.

LUN (Logical unit number)

The number assigned to a logical unit. Slices of a RAID are assigned (mapped to) LUNs by which they appear to the host computer.

Mirroring

See Disk Mirroring.

Parity

Parity information is redundancy information calculated from actual data values. If any single piece of data is lost, the data remaining and the parity information can be used together to compute the lost data. Parity information can either be stored on a separate, dedicated drive, or be mixed with the data across all the drives in the array.

RAID (Redundant Array of Independent / Inexpensive Disks)

A disk array in which part of the storage capacity is used to store redundant information about user data stored on the remainder of the storage capacity. The redundant information enables regeneration of user data in the event that one of the array member disks or the access path to it fails. See Parity. Different RAID levels offer different data throughput speeds and fault tolerance (data redundancy). RAID 0 does not feature redundant information but is nonetheless considered a special type of RAID.

SCSI

Small Computer System Interface.

Slice

A partition of a RAID. See LUN.

Striping

See Disk Striping.

Appendix E

Specifications

Item	Specifications
Operation System	OS Independent and Transparent
CPU	Intel i80303 64-bit RISC microprocessor
RAID Level	0, 1, 0+1, 3, 30, 5, 50
Cache Memory	Up to 512MB
SCSI Channel to Host	2(Max) Ultra 160 SCSI LVD
Fibre Channel to Host	2(Max) Optional for 2Gb FC upgrade
EIDE Channel to Device	16(Max) EIDE with Ultra DMA-100/133
Data Transfer Rate	Up to 160MB
Tagged Command Queuing	Yes, up to 256 Commands
Stripe Size	Variable
Write Option	Write through or Write back
Hot Swap	Yes
On Line Expansion	Yes
Hot Spare	Yes (Rebuild Transparently & Automatically)
Remote Management	RS-232 terminal emulation for configuration and monitoring
Remote Alerts	Fax, Pager
Local Alerts	Built-in buzzer

**Note**

Specifications subject to change without notice.

Appendix F

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