For Europe

 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 circlet 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.

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1. Introduction

Thank you for purchasing the ACS-8910 --a cost effective, high performance RAID solution.
The ACS-8910 is designed to meet today demand of higher storage solutions for the emerging needs of databases, e-mail, web servers and imaging systems maximizing data protection and exceptional performance in a storage controller. Target usage ranges from small business to departmental and corporate server needs. Plus, the ACS-8910 is designed for easy integration, smooth data expansion and server migration.

1.1 Package contents

- ACS-8910 Controller Box X 1
- ACS-8910 User Manual X 1
- ACS-7480 (Ultra160 SCSI) or ACS-7140 (Fibre 2Gigabit) daughter-board
- 80 Pins proprietary IDE Cable X 8
- Extension Cable (3-in-1) X 1
- 10-pin to 9-pin D-sub male Interface Cable X 1
- GUI CD X1
- GUI Manual X 1

1.2 Features

The ACS-8910 is a full-featured RAID controller designed to provide the utmost in fault tolerance, redundancy, reliability and performance. The following shows the features of the ACS-8910.

- Support for RAID Levels 0, 1, 0+1, 3and 5
- Host System independent
- Operating System independent
- Intel 80303 64-bit RISC High performance processor
- Support Ultra160 SCSI channel or Fibre 2Gigabits (Dual Chan is for option)
- Support 8 ATA-66/100 IDE channel
- Superior Accusys Array Management Firmware
- Flexible cache size of up to 512 MB
- Support up to 8 logical units
- Support on-line capacity expansion.
- Automatic Hot Swap, Hot Spare and Drive Rebuild Support
- Disk fail LED Indication
- Bad Sector reassignment
- Programmable Page and FAX event notification
- Remote monitoring through terminal

- UPS support through a standard UPS interface

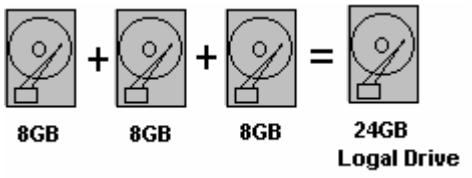
2. About RAID

2.1 Levels of RAID

RAID Level	Description	Minimum Drives	Data Availability	Performance Sequential	Performance Random
None RAID	Non-RAID	1		Drive	Drive
RAID 0	Disk Striping	**N**	= NRAID	R: Highest W: Highest	R: High W: Highest
RAID 1 (0+1)	Mirroring Plus Striping (if N>1)	N+1	>NRAID = RAID 5	R: High W: Medium	R: Medium W: Low
RAID 3	Striping with Parity on dedicated disk	N+1	>NARID = RAID 5	R: High W: Medium	R: Medium W: Low
RAID 5	Striping with Interspersed parity	N+1	>NRAID = RAID 5	R: High W: Medium	R: High W: Low

The ACS-8910 supports RAID Levels 0, 1, (0+1), (3) and 5. Depending on the application usage, different RAID levels perform different functions and fault tolerance. The following is a brief explanation of each RAID level. Be sure which RAID level is best suited for your application before configuring the ACS-8910.

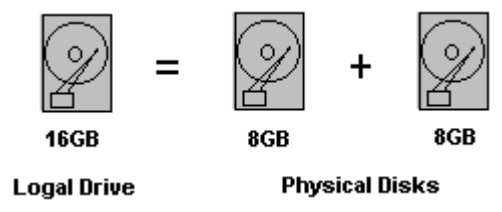
2.1.1 Disk Spanning (None RAID)

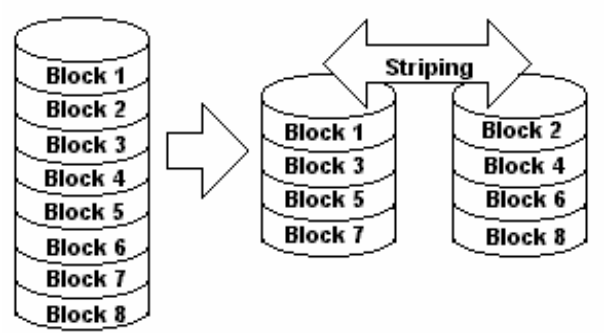


None RAID	
Minimum Disks required	1
Capacity	N
Redundancy	No

The capacity of all the drives is combined to become one logical drive (no block striping). In other words, the capacity of the logical drive is the total capacity of the physical drives. NRAID does not provide data redundancy.

2.1.2 Disk Striping (RAID 0)



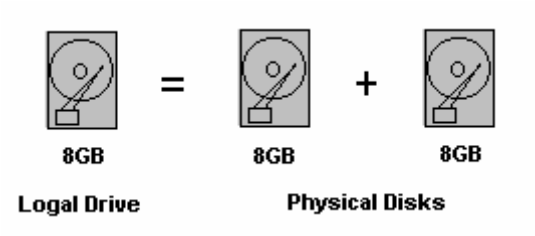


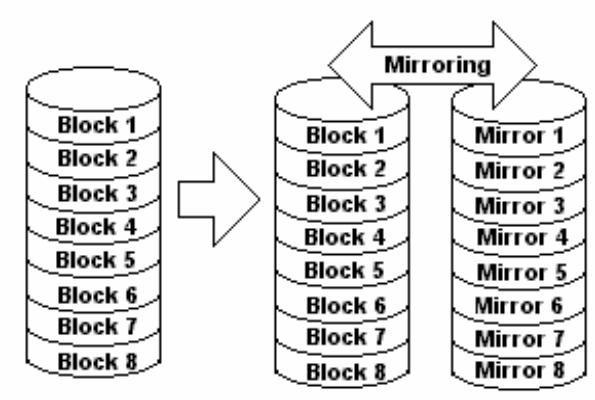
RAID 0	
Minimum Disks required	2
Capacity	N
Redundancy	No

Striping refers to the storing of data across multiple drives in a drive group. If there are three drives in a drive group then the subsequent data will be stored across all three drives. This creates a very high performance virtual disk with the capacity equal to the combined capacity of the installed disks.

RAID Level 0 provides high data reliability, availability and great performance for both read and write operations. No redundant parity is generated for protection against disk failure.

2.1.3 Mirroring (RAID 1)



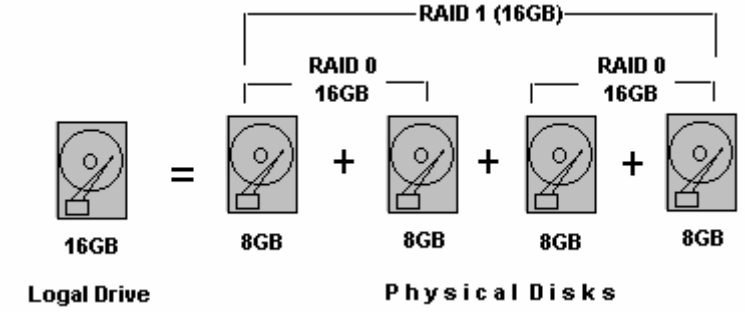


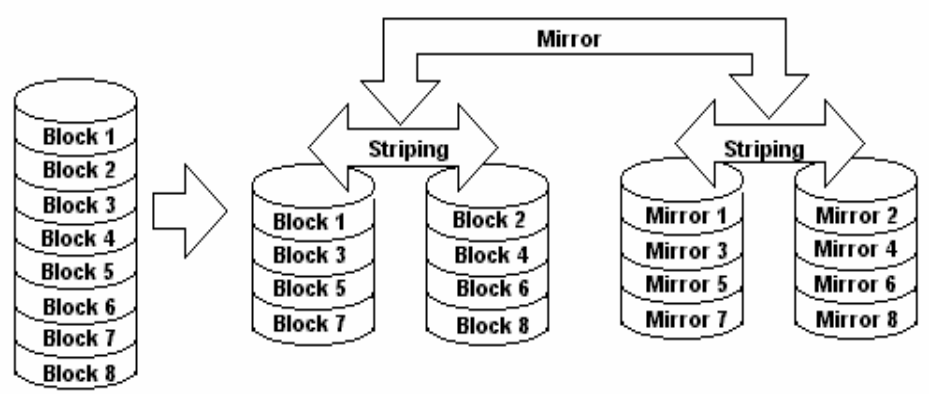
RAID 1	
Disks required	2
Capacity	N/2
Redundancy	Yes

RAID 1 mirrors the stored data from one to another. RAID 1 can only be performed with two hard drives. For instance, if there are more than two hard drives, RAID (0+1) will be performed automatically.

Disk Mirroring refers to the data duplication to two or more drives. Each drive contains a mirror image of the data on the other drive. Virtual disk space equals to half of the combined capacity of the installed disks although mirroring causes operational overhead resulting in lower performance for write operations it does provide the highest data reliability among RAID Level 0 to 5 with very high performance for read intensive operations.

2.1.4 Striping with Mirroring (RAID 0+1)

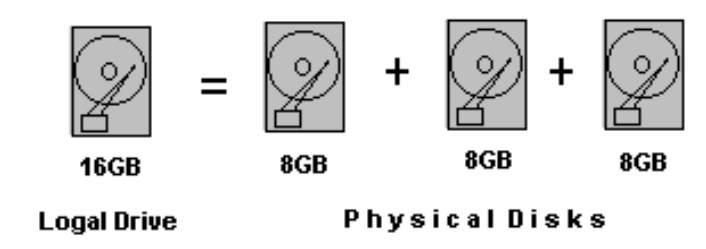


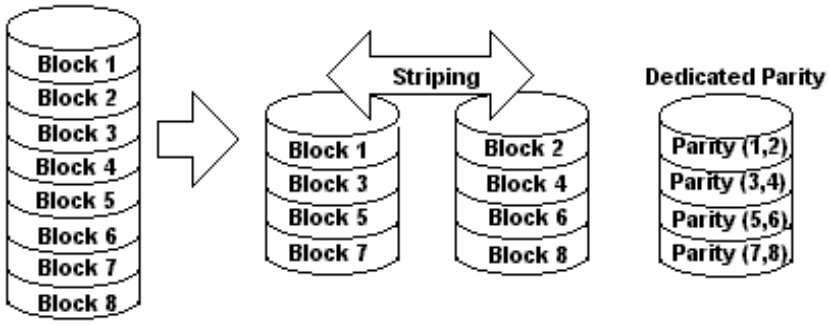


RAID (0+1)	
Minimum Disks required	4
Capacity	N/2
Redundancy	Yes

RAID (0+1) consists of RAID 0 and RAID 1-Striping and Mirroring. RAID (0+1) allows multiple simultaneous drive failures because of the full redundancy of the hard drives. Also, if there are more than two hard drives assigned to perform RAID 1, RAID (0+1) will be performed automatically.

2.1.5 Striping with Dedicated Parity Disk (RAID 3)

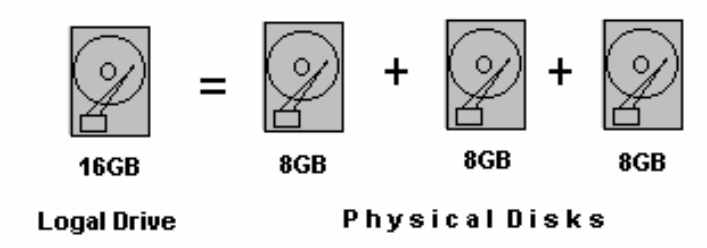


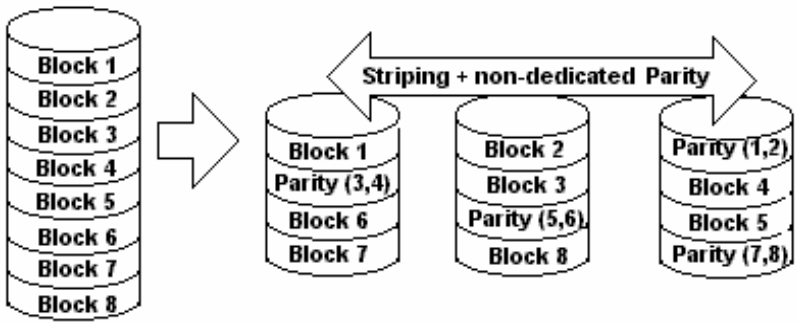


RAID 3	
Minimum Disks required	3
Capacity	N-1
Redundancy	Yes

RAID 3 performs Block Striping with Dedicated Parity. One drive member is dedicated to storing the parity data. When a single drive fails, the controller can recover/regenerate the lost data from the dedicated parity drive.

2.1.6 Striping with non-Dedicated Parity (RAID 5)





RAID 5	
Minimum Disks required	3
Capacity	N-1
Redundancy	Yes

Data is stripped across (such as RAID 0) all the drives with distributed parity (redundant data calculated by XOR logic used to rebuild the lost data). RAID Level 5 offers very high data redundancy, availability and performance.

2.2 Characteristics of RAID

The characteristics of RAID depend on your application and the RAID level you use. In general, using RAID provides Auto Hot Swap, Hot Spare and Auto Drive Rebuild.

2.2.1 Hot Swap Disk Cartridges

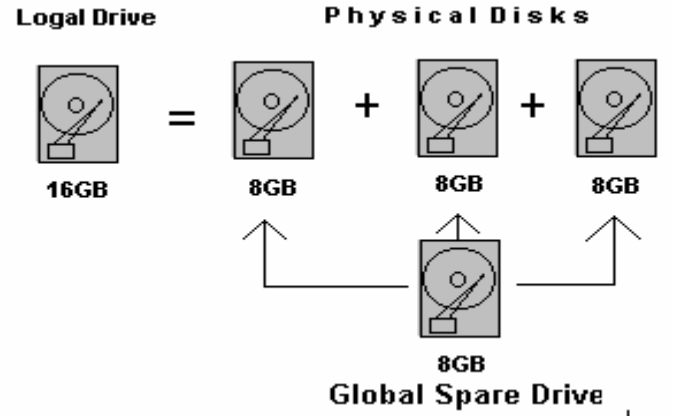
Hot Swapping allows disks to be removed and replaced without disrupting data access while the ACS-8910 system is in use.

Automatic Hot Spare allows a disk to be removed and replaced without turning off the power . This is usually performed when there is no Hot Spare drive configured. There is no need to power down the system.

2.2.2 Automatic Global Hot Spare

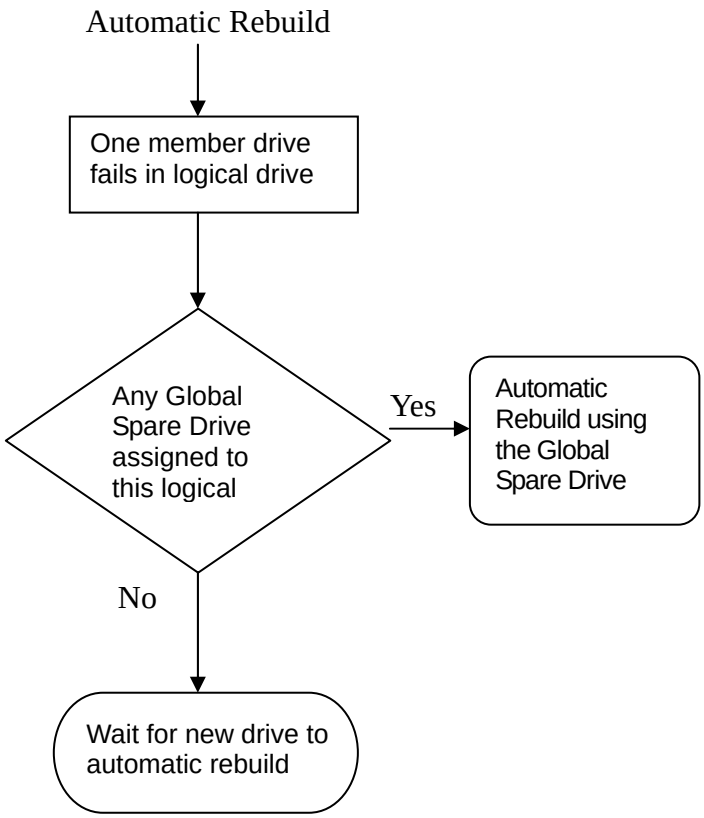
Hot Spare allows for the automatic replacement of a faulty drive without requiring intervention. When a disk fails, the ACS-8910 will automatically replace the faulty drive with the configured hot spare disk. Also, there is no need to turn off the power while replacing the defective disk.

Global Spare Drive



Global Spare Drive does not serve any particular logical drive. When a single drive fails from any of the logical drives, the Global Spare Drive will rebuild this particular logical drive atomatically.

2.2.3 Automatic Drive Rebuild



When one of the drive fails, the controller will check if there is any local spare drive assigned to this logical drive first; If yes, the controller will start to rebuild lost data atomatically.
If not, the controller will search for a Global Spare Drive; if the Global Spare Drive is available, the controller will auto-rebuild lost data.

If neither Local Spare Drive nor Global Spare Drive is available, the controller will not try to rebuild unless the user applies a forced-manual rebuild.

3. Hardware installation

3.1 Getting Ready

The ACS-8910 functions as a normal SCSI disk drive to your system. Please ensure your computer system has embedded SCSI support or has installed a SCSI host adapter. A device driver for supporting the embedded SCSI or SCSI adapter must be properly loaded and configured. Please follow your system or SCSI host adapter user's manual for the preparation.
If you are an advanced user or familiar with the installations for a RAID subsystem, you may skip ahead to section **4. Configuring ACS-8910**

3.1.1 Mode Operation

The ACS-8910 operates in three modes: Self-Diagnostic Mode, Configuration Mode and Operation Mode.

3.1.1.1 Self-Diagnostic Mode

To ensure flawless operation, ACS-8910 has a built-in self-diagnostic utility. Self-diagnostic Mode occurs automatically when the power is on, or after the ACS-8910 has been reset. In Self-Diagnostic Mode, all components will be tested, and any potential problems will be reported.

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

3.1.1.2 Configuration Mode

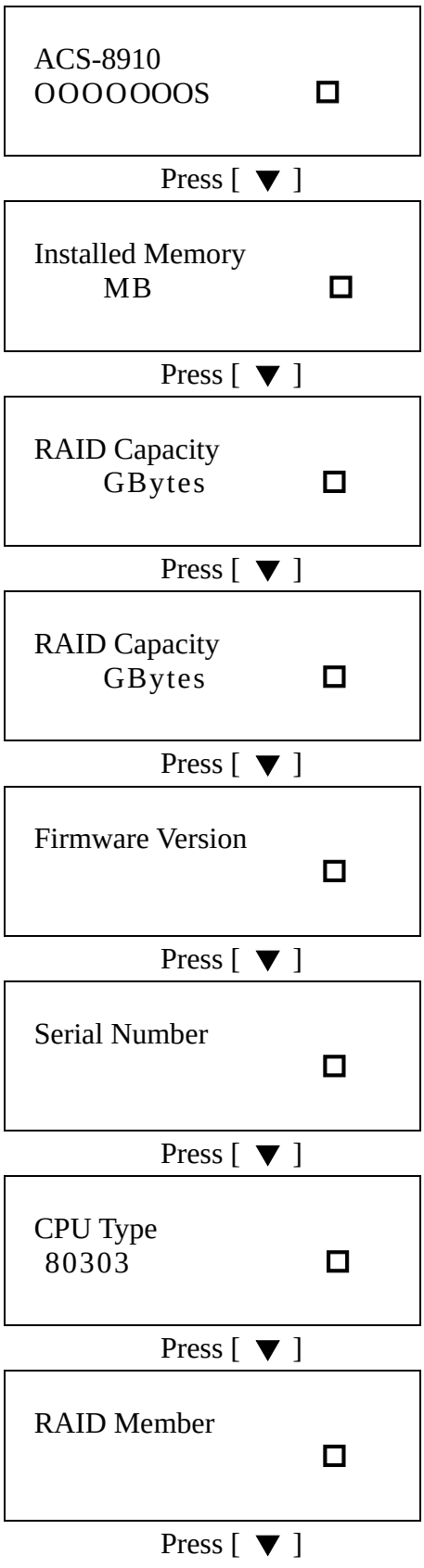
Configuration Mode will be selected whenever the Enter button is pressed during Operation Mode or when the Monitor Utility is invoked from the remote terminal. In Configuration Mode, user is able to modify the settings of the ACS-8910 and perform different functions to the controller. It is important to note that when running Configuration Mode, the ACS-8910 should be off-line and cannot be accessed by any application.

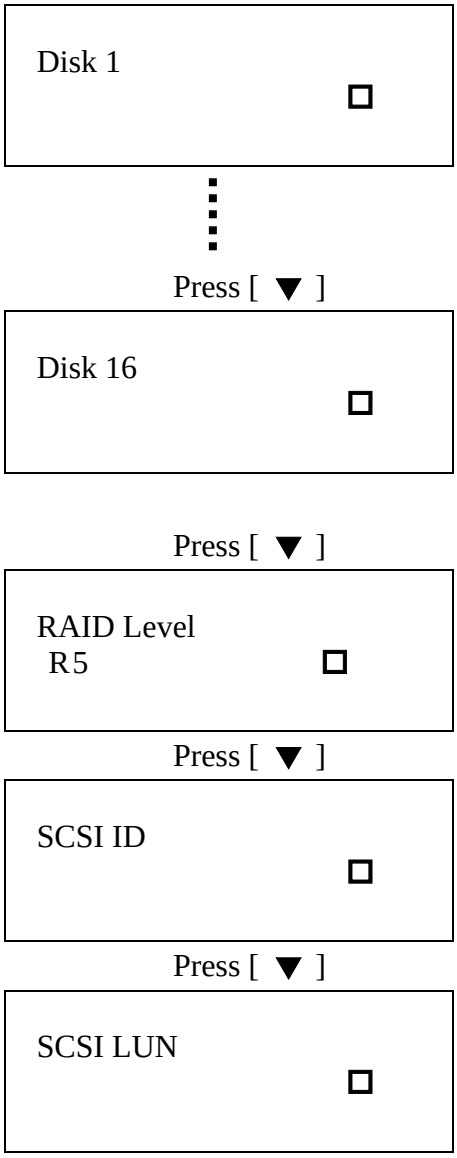
Entering a Password

If you have enabled the password-checking, then you will be required to enter the password. And you will not be allowed to proceed until the password is keyed in correctly. The default password is "00000000". Refer to section **4.3.5 System Parma Menu** for instructions on changing the default password.
You may use the front panel buttons to enter the password. Use "↑" and "↓" buttons to scroll through the available characters, then use "Enter" button to select the character and move to the next position. Once all the characters have been entered press the "Enter" button to access the Configuration Mode.

3.1.1.3 Operation Mode

The LCD Displayed Panel displays the current status of the ACS-8910. A typical display is shown as following:





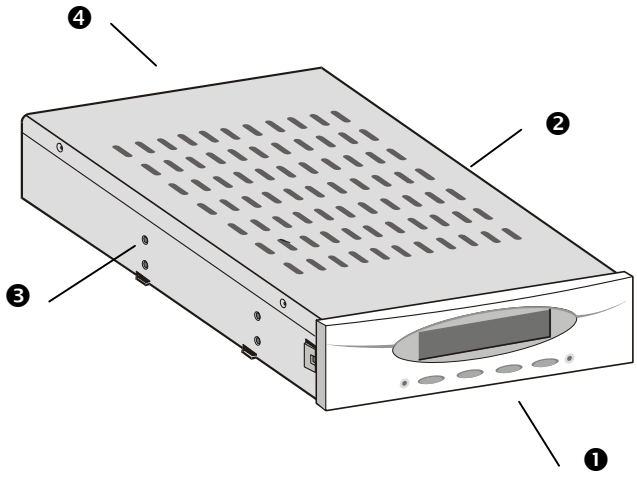
Field	**Description**	
ACS-8910	The ACS-8910 model number.	
OOOOOOOS	The 8 disks channel status. The first left O is channel 1. You can press the [▼] button to view the next page. Other symbols are:	
	Symbol	**Description**
	x	Disk is not installed
	A	Disk is being Added
	O	Disk is On-line
	S	Disk is a Spare disk
	R	Disk is Removed
	I	Disk is being Checked
R5	The RAID level (0, 1,0+1,3, 5) configuration.	
ID:0	The SCSI ID (0 - 15) configuration.	
□	Alternating cursor indicating operational status.	

When the Enter button is pressed in operation mode, the ACS-8910 will enter to Configuration Mode.

Note: In Configuration Mode, the ACS-8910 automatically returns to the Operation Mode when it remains inactive for 3 minutes.

3.2 The Controller Box

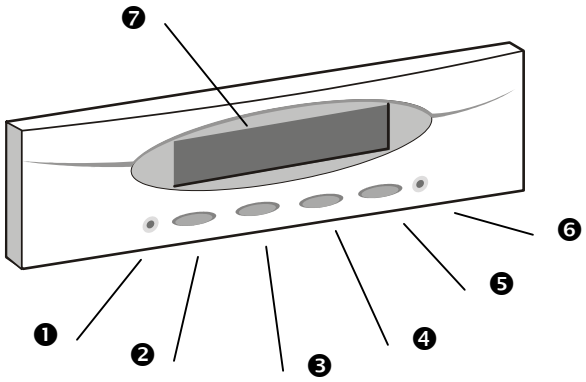
The controller box includes RAID controller board, control panel interface, box cover, screw mount and rear connector board.



❶ Front Panel/Interface
❷ Cover
❸ Screw Mount
❹ Rear/Connectors

3.3 The Control Panel

The ACS-8910 Control Panel consists of a two line by the 16 character LCD display, 4 push button switches and 6 LED indicators. It provides a way to configure and monitor the operation of the ACS-8910.

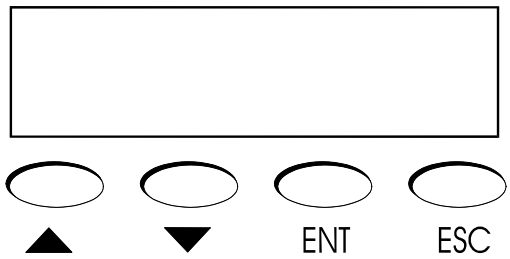


ACS-8910 Control Panel

❶ Activity LED, indicates data is being accessed
❷ Scroll Up button
❸ Scroll Down button
❹ Select button (ENT), to select an option
❺ Escape button (ESC), to return to the previous menu or cancel a selection
❻ Power LED,
❼ LCD, to display messages for configuration

3.3.1 Control Panel Key Definitions

A menu of configuration options shows on the LCD Display Panel. By pressing the ▲, ▼, **ENT** and **ESC** buttons, you can traverse the various options from the menu and configure the desired parameters. These buttons perform the following functions:



(▲) repeatedly press up arrow key until the required item is displayed

(▼) repeatedly press down arrow key until the required item is displayed

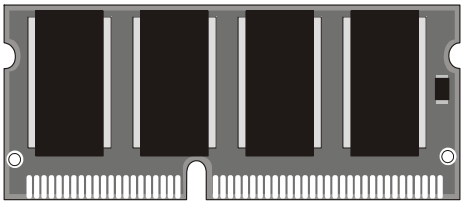
ENT: select a menu item, open a sub-menu, and select a value.

ESC: exit a sub-menu and return to the previous menu.

3.4 Memory Module

The ACS-8910 controller requires a minimum of 32 MB DRAM SO DIMM (Small Outline, Dual Inline Memory Modules) installed in the socket on the controller board in order to operate. The controller box is normally delivered without any DRAM installed.

SO-DIMM Specification



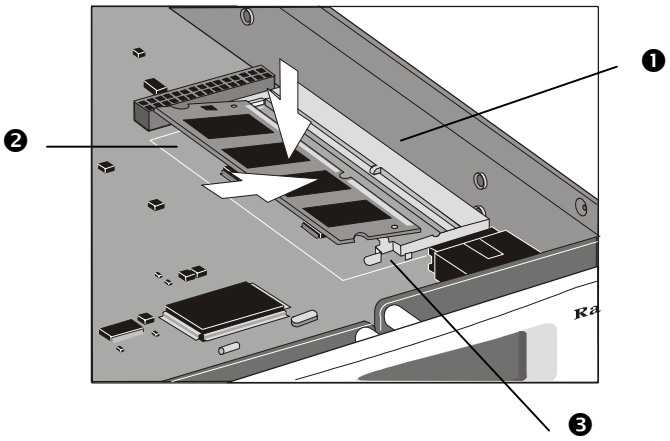
Minimum	Recommended
144-pin SDRAM SO DIMM modules (PC-100, 60~80 ns).	SDRAM
SO DIMM module, with or without parity.	With parity, for security
Minimum of one SO DIMM with 32 MB. The memory card socket can support 32, 64, 128 or 512 MB of memory.	Minimum of 32 MB, more memory (Up to 512MB) equals better performance. The size of the memory module defines the cache writing space available to the ACS-8910.

NOTE: The ACS-8910 controller can only accept some specified types of SO DIMM memory modules. Check the table below to find supported modules.

SDRAM Architecture	
512 MB	16 (32M x 8)
256 MB	16 (16M x 8), 8 (32M x 8) or 8 (16M x 16)
128 MB	16 (8M x 8), 8 (16M x8), 8 (8M x16) or 4 (16M x 16)
64 MB	8 (8M x 8), 8 (4M x 16) or 4 (8M x 16)
32 MB	4 (4M x 16)

3.4.1 Installing SO DIMM Module

Please follow below instructions to install SO-DIMM module.



1. Power off the system and disconnect the power connector.
2. Locate the SO DIMM socket ❶ on the controller board.
3. To install a memory card, hold the memory card ❷ with the edge connector side towards the slot. The edge connector is divided into two unequal lengths. With the controller box facing you, the shortest edge is closest to the front of the box, the longest end is nearest the back.
4. Hold the card at a shallow angle (about 25 degrees) and insert the edge connector into the connector slot. The “gold teeth” of the edge connector should no longer be visible when the card is fully inserted.
5. Press the module downwards so that it is flat inside the compartment. You can hear an audible click as the latches ❸ of the connector lock the card in place.

To remove a module that is already in place, unhook the latches on either side of the module. Put the card in vertical position., and lift it out of the socket.

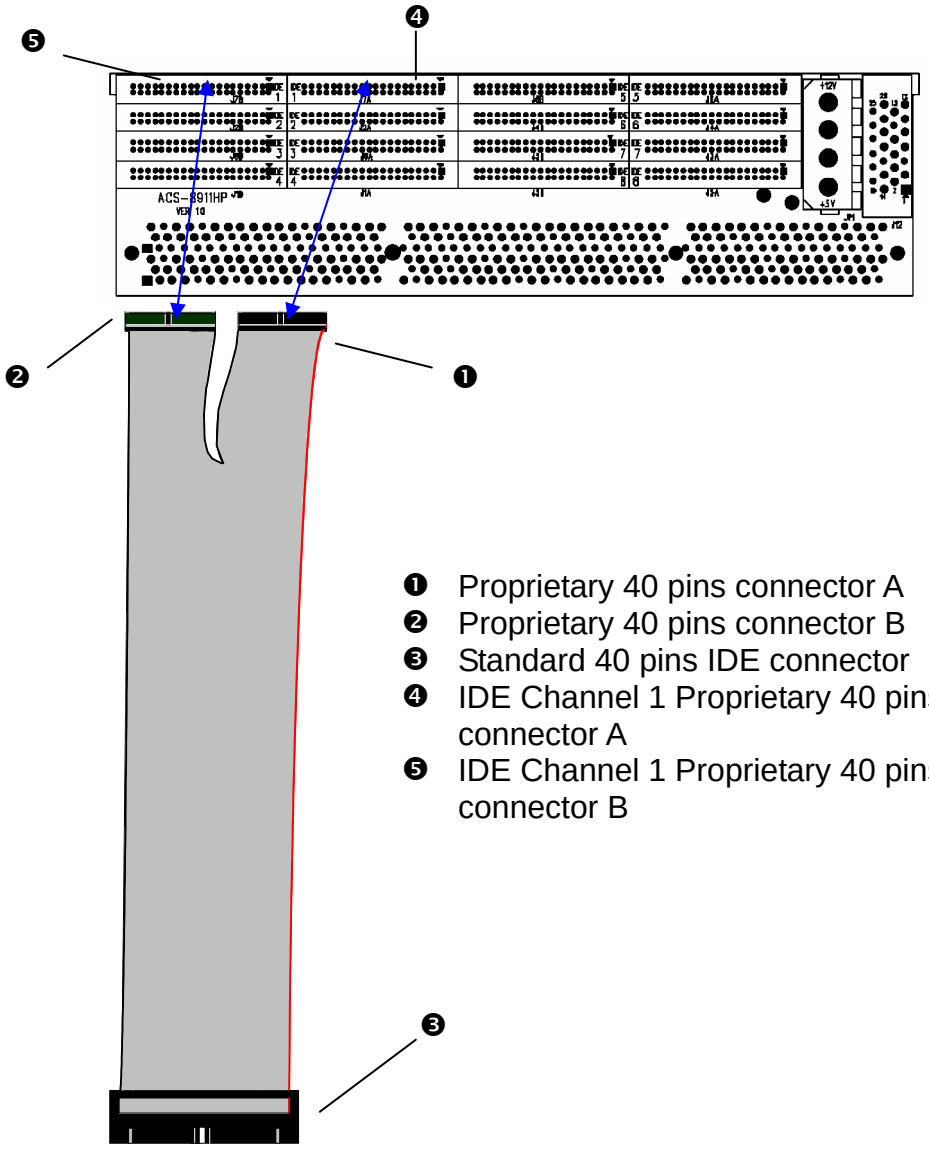
3.5 Installing Cables

There are three kinds of cables attached in the package of ACS-8910. They are “80 Pins IDE cables”, “Extension Cable (3-in-1)” and “10-pin to 9-pin D-sub male Interface Cable”. Follow the instructions to complete the cable installation as described below.

3.5.1 80 Pins IDE cables

The following drawing shows the steps on how to install the eight pieces of 80 Pins IDE Cables.

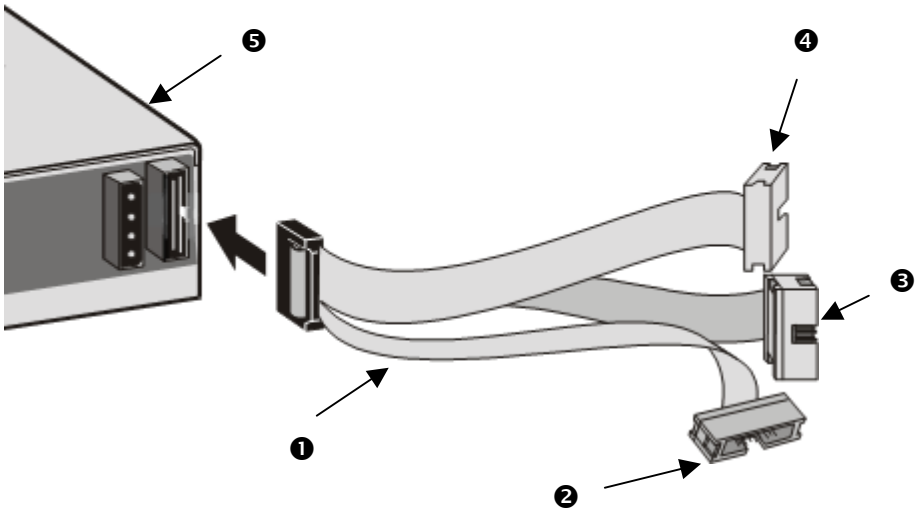
1. Connect ❶and❹, ❷and❺.
2. Connect ❸ with a standard IDE hard drive, or a hot swappable mobile rack that was inserted an IDE hard drive.
3. Repeat Step1 and 2 to complete the installation of eight pieces of 80 Pins IDE Cables and hard drives.



❶ Proprietary 40 pins connector A
❷ Proprietary 40 pins connector B
❸ Standard 40 pins IDE connector
❹ IDE Channel 1 Proprietary 40 pins Socket for connector A
❺ IDE Channel 1 Proprietary 40 pins Socket for connector B

3.5.2 Extension Cable (3-in-1)

The rear side of the ACS-8910 controller box has a connector for connecting an extension cable. This extension cable splits into three cables, each used to offer connectivity to a specific feature.

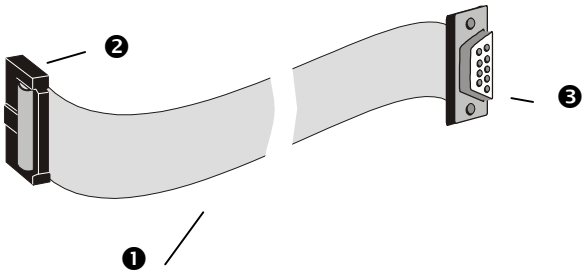


❶ Extension Cable
❷ Connection for a UPS and FAN device
❸ Connection for a Modem
❹ Connection for VT-100 or ANSI terminal-emulation
❺ Connector for Extension Cable

Note: The usage of each cable is clearly marked. All three functions offered through the extension cable can be simultaneously connected.

3.5.3 10-pin to 9-pin D-sub male Interface Cable

The ACS-8910 controller can be configured via PC running a VT-100 or ANSI terminal-emulation. In order to connect to PC, you need to connect an additional interface cable to the extension cable, which converts the RS-232 signal of the 10-pin header connector into a 9-pin D-sub male connector. The pin-layout of the 9-pin D-sub male connector is similar to that of PC's serial power and is set as a DTE device.



❶ 10-pin to 9-pin D-sub male Interface Cable
❷ 10-pin header
❸ 9-pin male D-sub header

GUIDELINES:

- The serial port's default is set at 19200 baud, 8 bit, 1 stop bit, and no parity. Use the COM1 serial port of the controller. The baud rate can be changed using the interface on front panel.
- When using PC as a terminal, any VT-100 compatible terminal software will work.

Refer to Chapter 5 for more information on configuring the ACS-8910 through a VT-100/ANSI terminal session.

3.6 Daughter-Board (optional)

Additional features that will become available through adding the optional proprietary daughter-board to the ACS-9900:

3.6.1 Daughter-Board Specifications

- Single Fiber Channel and the bandwidth up to 2Gbits
- Dual Fiber Channel and the bandwidth up to 2Gbits
- Single SCSI Channel and the bandwidth up to 160MB
- Dual SCSI Channel and the bandwidth up to 160MB
- …

Follow the documentation that comes with the daughter-board for directions on how to install the daughter-board in the controller board.

Note: Please refer to Section 4.1.5&4.1.6 for Dual Host Configuration.

4. Configuring ACS-8910

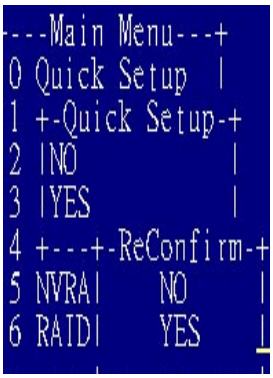
The following sections describe how to configure the ACS-8910. To configure the ACS-8910 you must configure the RAID settings and the SCSI settings. After these two steps are completed the ACS-8910 will perform as a normal SCSI hard disk to the host system.

4.1 Initial RAID Configuration

This section provides instructions on how to setup a RAID configuration by using the front control panel of the ACS-8910. Alternatively, the RAID configuration can be set up from the remote terminal or the terminal emulation program that can be found on your computer. Refer to section **6 Monitor Utility** for more details on RAID configuration by using the RS-232 port and monitor utility.

For	Section
Quick Setup	4.1.1
Single Host	4.2.1
Dual Host	4.2.4

4.1.1 Quick Setup



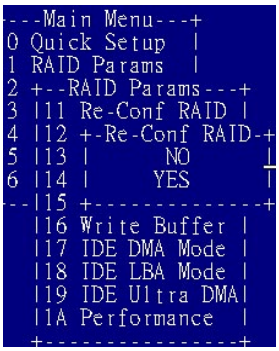
1. Turn on the ACS-8910 from power supply switch.
2. Press the [ENT] button to display the “Main Menu” menu.
3. Press the [ENT] button to open the “0 Quick Setup” menu.
4. Repeatedly press the [▼] button until the “01 Quick Setup” menu is displayed then press the [ENT] button.
5. Repeatedly press the [▼] button until the “011 Reconfirm” menu is displayed, then press the [ENT] button.
6. Select “Yes” to change an existing RAID configuration.

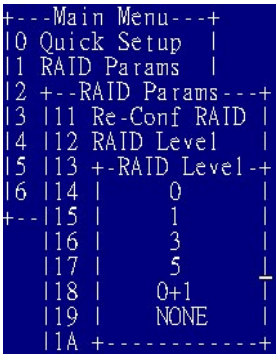
4.1.2 Single Host Configuration

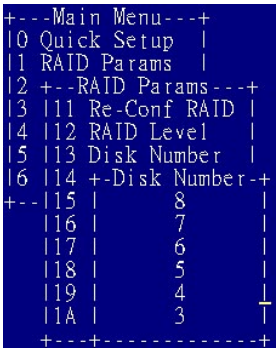
1. Turn on the ACS-8910 from power supply switch.
2. Press the [ENT] button to display the “Main Menu” menu.
3. Press the [ENT] button to open the “1 RAID Params” menu.
4. Repeatedly press the [▼] button until the “11 Re-conf RAID” menu is displayed then press the [ENT] button.
5. Repeatedly press the [▼] button until the “12 RAID Level” menu is displayed then press the [ENT] button.
6. Select the listed “0, 1,5” to configure a RAID Level, then press the [ENT] button.
7. Repeatedly press the [▼] button until the “13 Disk Number” menu is displayed, then press the [ENT] button.
8. Press the [▼] buttons to select the number of disks to configure for the ACS-8910, then press the [ENT] button.

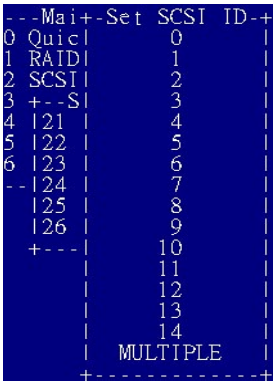
   NOTE: This disk number does not include “hot spare” disk.
9. Press the [ESC] button to return to the “Main Menu” menu.
10. Repeatedly press the [▼] button until the “2 SCSI Params” menu is displayed, then press the [ENT] button.
11. Repeatedly press the [▼] button until the “21 Set SCSI ID” menu is displayed, then press the [ENT] button.
12. Press the [▼] button to select a SCSI ID for ACS-8910, then press the [ENT] button.

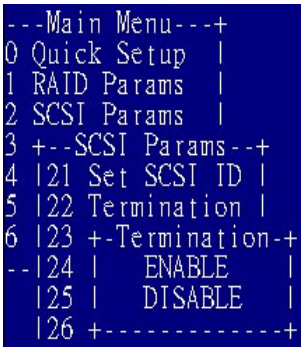
    NOTE: The default setting SCSI ID is 0.
13. Repeatedly press the [▼] button until the “22 Termination” menu is displayed, then press the [ENT] button.







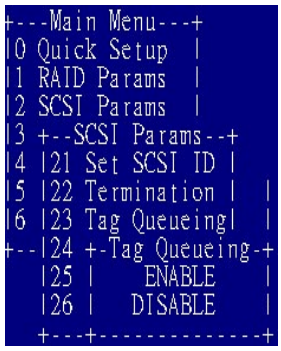




14. Press the [▼] buttons to enable or disable the SCSI termination for the ACS-8910, then press the [ENT] button.

    NOTE: If the ACS-8910 is the only SCSI device on the bus or is at the end of a daisy chain, the termination should be enabled. If the ACS-8910 is in the middle of a daisy chain the termination should be disabled.

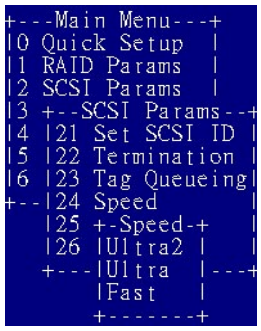
15. Repeatedly press the [▼] button until the “23 Tag Queuing” menu is displayed, then press the [ENT] button.



16. Press the [▼] button to enable or disable the Tag Queuing for the ACS-8910, then press the [ENT] button.

    NOTE: The default setting for Tag Queuing is “Enabled”. Tag Queuing allows the ACS-8910 to process multiple requests in order to improve the performance.

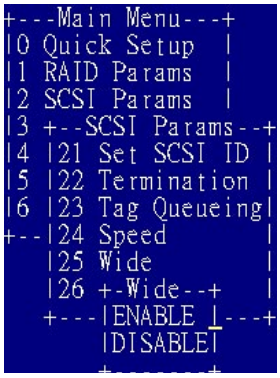
17. Press the [▼] button to select the “24 Speed” and “ 25 Wide” menu.



18. Follow the list below to setup SCSI interface of Host.

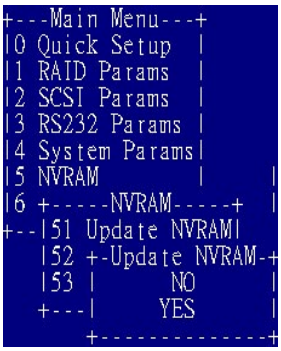
Speed/Wide / SCSI Interface	Wide	Fast	Ultra	Ultra2	Ultra 3
SCSI-2	Disable	[ENT]			
Wide SCSI	Enable	[ENT]			
Ultra SCSI	Disable		[ENT]		
Ultra Wide SCSI	Enable		[ENT]		
Ultra 2 SCSI	Enable			[ENT]	

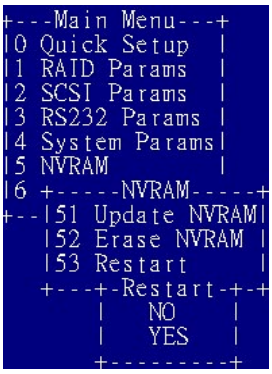
19. Press the [ESC] button to return to the “Main Menu” menu.
20. Repeatedly press the [▼] button until the “5 NVRAM” menu is displayed, then press the [ENT] button.
21. Repeatedly press the [▼] button until the “51 Update NVRAM” menu is displayed, then press the [ENT] button.



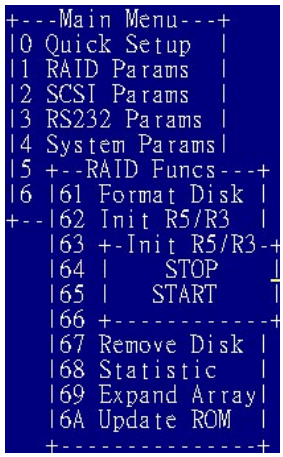
22. Repeatedly press the [▼] button until the “Yes” option is displayed, then press the [ENT] button.
23. Repeatedly press the [▼] button until the “53 Restart” menu is displayed, then press the [ENT] button.
24. Repeatedly press the [▼] button until the “Yes” option is displayed, then press the [ENT] button.

    NOTE: This will automatically restart the ACS-8910.





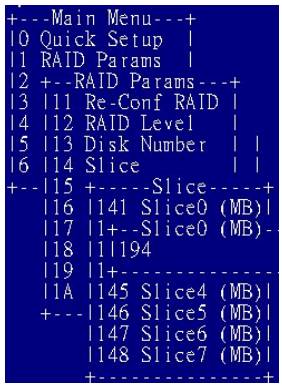
4.1.3 Single Host Configuration for Logical Units



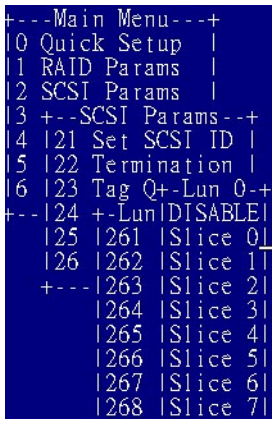
The ACS-8910 RAID controller can support up to 8 logical units. A RAID array can be divided into multiple logical units. A logical unit is that portion of a disk array seen by the host system as a single logical device. Each logical unit is identified to the host by its **L**ogical **U**nit **N**umber.

1. Please complete the Single host configuration steps first.
2. Press the [ENT] button to open the “6 RAID Funcs” menu.
3. Repeatedly press the [▼] button until the “62 Init R5/R3” menu is displayed, then press the [ENT] button.
4. Repeatedly press the [▼] button until the ”STOP” option is displayed, then press the [ENT] button.
5. Press the [ESC] button to return to the “Main Menu” menu.
6. Press the [ENT] button to open the “1 RAID Parmas” menu.
7. Press the [▼] button until the “14 Slice” menu is displayed, then press the [ENT] button.

   NOTE: The Slice will allow you to divide the partition size of the ACS-8910.



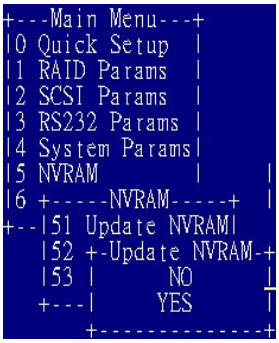
8. Repeatedly press the [▼] button until the “141 Slice0(MB)” menu is displayed, then press the [ENT].
9. Key-in the capacity that required for Slice 0, then press the [ENT] button.
10. Press the [▼] button to select from “142 Slice 1(MB)” to “148 Slice7(MB)”, then follow the steps 8 and 9.
11. Press the [ESC] button to return to the “Main Menu” menu.
12. Repeatedly press the [▼] button until the “2 SCSI Params” menu is displayed, then press the [ENT] button.



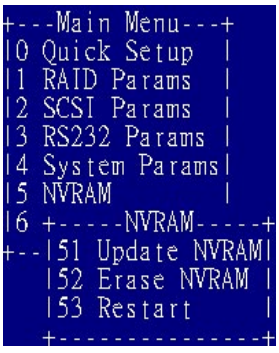
13. Repeatedly press the [▼] button until the “26 LUN map” menu is displayed, then press the [ENT] button.
14. Repeatedly press the [▼] button until the “2161 LUN 0” menu is displayed, then press the [ENT] button.
15. Follow the next table to setup “LUN” menu.

LUN 0	Slice 0
LUN 1	Slice 1
LUN 2	Slice 2
LUN 3	Slice 3
LUN 4	Slice 4
LUN 5	Slice 5
LUN 6	Slice 6
LUN 7	Slice 7

NOTE: The LUN numbers depend on how many slices you set.

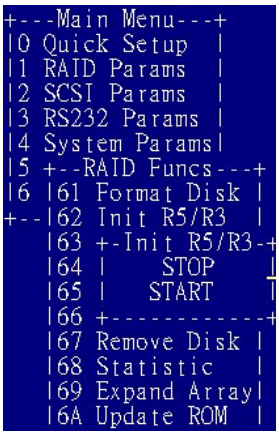


16. Press the [ESC] button to return to the “Main Menu” menu.
17. Repeatedly press the [▼] button until the “5 NVRAM” menu is displayed, then press the [ENT] button.
18. Repeatedly press the [↓] button until the “51 Update NVRAM” menu is displayed, then press the [ENT] button.
19. Repeatedly press the [▼] button until the “Yes” option is displayed, then press the [ENT] button.
20. Repeatedly press the [▼] button until the “53 Restart” menu is displayed, then press the [ENT] button.
21. Repeatedly press the [▼] button until the ”Yes” option is displayed, then press the [ENT] button.
22. Press the [ENT] button to open the “6 RAID Funcs” menu.



23. Repeatedly press the [▼] button until the sub-menu “62 Init R5/R3” option is displayed, then press the [ENT] button.

24. Repeatedly press the [▼] button until the ”START” option is displayed, then press the [ENT] button.



NOTE: The ACS-8910 is now configured completely for logical units.

4.1.4 EXAMPLE for Logical units of Single Host Configuration

Example 1 :

Ordinary Setup for logical units:

Disk	5 GB x 6	Partition	4
On-line Disk	5	Partition 1	5 GB
Spare Disk	1	Partition 2	8 GB
RAID Level	5	Partition 3	7 GB
SCSI ID	3	Partition 4	5 GB

ACS-8910 Configuration:

Step	Menu	Setting
1	11 Re-conf RAID	Yes
2	12 RAID Level	5
3	13 Disk Number	5
4	21 Set SCSI ID	3
5	51 Update NVRAM	Yes
6	53 Restart	Yes
7	62 Init R5	STOP
8	141 Slice 0	5000 MB
9	142 Slice 1	8000 MB
10	143 Slice 2	7000 MB
11	144 Slice 3	5000 MB
12	261 LUN 0	Slice 0
13	262 LUN 1	Slice 1
14	263 LUN 2	Slice 2
15	264 LUN 3	Slice 3
16	51 Update NVRAM	Yes
17	53 Restart	Yes
18	62 Init R5	START

Example 2 :

Multiple SCSI ID Setup for logical unit:

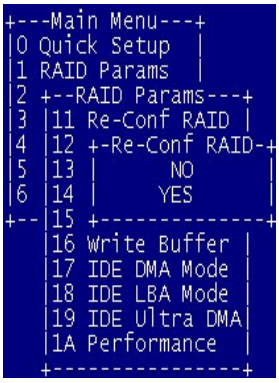
Disk	5 GB x 6	Partition	4
On-line Disk	5	Partition 1	5 GB / SCSI ID 2
Spare Disk	1	Partition 2	8 GB / SCSI ID 4
RAID Level	5	Partition 3	7 GB / SCSI ID 1
		Partition 4	5 GB / SCSI ID 0

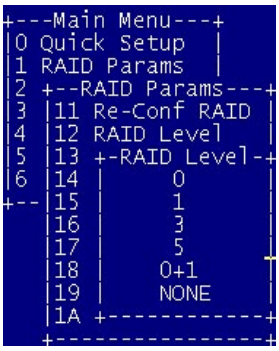
ACS-8910 Configuration:

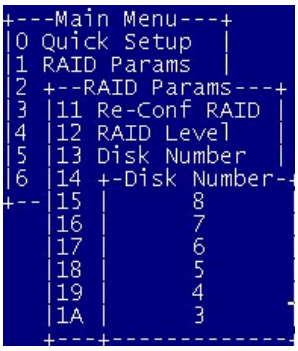
Step	Menu	Setting
1	11 Reconf RAID	Yes
2	12 RAID Level	5
3	13 Disk Number	5
4	51 pdate NVRAM	Yes
5	53 Restart	Yes
6	62 Init R5	STOP
7	141 Slice 0	5000 MB
8	142 Slice 1	8000 MB
9	143 Slice 2	7000 MB
10	144 Slice 3	5000 MB
11	21 SCSI ID	MULTIPLE
12	261 LUN 0 (SCSI ID 0)	Slice 3
13	262 LUN 1 (SCSI ID 1)	Slice 2
14	263 LUN 2 (SCSI ID 2)	Slice 0
15	264 LUN 4 (SCSI ID 4)	Slice 1
16	51 Update NVRAM	Yes
17	53 Restart	Yes
18	62 Init R5	START

4.1.5 Dual Host Configuration

Note: This Section is only performed when the daughter board is connected to the ACS-8910 controller.





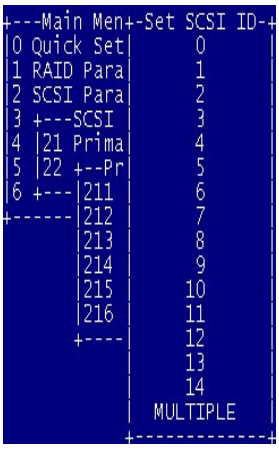


1. Turn on the ACS-8910 from power supply switch.
2. Press the [ENT] button to display the “Main Menu” menu.
3. Press the [ENT] button to open the “1 RAID Params” menu.
4. Repeatedly press the [▼] button until the “11 Re-conf RAID” menu is displayed, then press [ENT] button.
5. Repeatedly press the [▼] button until the “12 RAID Level” menu is displayed, then press the [ENT] button.
6. Select the listed “0, 1,3,0+1,5” to configure a RAID Level, then press the [ENT] button.
7. Repeatedly press the [▼] button until the “13 Disk Number” menu is displayed, then press the [ENT] button.
8. Press the [▼] button to select the number of the disks to configure the ACS-8910, then press the [ENT] button.

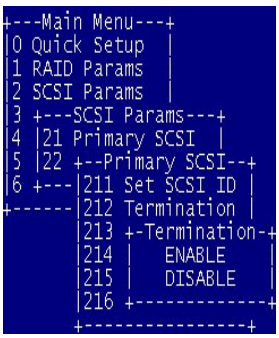
   NOTE: The disk number does not include “hot spare”.

9. Press the [ESC] button to display the ”Main Menu” menu.
10. Repeatedly press the [▼] button until the “21 Primary SCSI” menu is displayed, then press the [ENT] button.
11. Repeatedly press the [▼] button until the “211 Set SCSI ID” menu is displayed, then press the [ENT] button.
12. Press the [▼] button to select a SCSI ID for ACS-8910, then press the [ENT] button.

    NOTE: The default setting is SCSI ID 0.

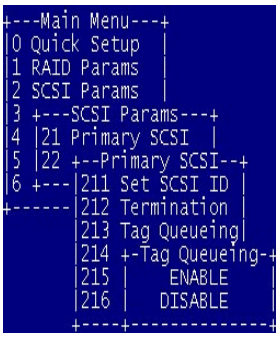


13. Repeatedly press the [▼] button until the “212 Termination” menu is displayed, then press the [ENT] button.



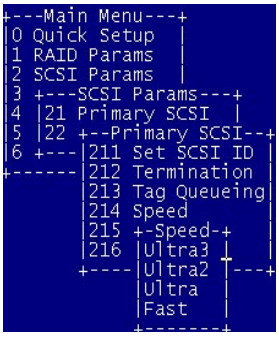
14. Press the [▼] button to enable or disable the SCSI termination for ACS-8910, then press the [ENT] button.

    NOTE: If the ACS-8910 is the only SCSI device on the bus or is at the end of a daisy chain the termination should be enabled. If the ACS-8910 is in the middle of a daisy chain the termination should be disabled.

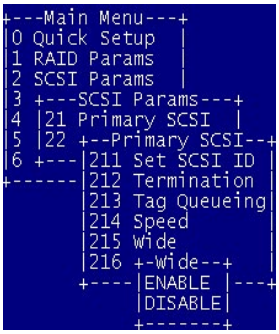


15. Repeatedly press the [▼] button until the “213 Tag Queuing” menu is displayed, then press the [ENT] button.
16. Press [▼] button to enable or disable the Tag Queuing for ACS-8910, then press the [ENT] button.

    NOTE: The default setting for Tag Queuing is “Enabled”. Tag Queuing allows the ACS-8910 to process multiple requests thus improving performance.



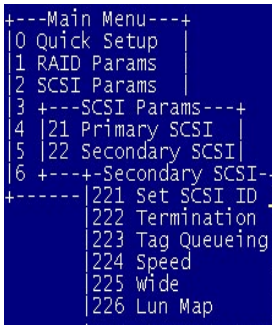
17. Press the [▼] button to select the “214 Ultra ” and “ 215 Wide” menu.



18. Follow the list below to setup SCSI interface of Host

Speed/Wide / 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]	

19. Press the [ESC] button and the [▼] button until the “22 Secondary Host” menu is displayed, then press the [ENT] button.



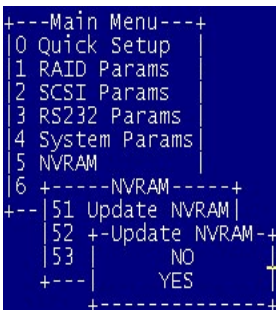
20. Repeat the steps from 11 to 18 to select the Secondary Host.
21. Repeatedly press the [▼] button until the “5 NVRAM” menu is displayed, then press the [ENT] button.
22. Repeatedly press the [▼] button until the “51 Update NVRAM” menu is displayed, then press the [ENT] button.
23. Repeatedly press the [▼] button until the “Yes” option is displayed, then press the [ENT] button.
24. Repeatedly press the [▼] button until the “53 Restart” menu is displayed, then press the [ENT] button.
25. Repeatedly press the [▼] button until the ”Yes” option is displayed, then press the [ENT] button.

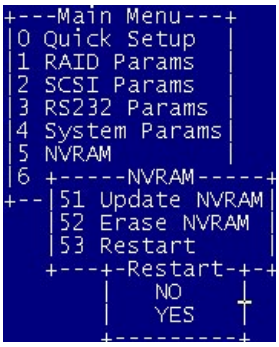
NOTE: This will automatically restart the ACS-8910.

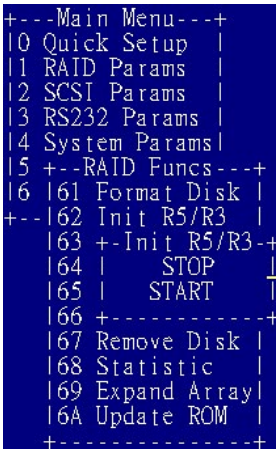
26. Press the [ENT] button to open the “6 RAID Funcs” menu.
27. Press the [▼] button until the sub-menu “62 Init R5/R3” option is displayed, then press [ENT] button.
28. Repeatedly press the [▼] button until the ”STOP” option is displayed, then press the [ENT] button
29. Press the [ESC] button to return to the “Main Menu” menu.
30. Press the [ENT] button to open the “1 RAID Parmas” menu.
31. Repeatedly press the [▼] button until the sub-menu “14 Slice” option is displayed, then press the [ENT] button.

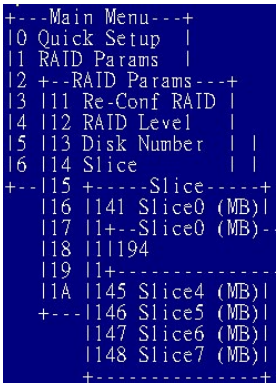
NOTE: The Slice will allow you to divide the partition size of ACS-8910.

32. Repeatedly press the [▼] button until the “141 Slice0(MB)” menu is displayed.
33. Key-in the capacity that required for Slice 0, then press the [ENT] button.

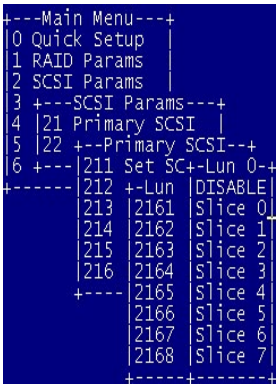








34. Press the [▼] button to select from “142 Slice 1(MB)” to “148 Slice7(MB)”, then repeat the steps 8 and 9.



35. Press the [ESC] button to return to the “Main Menu” menu.

36. Repeatedly press the [▼] button until the “21 Primary SCSI” menu is displayed, then press the [ENT] button.

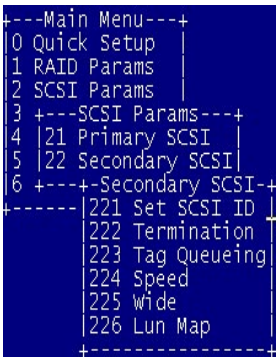
37. Repeatedly press the [▼] button until the “216 LUN map” menu is displayed, then press the [ENT] button.

38. Repeatedly press the [▼] button until the “2161 LUN 0” menu is displayed, then press the [ENT] button.

39. Follow the table shown below to setup the “LUN”

LUN 0	Slice 0
LUN 1	Slice 1
LUN 2	Slice 2
LUN 3	Slice 3
LUN 4	Slice 4
LUN 5	Slice 5
LUN 6	Slice 6
LUN 7	Slice 7

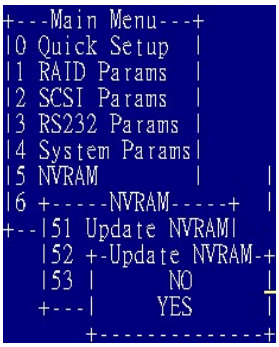
NOTE: The LUN numbers depend on how many slices you set.



40. Press the [ESC] button and the [▼] button until the “22 Secondary Host” menu is displayed, then press the [ENT] button..

41. Repeat the steps from 36 to 39 to select the Secondary Host.

42. Press the [ESC] button to return to the “Main Menu” menu.



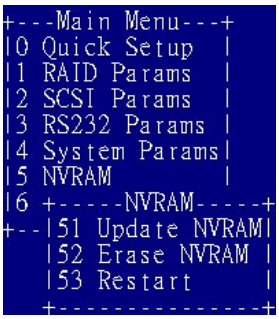
43. Repeatedly press the [▼] button until the “5 NVRAM” menu is displayed, then press the [ENT] button.

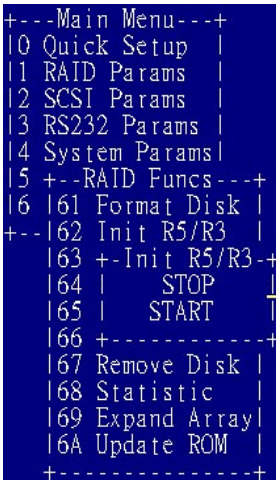
44. the [▼] button until the “51 Update NVRAM” menu is displayed, then press the [ENT] button.

45. Repeatedly press the [▼] button until the “Yes” option is displayed, then press the [ENT] button.

46. Repeatedly press the [▼] button until the “53 Restart” menu is displayed, then press the [ENT] button.
47. Repeatedly press the [▼] button until the ”Yes” option is displayed, then press the [ENT] button.
48. Press the [ENT] button to open the “6 RAID Funcs” menu.
49. Repeatedly press the [▼] button until the sub-menu “62 Init R5/R3” option is displayed, then press [ENT] button.
50. Repeatedly press the [▼] button until the ”START” option is displayed, then press the [ENT] button.

    NOTE: The ACS-8910 is now configured the Dual Host completely.





4.1.6 EXAMPLE for Dual Host Configuration

Dual Host Setup :

Disk	8 GB x 6	Host 1 SCSI ID	0
On-line Disk	5	Host 2 SCSI ID	0
Spare Disk	1	Partition for Host 1	25 GB
RAID Level	5	Partition for Host 2	15 GB

ACS-8910 Configuration:

Step	Menu	Setting
1	11 Reconf RAID	Yes
2	12 RAID Level	5
3	13 Disk Number	5
4	211 Set Primary SCSI ID	0
5	221 Set Secondary SCSI ID	0
6	51 Update NVRAM	Yes
7	53 Restart	Yes
8	62 Init R5	STOP
9	141 Slice 0	25000 MB
10	142 Slice 1	15000 MB
11	2161 Primary SCSI LUN 0	Slice 0
12	2261 Secondary SCSI LUN 0	Slice 1
13	51 Update NVRAM	Yes
14	53 Restart	Yes
15	62 Init R5	START

If you wish to enable Host 1 to access to Host 2's partition, then the following setup requires to be added.

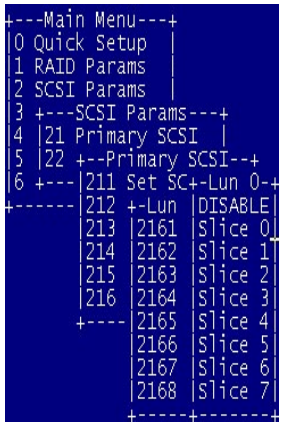
2162 Primary SCSI LUN 1	Slice 1

If you wish to enable Host 2 to access to Host 1's partition, then the following setup requires to be added.

2262 Primary SCSI LUN 1	Slice 0

4.1.7 Dual Host Configuration for Redundant Server & HA software

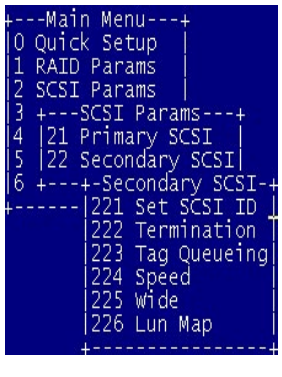
1. Please complete the Dual Host Configuration steps first.
2. Press the [Esc] button to display the ”Main Menu” menu.
3. Repeatedly press the [▼] button until the “2 SCSI Params” menu is displayed, then press the [ENT] button.
4. Repeatedly press the [▼] button until the “216 LUN map” menu is displayed, then press the [ENT] button.
5. Repeatedly press the [▼] button until the “2161 LUN 0” menu is displayed, then press the [ENT] button.
6. Follow the table to setup “LUN”

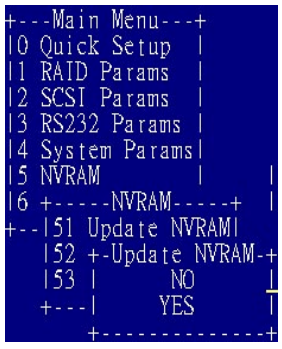


LUN 0	Slice 0
LUN 1	Slice 1
LUN 2	Slice 2
LUN 3	Slice 3
LUN 4	Slice 4
LUN 5	Slice 5
LUN 6	Slice 6
LUN 7	Slice 7

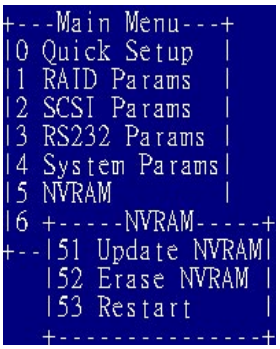
NOTE: The LUN numbers depend on how many slices you set.

7. Press the [ESC] button and the [▼] button until the “22 Secondary Host” menu is displayed, then press the [ENT] button.
8. Repeat the steps from 4 to 6 to select the Secondary Host.
9. Press the [ESC] button to return to the “Main Menu” menu.
10. Repeatedly press the [▼] button until the “5 NVRAM” menu is displayed, then press the [ENT] button.
11. Repeatedly press the [▼] button until the “51 Update NVRAM” menu is displayed, then press the [ENT] button.
12. Repeatedly press the [▼] button until the “Yes” option is displayed, then press the [ENT] button.





13. Repeatedly press the [▼] button until the “53 Restart” menu is displayed ,then press the [ENT] button.



14. Repeatedly press the [▼] button until the “Yes” option is displayed, then press the [ENT] button.

NOTE: 1.This will automatically restart the ACS-8910

2. The ACS-8910 is now configured the Dual Host for Redundant Server & HA software completely.

4.1.8 Example for Redundant Server and HA software Configuration

Dual Host for Redundant Server and HA software Setup :

Disk	8 GB x 6
On-line Disk	5
Spare Disk	1
RAID Level	5
Host 1 SCSI ID	0
Host 2 SCSI ID	0

ACS-8910 Configuration:

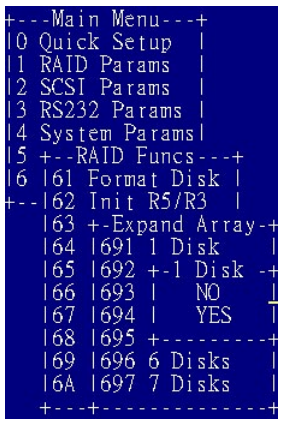
Step	Menu	Setting
1	11 Reconf RAID	Yes
2	12 RAID Level	5
3	13 Disk Number	5
4	211 Set Primary SCSI ID	0
5	221 Set Secondary SCSI ID	0
6	51 Update NVRAM	Yes
7	53 Restart	Yes
8	62 Init R5	STOP
9	2161 Primary SCSI LUN 0	Slice 0
10	2261 Secondary SCSI LUN 0	Slice 0
11	51 Update NVRAM	Yes
12	53 Restart	Yes
13	62 Init R5	START

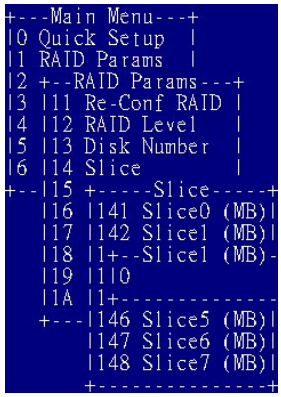
4.2 Expand the RAID capacity

The ACS-8910 provides the " Capacity expansion" function, which allows to expand current RAID capacity by adding a new disk into your RAID subsystem.

NOTE: ACS-8910 allows one disk fail when you execute this expansion function.

1. Adding a new disk to your RAID subsystem.
   NOTE: Be sure the capacity of new added disk has the same or larger capacity than the existing on-line disk capacity.
2. Turn on the ACS-8910 from power supply switch.
3. Press the [ENT] button to display the "Main Menu" menu.
4. Repeatedly press the [▼] button until the "06 RAID Func" menu is displayed, then press the [ENT] button.
5. Repeatedly press the [▼] button until the "69 Expand Array" menu is displayed, then press the [ENT] button.
6. Select the listed "3, 4, 5,6, 7, 8, 9, 10, 11, 12, 13, " to expand disk number for RAID capacity, then press the [ENT] button.
7. Select "Yes" to execute the disk expansion.
8. Press the [ESC] button to return to the "Main Menu" menu.
9. Repeatedly press the [▼] button until the "01 RAID Params" menu is displayed, then press the [ENT] button.
10. Repeatedly press the [▼] button until the "14 Slice" menu is displayed, then press the [ENT] button.
11. Repeatedly press the [▼] button until the "142 Slice 1" menu is displayed, then press [ENT] button.





NOTE: The expanded capacity will be allocated to the new slice. For example, if the Slice0, Slice1, and Slice2 are already existed before expanding the capacity, then the new added capacity can be found in Slice3.

12. The LCD will display the new capacity.

Now, you have expanded the RAID capacity, and the next step is to divide the slice capacity. (Refer to Section 4.1.3)

4.3 The ACS-8910 Configuration Menu

The ACS-8910 should be disconnected from the host system when running the Configuration Menu. The Main Menu consists of 6 categories. Each category is used to configure a different part of the ACS-8910 controller. The following shows the main menu categories. Each category has sub-menu and options. In the following sections, each main hierarchy will be described in details.

Main Menu
0 Quick Setup
1 RAID Params
2 SCSI Params
3 RS232 Params
4 System Params
5 NVRAM
6 RAID Func
7 Special

4.3.1 Quick Setup menu

The Quick Setup menu, which provides a quickly RAID level 5 configuration. On the other hand, all the installed disks will be configured to RAID level 5.

Sub-menu	Settings	Default setting
01 Quick Setup	No, Yes	No
Description:	This procedure will provide a quickly way to setup a RAID 5 configuration. **NOTE 1: You will change to new setup if RAID old configuration has exited.** **NOTE 2: The original data will be lost if you execute this quick setup.**	

Sub-menu	Settings	Default setting
011 Reconfim	No, Yes	No
Description:	Re-confirm Quick Setup procedures. **NOTE: The RAID controller will re-start automatically after pressing "Yes" from Re-confirm menu**	

4.3.2 RAID Params menu

The RAID Params menu configures the ACS-8910 for the different supported RAID levels. To avoid accidentally erasing an existing configuration you specified, using the “11 Re-Conf RAID” option, if you want to change the configuration.

NOTE: Any changes made to 11 Re-Conf RAID, 12 RAID Level, 13 Disk Number, 14 Slice and 15 Stripe will cause data on the drives to be permanently erased.

Sub-menu	Settings	Default setting
11 Reconf RAID	No, Yes	No
Description:	Change an existing RAID configuration.	

Sub-menu	Settings	Default setting
12 RAID Level	0, 1, 0+1, 3, 5, None	0+1
Description:	Specify a RAID Level.	

Sub-menu	Settings	Default setting
13 Disk Number	16,14,12, 10, 8, 6, 4, 2	12
Description :	Specify the number of disks in an array. The number is based on the number of physical disks installed.	

Sub-menu	Sub-menu	Setting
14 Slice	**141 Slice0 – 148 Slice7**	(MB)
Description	Slice will allow to divide the partition size	

Sub-menu	Settings	Default setting
15 Stripe Size	128, 64, 32, 16, 8,	128
Description:	Specify the size in blocks (1 block = 512 bytes) the data stripe written to the disks.	

Sub-menu	Settings	Default setting
16 Write Buffer	Enable, Disable	Enable
Description:	Use to buffer write operations using memory. This helps to improve the write performance for RAID 5 configuration.	

Sub-menu	Sub options	Settings	Default setting
17 DMA Mode	**171 Disk 1**	0, 1, 2, 3, 4, 5	5
	172 Disk 2	0, 1, 2, 3, 4, 5	5
	173 Disk 3	0, 1, 2, 3, 4, 5	5
	174 Disk 4	0, 1, 2, 3, 4, 5	5
	175 Disk 5	0, 1, 2, 3, 4, 5	5
	176 Disk 6	0, 1, 2, 3, 4, 5	5
	177 Disk 7	0, 1, 2, 3, 4, 5	5
	178 Disk 8	0, 1, 2, 3, 4, 5	5
	179 Disk 9	0, 1, 2, 3, 4, 5	5
	17A Disk10	0, 1, 2, 3, 4, 5	5
	17B Disk11	0, 1, 2, 3, 4, 5	5
	17C Disk12	0, 1, 2, 3, 4, 5	5
	17H ALL	0, 1, 2, 3, 4, 5	5
Description:	To negotiate the highest DMA data transfer mode with the installed disks during initialization.		

Sub-menu	Settings	Default setting
18 LBA Mode	Enable, Disable	Enable
Description:	Enable or disable LBA mode	

Sub-menu	Settings	Default setting
19 Ultra DMA	Enable, Disable	Enable
Description:	Enable or disable Ultra DMA function	

Sub-menu	Settings	Default setting
1A Performance	Sequential, Random	Random
Description:	Select the application performance - Sequence or Random R/W.	

4.3.3 SCSI Params menu

The SCSI Params menu configures the SCSI portion of the ACS-8910 controller. The SCSI ID and the termination must be set to avoid causing a conflict with the SCSI adapter or other SCSI devices daisy chained with the ACS-8910. Command Tag Queuing is a function that allows a SCSI device to handle multiple requests without having to serialize the operations. This frees the disks to process requests in whatever order is convenient, instead of blindly processing and acknowledging each disk operation before starting the next. This allows the ACS-8910 to efficiently handle multithreaded applications that issue multiple disk commands.

Sub-menu option	Settings	Default setting
21 Primary SCSI	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, Multiple	0
Description:	Specify the Primary SCSI ID for the ACS-8910.	

Sub-menu option	Settings	Default setting
22 Termination	Enable, Disable	Enable
Description:	Enable the SCSI termination of the ACS-8910.	

Sub-menu option	Settings	Default setting
23 TAG Queuing	Enable, Disable	Enable
Description:	This feature allows the handling of more I/O requests from the host improving the performance of the ACS-8910.	

Sub-menu option	Settings	Default setting
24 Speed	Ultra 3, 2, Fast	Ultra 3
Description	Enable Ultra SCSI feature.	

Sub-menu option	Settings	Default setting
25 Wide	Enable, Disable	Enable
Description:	Enable Wide SCSI feature	

Sub-menu option	Sub-menu option	Settings	Default setting
26 LUN map	**261 LUN 0**	Disable, Slice 0 -Slice 7	Slice 0
	262 LUN 1	Disable, Slice 0 -Slice 7	Slice 1
	263 LUN 2	Disable, Slice 0 -Slice 7	Slice 2
	264 LUN 3	Disable, Slice 0 -Slice 7	Slice 3
	265 LUN 4	Disable, Slice 0 -Slice 7	Slice 4
	266 LUN 5	Disable, Slice 0 -Slice 7	Slice 5

	267 LUN 6	Disable, Slice 0 -Slice 7	Slice 6
	268 LUN 7	Disable, Slice 0 -Slice 7	Slice 7
Description:	A RAID array may be divided into multiple logical units. A logical unit is that portion of a disk array taken as a single logical device by Host system. Each logical unit is identified to the host by its **L**ogical **U**nit **N**umber		

Sub-menu option	Sub-menu option	Settings	Default setting
22 Secondary SCSI	**221 Set SCSI ID**	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,Multiple	0
Description:	Specify the Secondary SCSI ID for the ACS-8910.		

Sub-menu option	Sub-menu option	Settings	Default setting
	222 Termination	Enable, Disable	Enable
Description:	Enable the SCSI termination of the ACS-8910.		

Sub-menu option	Sub-menu option	Settings	Default setting
	223 TAG Queuing	Enable, Disable	Enable
Description:	Enable the SCSI Tag Queuing feature. This feature allows the handling of more I/O requests from the host improving the performance of the ACS-8910.		

Sub-menu option	Sub-menu option	Settings	Default setting
	224 Speed	Ultra 3, Ultra2, Ultra, Fast	Ultra 3
Description:	Enable Host SCSI interface.		

Sub-menu option	Sub-menu option	Settings	Default setting
	225 Wide	Enable, Disable	Enable
Description:	Enable Wide SCSI feature.		

Sub-menu option	Sub-menu option	Sub-menu option	Settings	Default setting
	226 LUN map	**2261 LUN 0**	Disable, Slice 0 -Slice 7	Slice 0
		2262 LUN 1	Disable, Slice 0 -Slice 7	Slice 1
		2263 LUN 2	Disable, Slice 0 -Slice 7	Slice 2
		2264 LUN 3	Disable, Slice 0 -Slice 7	Slice 3
		2265 LUN 4	Disable, Slice 0 -Slice 7	Slice 4
		2266 LUN 5	Disable, Slice 0 -Slice 7	Slice 5
		2267 LUN 6	Disable, Slice 0 -Slice 7	Slice 6
		2268 LUN 8	Disable, Slice 0 -Slice 7	Slice 7
Description:	A RAID array may be divided into multiple logical units. A logical unit is that portion of a disk array taken as a single logical device by Host system. Each logical unit is identified to the host by its **L**ogical **U**nit **N**umber			

4.3.4 RS232 Params menu

The RS232 Params menu configures the external ports of the ACS-8910. The ACS-8910 can communicate with remote terminal and modem. The ACS-8910 and the remote terminal must be set to the same communication settings (baud rate, stop bit, data bit, and parity).

Sub-menu options	Sub options	Settings	Default setting
31 Modem Port	**311 Baud Rate**	2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, 115200	115200
	312 Stop bit	1, 2	1
	313 Data bit	7, 8	8
	314 Parity	None, Odd, Even	None
Description:	Specify the communication protocol between the ACS-8910 and external modem.		

Sub-menu options	Sub options	Settings	Default setting
32 Terminal Port	**321 Baud Rate**	2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, 115200	115200
	322 Stop bit	1, 2	1
	323 Data bit	7, 8	8
	324 Parity	None, Odd, Even	None
Description:	Specify the communication protocol between the ACS-8910 and remote terminal or terminal emulation software. The settings on the remote terminal must match the settings of the ACS-8910.		

4.3.5 System Params menu

The System Params menu configures the internal operation of the ACS-8910. To avoid having the configuration altered by unauthorized personnel you can enable the password function from Configuration Mode. Also, by selecting the “Pager Info”, “FAX Info” and “Company Info” options, you will be altered when a disk failure occurs. The Pager and FAX require an external modem to be attached to the modem port.

Sub-menu options	Sub options	Settings	Default setting
41 Passwd Info	**411 Passwd Check**	Disable, Enable	Enable
	412 Set Passwd	Up to 8 characters	00000000
Description:	Enable the password function by selecting “Set Passwd” and changing the default password.		

Sub-menu options	Sub options	Settings	Default setting
42 Pager Info	**421 Paging**	Disable, Enable	Disable
Description:	Enable / Disable Pager function.		
	422 Pager1 No.	Enter the pager number to notify	
		4221 Tel No.	16 characters
		4222 Pin No.	16 characters

Sub-menu options	Sub options	Settings	Default setting
	423 Pager2 No.	Enter the pager number to notify	
		4231 Tel No.	16 characters
		4232 Pin No.	16 characters
	424 Code	Enter the code displayed on the pager	
		4241 Part 1.	16 characters
		4242 Part 2.	16 characters
	425 Repeat # **(#: times)**	20, 15, 10, 5	5
Description:	Setup page times		
	426 Interval	20, 15, 10, 5	5
Description:	Page the pager numbers every interval time.		
	427 Page NOW	None	None
Description:	Enable paging notification when a disk failure occurs. One or two pagers can be notified with a unique code that can be up to 28 characters. For each pager you can enter the telephone number and pin number (if required). The pager(s) can be notified up to 20 times at intervals (in minutes) of up to 20 minutes. Use the Page NOW option to immediately send a page.		

Sub-menu options	Sub options	Settings	Default setting
43 FAX Info	**431 FAX**	Disable, Enable	Disable
Description:	Enable / Disable Fax function.		
	432 FAX Class	1, 2	1
Description:	Setup your modem machine supports class 1 or 2.		
	433 FAX1 No.	Up to 16 numbers	
	434 FAX2 No.	Up to 16 numbers	
	435 Repeat #	20, 15, 10, 5	5
Description:	Setup FAX times		
	436 FAX NOW	None	None
Description:	Enable fax notification when a disk failure occurs. One or two fax stations can be notified. Use the FAX Class to specify the fax class support of the modem. The fax can be sent up to 20 times at intervals (in minutes) of up to 20 minutes. Use the FAX Now option to immediately send a fax.		

Sub-menu options	Sub options	Settings
44 Company Info:	**String 1**	up to 16 alphanumeric characters
	String 2	up to 16 alphanumeric characters
Description:	This information will appear at the top of the fax document.	

Sub-menu options	Default setting	Settings
45 Modem Init St	AT&D0&K4E0	
Description:	Change the initialization command for the modem. Change this option if the default string does not work with your modem.	

4.3.6 NVRAM menu

The NVRAM menu options control the configuration information. When using this menu option the ACS-8910 required to be off-line. Any change made in this group will cause data on the drives to be permanently erased.

Once a configuration change has been made the NVRAM (where the settings are stored) must be updated. If a change causes an error or if the controller fails, use the ”Erase NVRAM” option to clear the contents of NVRAM restoring the default values. To enable a change to take effect, the ACS-8910 controller must be restarted. Use the Restart option to automatically reset the ACS-8910 controller.

Sub-menu options	Settings	Default setting
51 Update NVRAM	No, Yes	No
Description:	Store the settings for all the options. Any change has to be saved in NVRAM,.in order to have this change to take effect.	

Sub-menu options	Settings	Default setting
52 Erase NVRAM	No, Yes	No
Description:	Clear the contents of NVRAM and restore the default settings.	

Sub-menu options	Settings	Default setting
53 Restart	No, Yes	No
Description:	Reset the ACS-8910. Use this option after changing any settings to allow them to take effect.	

4.3.7. RAID Funcs menu

The RAID Funcs menu allows different functions to be performed on the ACS-8910.

NOTE: Any changes made to 61 Format Disk, 62 Init RAID 5, 63 R5 Check will cause data permanently erased on the disks.

Sub-menu	Sub options	Settings	Default setting
61 Format Disk	**611 Format Disk1**	Stop, Start	Stop
	612 Format Disk2	Stop, Start	Stop
	613 Format Disk3	Stop, Start	Stop
	614 Format Disk4	Stop, Start	Stop
	615 Format Disk5	Stop, Start	Stop
	616 Format Disk6	Stop, Start	Stop
	617 Format Disk7	Stop, Start	Stop
	618 Format Disk8	Stop, Start	Stop
	619 Format Disk9	Stop, Start	Stop
	61A Format Disk10	Stop, Start	Stop
	61B Format Disk11	Stop, Start	Stop
	61C Format Disk12	Stop, Start	Stop
	61D Format Disk13	Stop, Start	Stop
	61E Format Disk14	Stop, Start	Stop
	61F Format Disk15	Stop, Start	Stop
	61G Format Disk16	Stop, Start	Stop
	61H Format ALL	Stop, Start	Stop
Description:	Low level Format for the disk. This option is only available when the ACS-8910 is not configured. This option is not mandatory but optional. Most new disks do not require a low level format. Used only if drive is encountering problems.		

Sub-menu options	Settings	Default setting
62 Init R5/R3	Stop, Start	Stop
Description:	When configuring a disk group for RAID Level 3 or 5. During an initial R3 or 5 configuration this is automatically executed.	

Sub-menu options	Settings	Default setting
63 R5/R3 Check	Stop, Start	Stop
Description:	To verify the R5/R3 configuration. This option should be executed when initially configuring for R5/R3.	

Sub-menu options	Settings	Default setting
64 Beeper	Clear, Enable, Disable	Enable
Description:	Turn on/off the audible alarm when an error occurs or during an Init R5/R3, R5 Check.	

Sub-menu options	Settings	Default setting
65 Stop Modem	No, Yes	No
Description:	To stop an ongoing Page or FAX notification. Use this option to stop receiving the same Page or FAX notification after the initial Page or FAX has been acknowledged.	

Sub-menu options	Settings	Default setting
66 Add Disk	Disk 1	None
	Disk 2	None
	Disk 3	None
	Disk 4	None
	Disk 5	None
	Disk 6	None
	Disk 7	None
	Disk 8	None
	Disk 9	None
	Disk 10	None
	Disk 11	None
	Disk 12	None
	Disk 13	None
	Disk 14	None
	Disk 15	None
	Disk 16	None
Description:	Use this option to add a disk to an existing configuration. This is only valid if not all disks were configured then a disk can be added without having to take the ACS-8910 off-line.	

Sub-menu options	Settings	Default setting
67 Remove Disk	Disk 1	None
	Disk 2	None
	Disk 3	None
	Disk 4	None
	Disk 5	None
	Disk 6	None
	Disk 7	None
	Disk 8	None
	Disk 9	None
	Disk 10	None
	Disk 11	None
	Disk 12	None
	Disk 13	None
	Disk 14	None
	Disk 15	None
	Disk 16	None
Description:	Remove a disk from an existing configuration. This allows the safe shutdown of a potential faulty disk. The drive will be removed from the configuration and the spare drive (if available) will automatically be added. Once the drive has been removed, use the Add Disk option to add the new drive to the configuration.	

Sub-menu options	Settings	Default setting
68 Statistic	None	None
Description:	View the current settings that saved in NVRAM and get a statistical analysis of the read and write operations plus the percentage of cache hits. This information can only be viewed by using the Monitor Utility from a remote terminal.	

Sub-menu options	Sub Option	Setting	Default Setting
69 Expand Array	691 1 Disk	No, Yes	No
Description:	692 2 Disks	No, Yes	No
	693 3 Disks	No, Yes	No
	694 4 Disks	No, Yes	No
	695 5 Disks	No, Yes	No
	696 6 Disks	No, Yes	No
	697 7 Disks	No, Yes	No
Description:	To expand moer capacity		

Sub-menu options	Settings	Default setting
6A Update ROM	None	None
Description:	Update the programmable firmware of the ACS-8910. This option should only be executed when the ACS-8910 is off-line.	

5. Page and FAX Notification

The ACS-8910 supports automatic notification by PAGER or FAX in the event that a disk failure occurs when the Operation Mode is in use. Enabling the Pager and FAX features of the ACS-8910 during Configuration Mode does this. The following sections describe the requirements for PAGE and FAX Notification and step-by-step instructions for enabling these options.

5.1 Modem Port Settings

The following are the settings supported by the Page and FAX Notification options. These options support any external Data/FAX modem.

Parameter	**Value**	**Default Value**
Baud Rate	2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, 115200	115200
Stop bits	1, 2	1
Data Bits	7, 8	8
Parity	None, Odd, Even	None
Flow Control	**Software Flow Control (XON/XOFF)**	Enabled

5.1.1 Modem Access

Attach the external modem to the Modem port located on the back of the ACS-8910. Attach the modem cable (provided by the modem manufacturer) from the Modem port located on the back of the ACS-8910 to the connector at the back of the modem.

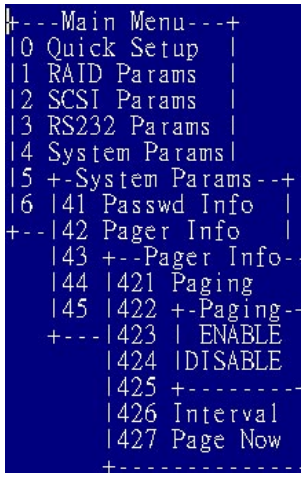
The ACS-8910 provides a generic initialization string that is compatible with most modem models. However, if your modem requires its own initialization string (specified in the modem users guide) refer to section **3.3.5 System Params** for instructions on changing the default initialization string.

5.2 Configuring PAGE and FAX Notification

The instructions use the Monitor Utility via the RS-232 port for easy configuration. However, these steps also may be performed by using the front control panel. Refer to section **5.2.1**and **5.2.2** for instructions on how to configure and use the front control panel.

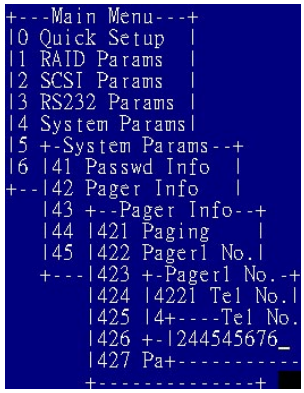
NOTE: Before running these procedures, make sure the ACS-8910 is off-line from the host computer.

5.2.1 Paging Notification



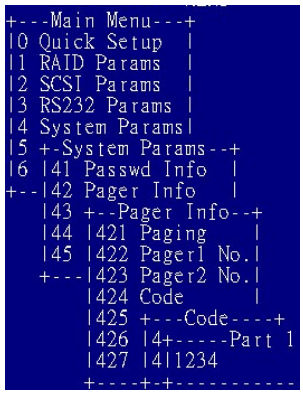
1. Press the [ENT] button to display the ”Main Menu” menu.
2. Press the [▼] button to open the “4 System Params” menu and press the [ENT] key.
3. Repeatedly press the [▼] button until the “42 Pager Info” menu is displayed, then press the [ENT] button.
4. Repeatedly press the [▼] button until the “421 Paging” menu is displayed, then press the [ENT] button.
5. Repeatedly press the [▼] button until the ”Enable” option is displayed, then press the [ENT] button.
6. Repeatedly press the [▼] button until the “422 Pager1 No.” menu is displayed, then press the [ENT] button.
7. Repeatedly press the [▼] button until the “4221 Tel No.” menu is displayed, then press the [ENT] button.
8. Key-in the primary pager numbers, then press the [ENT] button.
9. Repeatedly press the [▼] button until the “4221 Tel No.” menu is displayed, then press the [ENT] button.
10. Key-in the pin number, then press the [ENT] button.

    NOTE: The pin number is only required if an user pin is necessary to ENT a code.



11. Repeatedly press the [▼] button until the “424 Code” is displayed, then press the [ENT] button.
12. Repeatedly press the [▼] button until the “4241 Part 1” menu is displayed, then press the [ENT] button.
13. Key-in the numeric codes to display on the pager.

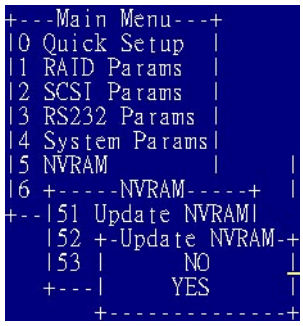
    NOTE: Up to 16 characters can be entered.



14. Repeat the step 7 and 13, the secondary pager and pin numbers.

15. Press the [Esc] key to return to the ”Main Menu” menu.

To save the current configuration continue to the next step.



16. Repeatedly press the [▼] button until the “5 NVRAM” menu is displayed, then press the [ENT] key.

17. Repeatedly press the [▼] button until the “51 Update NVRAM” menu is displayed, then press the [ENT] key.

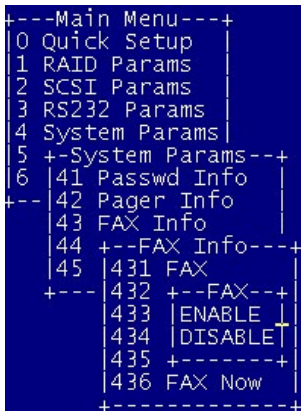
18. Repeatedly press the [▼] button until the ”Yes” option is displayed, then press the [ENT] key. Paging Notification setup is now complete. Go to FAX Notification section to configure the FAX notification.

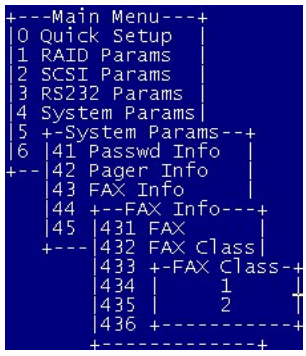
5.2.2 FAX Notification

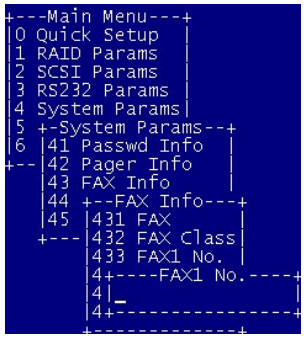
1. Press the [ENT] button to display the ”Main Menu” menu.
2. Repeatedly press the [▼]button until the “4 System Params” menu is displayed, then press the [ENT] key.
3. Repeatedly press the [▼] button until the “43 FAX Info” menu is displayed, then press the [ENT] key.
4. Repeatedly press the [▼] button until the “431 FAX” menu is displayed, then press the [ENT] key.
5. Repeatedly press the [▼] button until the ”Enable” option is displayed, then press the [ENT] key.
6. Repeatedly press the [▼] button until the “432 FAX Class” menu is displayed, then press [ENT] key.
7. Press the [▼] button to select the FAX class supported by the modem.

   NOTE: Refer to the modem user’s manual for FAX class support.
8. Repeatedly press the [▼] button until the “433 FAX1 No.” menu is displayed, then press the [ENT] key.
9. Key-in the primary fax numbers, then press the [ENT] key.
10. Repeat step 8 and 9 to setup the “434 FAX2 No.” the secondary fax number.

    NOTE: This secondary option is only necessary if notification to the second FAX station is desired.
11. Press the [Esc] key to return to the ”Main Menu” menu.

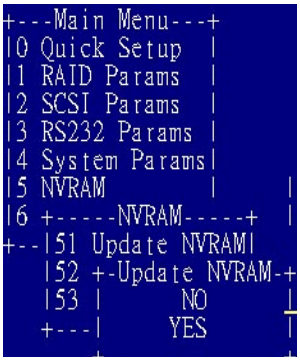






NOTE: To set up the Pager Notification options, go to *Paging Notification Section*. Save the current configuration and continue to the next step.

12. Repeatedly press the [▼] button until the “5 NVRAM” menu is displayed, then press the [ENT] key.
13. Repeatedly press the [▼] button until the “51 Update NVRAM” menu is displayed, then press the [ENT] key.
14. Repeatedly press the [▼] button until the ”Yes” option is displayed, then press the [ENT] key.



FAX Notification setup is now complete.

6. Monitor Utility

The ACS-8910 control panel allows for exploration of all configurable features. However, the small form factor of the control panel only allows a small LCD display output. A limited amount of information can be displayed at a given time on the LCD display.

The monitor utility displays all information on a larger terminal screen via a serial interface. The monitor utility is identical to the LCD display in that it displays the basic self-diagnostic, operation, and configuration information. However, it allows the Configuration Menu to be displayed by using a graphical user interface. Additionally, it displays more verbose error, warning, and status messages, impractical to display on the LCD on the front control panel.

NOTE: The Monitor Utility via the RS-232 interface and the front control panel cannot be used at the same time. When one is active, access to the other is disabled.

6.1 Key Definitions under ANSI Terminal

The ACS-8910 supports VT100 terminal and standard ANSI Terminal emulation. The following shows the definitions of the function:

A or ↑- scroll upward through the menu items
Z or ↓- scroll downward through the menu items
Enter - select an item from menu; launch a sub-menu or select a value
ESC - exit the sub-menu and return to the previous menu
TAB – Switch the MENU or OUTPUT screen.

The rest of the alpha-numeric keys are also supported for password and when prompted for input.

6.2 Connecting Terminals

The monitor utility may be accessed via the RS-232 connector located on the back of the ACS-8910. The following sections describe how to configure the ACS-8910 to access the monitor utility via the RS-232 port.

6.2.1 Communication Ports Settings

To configure the RS-232 communication ports, the following settings are required to configure at the remote terminal (or terminal emulation program) and at the ACS-8910 controller.

Parameter	**Value**	**Default Value**
Baud Rate	2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, 115200	19200
Stop bits	1, 2	1
Data Bits	7, 8	8
Parity	None, Odd, Even	None
Flow Control	Software Flow Control (XON/XOFF)	Enabled

6.2.2 Terminal Access

To access the monitor utility connect (a standard female DB-9 to female DB-9 cable is included) the remote ANSI terminal or terminal emulation program to the RS-232 port located at the back of the ACS-8910 controller. For instructions on how to use the Monitor Utility, go to section **6.3 Using the Monitor Utility**

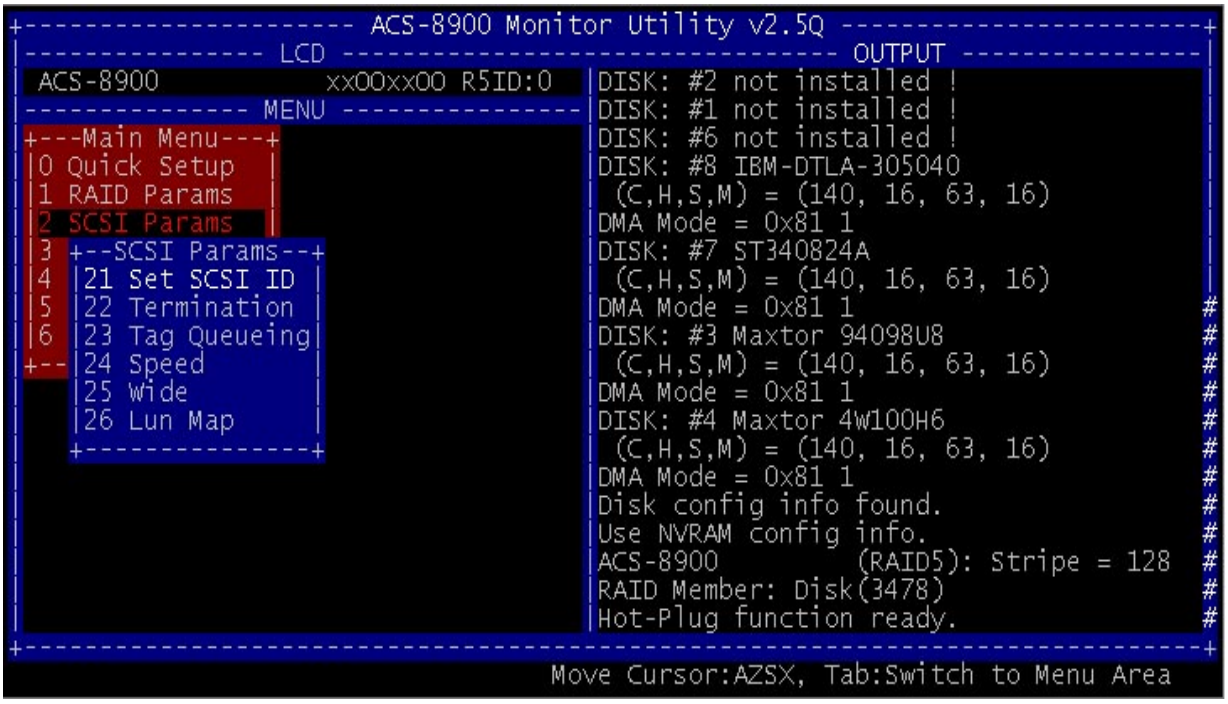
6.2.3 Using a PC for Terminal Emulation

If you do not have a dedicated terminal, you can still use a PC with third party communication software that supports ANSI terminal emulation. The majority operating systems provide ANSI terminal emulation programs.

6.3 Using the Monitor Utility

From the remote terminal (or terminal emulation program), press the [Ctrl]+[D] to lunch the “Monitor Utility”. The ACS-8910 “Monitor Utility” screen will appear as below.

The “model number” and the “firmware version” of the ACS-8910 show on the top of the screen. And the “LCD” window appears on the left of the screen. To configure the system by selecting the items that show on the “main menu” window. Alternatively, all the items that displayed on the “ Monitor Utility” screen are also appeared on the LCD display of the ACS-8910 front control panel. Moreover, the “OUTPUT” window shows the detailed information about the status of the ACS-8910 controller. At the bottom of the screen shows you how to operate the “ Monitor Utility” screen by using these buttons.



6.3.1 Running Configuration Mode

Configuration Mode through the monitor utility is similar to the LCD display. However, it has a graphical interface that allows for easier navigation through the menu system.

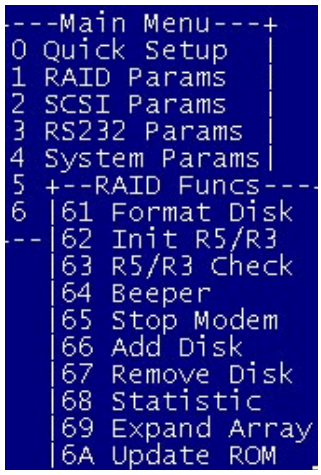
6.3.2 Updating the Firmware

The embedded firmware of the ACS-8910 can be updated through the RS-232 port using a terminal or PC in terminal emulation mode. When updating the firmware, be sure the ACS-8910 is disconnected to the system to avoid any data lost.

Verify the terminal, or terminal emulation software, settings (Baud rate, Stop bit, Data bit, Parity, Flow control) match the RS-232 settings of the ACS-8910. The Flow control must be set to Software control (XON/XOFF) and the file transfer protocol must be set to ASCII.

To update the firmware, perform the following steps.

NOTE: Refer to section 6.1 Key Definitions under ANSI Terminal for information on how to navigate when running the Monitor Utility.



1. Start the Monitor Utility by pressing the [Ctrl]+[D] keys.
2. Go to the ”Menu” section by pressing the [Tab] key.
3. Press the [ENT] key to open the ”Main Menu” menu.
4. Go to the “6 RAID Funs” menu.
5. Go to the “6A Update ROM” menu, then press the [ENT] key.
6. When prompted ”Are you ready to download the new firmware? (Y/N)” ENT [Y] to continue.
7. When prompted ”Are you sure? (Y/N)” enter [Y] to confirm.
8. Press the “ALT+T”, then press “T”
9. Choice the new firmware file from your disk drive.
10. When prompted ”Begin firmware transfer now”, it means the file has began to transfer.
11. From the terminal or terminal emulation program, go to the location where the new firmware file is located and began the file transfer.
12. Once the file transfer is complete the screen will display a similar message:

    File transfer is complete
    Checksum = xxxxx : OK.
    New firmware transfer complete.

13. When the message ”Enter ’Go’ to update the firmware” prompted; type ”Go” to continue.
14. When the message ”Enter ’Go’ to reconfirm” prompted, type ”Go” to continue.
    The firmware will be programmed and the ACS-8910 will automatically restart once completed. The firmware upgrade is done.

8. Troubleshooting

Problem: ACS-8910 is not properly identified by the SCSI adapter during the initialization of you computer system.

Possible Cause: The SCSI ID set for the ACS-8910 is used by another SCSI device attached to the same SCSI adapter.

Solution: Through the Configuration Mode select SCSI Params, then Set SCSI ID, and specify a different SCSI ID. Also, most SCSI host adapters provide a onboard ROM BIOS, or software utility, that displays the devices attached and their SCSI ID. Disconnect the ACS-8910 from the SCSI host adapter and during the system boot, or by running the utility, note the SCSI ID already in use. This will select a SCSI ID for the ACS-8910.

Problem: The ACS-8910 is identified at all SCSI ID.

Possible Cause: The SCSI ID set for the ACS-8910 is identical to the reserved SCSI ID used by the SCSI adapter in your computer system.

Solution: Use the Configuration Mode to configure the ACS-8910 for a different SCSI ID. Remember the majority of SCSI host adapter reserves SCSI ID 7 for the adapter ID.

Problem: The ACS-8910 is not been detected by the SCSI host adapter.

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

Solution: In a daisy chain configuration verify only the SCSI host adapter and the last SCSI device is terminated. To change the termination settings of the ACS-8910 use the SCSI Params menu and SCSI Termination option to enable or disable termination.

Problem: Unable to access the ACS-8910 after the operating system boots up.

Possible Cause: The ACS-8910 is not configured.

Solution: Be sure the ACS-8910 is configured for a RAID level. If no RAID level is configured the operating system will not detect the ACS-8910 as a disk drive.

Problem: Unable to access the Configuration Mode using the remote terminal interface.

Possible Cause: The terminal communications settings are not matching the settings of the ACS-8910 RS-232 interface.

Solution: The default settings for the RS-232 port are 19200 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 during Configuration Mode verify the settings of the ACS-8910 in the RS-232 Params, Terminal option and change the terminal settings accordingly.

Problem: Unable to send a Page or FAX using the modem port.

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

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

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

Solution: 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

Problem: The front panel LCD displays alternating “Zz” characters.

Cause: These characters are displayed when the cache is full with write request's data that have not been processed. It will halt requests from the host to flush the data in the cache.

Solution: None needed.

Problem: The front panel LCD displays alternating “Ww” characters.

Cause: These characters are displayed to indicate the write requests in the cache are being processed. When these characters are displayed, the ACS-8910 will halt requests from the host (see above).

Solution: 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.

Problem: Newly installed memory fails during Self-Test or is not detected.

Possible Cause: Memory SO-DIMM module may not be properly seated or may not be supported by the particular ACS-8910 model.

Solution: Re-sit the memory module in to 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. The ACS-8910 supports 144-pin SO-DIMM SDRAM.

9. Contact Us

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Specifications are subject to change without notice!

APPENDIX A - Error Messages

The following is a listing of the error messages generated by the ACS-8910 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 can not 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.
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 Connection… Fail	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.
DISK: #x is off-line!	Disk number (x) failed and was removed from the RAID configuration.
DISK: #x not installed!	The disk (x) is not 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 Message	**Explanation**
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.
Paging: Modem is busy!	The modem is currently is 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 B : Technical Specifications

ACS-8910 Disk Array Controller

Operation System	OS independent and Transparent
CPU	Intel 80303 64-bit RISC microprocessor
SCSI I/O Processor	LSI 53C1010 Ultra160
RAID Level	0,1,3,5,0+1
Cache Memory	One 144-pin SO-DIMM , 32~ 512 MB
Battery Backup	Yes (option)
SCSI Bus Termination:	Active Termination, software configurable
SCSI Architecture	Multiple ID & Multiple LUN
SCSI Channel to Host	2(option) Ultra160
Fibre Channel to Host	2(option) 2Gigabit bandwidth
IDE Disk Channel	Up to 8 x IDE ATA-66/100
Data Transfer Rate	160 MB (SCSI) to 250 MB (Fibre)
Tagged Command Queuing	Yes, up to 256 Commands
Stripe Size	Variable
Write Option Write through	Write through or Write Back
Hot Swap	Yes
Hot Spare	Yes (rebuild Transparently & Automatically)
On Line Expansion	Yes
User Friendly GUI man	Yes
Remote Management	RS-232 terminal emulation for configuration and monitoring
Remote Alarm	Fax, Pager
Beeper Alarm	Yes
Controller Size:	H 40.7 mm x W 150mm x D 197mm
Operating Temperature:	5°C to 45°C (41°F to 113°F)

Note: Specifications subject to change without notice.

APPENDIX C : SCSI Cable Specifications

SCSI Standards, Cable Length and corresponding Maximum Possible Drive Connections

	Single-Ended	Differential	Ultra2	Maximum Drives
SCSI-1	6 m	25 m		8
SCSI-2	3 m	25 m		8
Wide SCSI-2	3 m	25 m		16
Ultra SCSI-2	1.5 m	25 m		8
Ultra SCSI-2	3 m	-		4
Ultra Wide SCSI-2	-	25 m		16
Ultra Wide SCSI-2	1.5 m	-		8
Ultra Wide SCSI-2	3 m	-		4
Ultra 2 Wide SCSI			12m	16

SCSI Bus Width and Maximum Throughput

	Bus Width	SCSI Bus Sync. Frequency	Max. Bus Throughput	SCSI ID Up to
SCSI-1	8-bit	Asynchronous	5 MB/Sec	7
(Fast) SCSI-2	8-bit	10 MHz	10 MB/Sec	7
(Fast) Wide SCSI-2	16-bit	10 MHz	20 MB/Sec	15
Ultra SCSI-2	8-bit	20 MHz	20 MB/Sec	7
Ultra Wide SCSI-2	16-bit	20 MHz	40 MB/Sec	15
Ultra 2 SCSI	16-bit	40 MHz	80 MB/Sec	15
Ultra 160 SCSI	16-bit	80 MHz	160 MB/Sec	15

APPENDIX D : Glossary

Array Management Software, Firmware

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.

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

Data distributed across all the disks in the array. There is no redundant information generated or stored.

Disk Mirroring

Data is duplicated on different sets of disks in the array.

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 book, as long as they have disks attached to them.

Hot Spare

The substitution of a replacement unit in a disk system for defective one, where the substitution can be performed while the controller is running.

Hot Swap

The substitution of a replacement unit in a disk controller for a defective one, where the substitution can be performed by the controller itself while it continues to perform its normal function. Hot Swaps do not require human intervention (i.e., hot spare)

Member Disks

Disk channels configured for a particular RAID Level. Member disks are identified by a status of ” displayed on the front panel LCD.

Mirroring

A form of RAID in which *Array Management Software* maintains two or more identical copies of data on separate disks.

MTBF

An abbreviation for ***Mean Time Between Failure***, the average time from start of use to failure in a large population of identical components or devices.

RAID

A ***Redundant Array of Independent Disks*** (RAID or RAID array) is 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.

RAID levels

The original RAID level 1 through 5 was outlined in a research paper entitled *A Case for Redundant Arrays of Inexpensive Disks*. This paper was published in 1988 by David A. Patterson, Garth Gibson, and Randy H. Katz of the University of California at Berkley. Counting the term RAID 0 that refers to disk striping and later defined RAID 6, there are 7 levels of RAID.

SCSI

Small Computer System Interface.

Spare, Spare Disk

A disk reserved for the purpose of substituting for a like entity in case of failure of that entity.

Swap

The installation of a replacement unit in place of a defective unit. Units are parts of a disk controller that may either field replaceable by a vendor service representative or consumer replaceable.

APPENDIX E : Record the ACS-8910 Setting

F.1 View Drive Information

Channel	Brand	Model	Capacity
1			GB
2			GB
3			GB
4			GB
5			GB
6			GB
7			GB
8			GB

F.2 RAID Parameters Information

RAID Level	☐ 0 ☐ 1 ☐ 3 ☐ 5 ☐ 0+1
Disk Number	☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8
Spare Disk	☐ No ☐ Yes Channel _____
Slice 0	_____ GB
Slice 1	_____ GB
Slice 2	_____ GB
Slice 3	_____ GB
Slice 4	_____ GB
Slice 5	_____ GB
Slice 6	_____ GB
Slice 7	_____ GB

F.3 SCSI Parameters Information

Primary SCSI lD	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7
Termination	☐ Enable ☐ Disable
TAG Queuing	☐ Enable ☐ Disable
Speed	☐ Ultra2 ☐ Ultra160
Ultra	☐ Enable ☐ Disable
Wide	☐ Enable ☐ Disable
LUN 0 to Slice	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7
LUN 1 to Slice	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7
LUN 2 to Slice	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7
LUN 3 to Slice	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7
LUN 4 to Slice	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7
LUN 5 to Slice	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7
LUN 6 to Slice	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7
LUN 7 to Slice	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7

Secondary SCSI lD	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7
Termination	☐ Enable ☐ Disable
TAG Queuing	☐ Enable ☐ Disable
Speed	☐ Ultra2 ☐ Ultra160
Ultra	☐ Enable ☐ Disable
Wide	☐ Enable ☐ Disable
LUN 0 to Slice	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7
LUN 1 to Slice	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7
LUN 2 to Slice	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7
LUN 3 to Slice	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7
LUN 4 to Slice	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7
LUN 5 to Slice	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7
LUN 6 to Slice	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7
LUN 7 to Slice	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7

F.4 RS-232 Params Information

F.4.1 Modem Parameters Information

Baud Rate	☐ 2400 ☐4800 ☐9600 ☐14400 ☐19200 ☐28800 ☐38400 ☐57600 ☐115200
Stop Bit	☐ 1 ☐ 2
Data Bit	☐ 1 ☐ 2
Parity	☐ None ☐ Odd ☐ Even

F.4.2 Terminal Parameters Information

Baud Rate	☐ 2400 ☐4800 ☐9600 ☐14400 ☐19200 ☐28800 ☐38400 ☐57600 ☐115200
Stop Bit	☐ 1 ☐ 2
Data Bit	☐ 1 ☐ 2
Parity	☐ None ☐ Odd ☐ Even

F.5 System Parameters Information

F.5.1 Password Information

Passwd Check	☐ Enable ☐ Disable
Set Password	Default :00000000 New : _____

F.5.2 Pager Information

Paging	☐ Enable ☐ Disable
Pager 1 No	Tel No. : _____ Pin No. : _____
Code	_____
Pager 2 No	Tel No. : _____ Pin No. : _____
Code	_____
Repeat	☐ 20 ☐ 15 ☐ 10 ☐ 5
Interval	☐ 20 ☐ 15 ☐ 10 ☐ 5

F.5.3 Pager Information

FAX	☐ Enable ☐ Disable
FAX Class	☐ 1 ☐ 2
FAX 1 No.	_____
FAX 2 No.	_____
Repeat	☐ 20 ☐ 15 ☐ 10 ☐ 5
Interval	☐ 20 ☐ 15 ☐ 10 ☐ 5

F.5.4 Company Information

String 1	_____
String 2	_____

F.5.5 Modem Information

Modem Initialize String (Hays)	Default : **AT&D0&K4E0**
Brand	_____
Initialize String	_____

F.6 View ACS-8910 Controller Information

Cache Size	☐32MB ☐64MB ☐128MB
Capacity	_____ GB
Firmware version	_____
Serial Number	_____
RAID Member	_____