Intel® Integrated RAID Controller SRCU42L

Dual-channel Low Profile U320 RAID Controller Hardware Installation and User's Guide, Version 1.2.6

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Contents

1 Getting Started

1.1 Using the User Documentation Set 5
1.1.1 Document Formats 6
1.2 About This Guide 6
1.3 Customer Support Contact Information 6
1.4 Regulatory and Certification Information 7
1.4.1 Product Regulatory Compliance 7
1.4.2 Product Safety Compliance 7
1.4.3 Product EMC Compliance 7
1.4.4 Product Regulatory Compliance Markings 8
1.4.5 Electromagnetic Compatibility Notices 8
1.5 Warnings and Cautions 11

2 Hardware Installation

2.1 Installation Procedures 13
2.1.1 Computer System Hardware Requirements 13
2.1.2 Installing the IIR Controller 14
2.1.3 Changing Jumper Settings 15
2.2 Diagnostic Features 17
2.2.1 LED Indicators 18
2.2.2 Audible Alarm 18
2.2.3 Beep Sequences During System Boot 19
2.3 SCSI Termination 19

3 Hardware Specifications and Features

3.1 IIR Controller Hardware Features 21
3.1.1 Key Features 21
3.2 Operating System Support 23
3.3 Supported SCSI Technology 23
3.3.1 Supported Hard Drive Technology 23
3.3.2 Support for Non-Hard-Disk-Drive SCSI Devices (Non-Direct-Access Devices) 25
3.4 Array Roaming Compatibility 25
3.5 Optional Features 26
3.5.1 PCI Hot Plug 26
3.5.2 Configurable Disk Drive SCSI Parameters 26
3.5.3 Configurable I/O Controller SCSI Parameters 27
3.6 RAID Controller Drive Limitations (Host, Array, Logical, and Physical) 27

A Flash Memory Programming

A.1 Firmware Update Procedure via XROM StorCon 29
A.2 Firmware Recovery Procedure via Flash Recovery Utility (FRU) 30

Figures

2-1 IIR Controller Component Layout 14
2-2 Installing the IIR Controller into a Computer System 15
2-3 Jumper Locations and Pin Numbers 16
2-4 LED Labels and Colors 18

Tables

2-1 Controller Jumper Settings 17
2-2 LED Descriptions 18
2-3 Beep Sequences 19
3-1 Hardware Architecture 21
3-2 Environmental Specifications 22
3-3 Supported SCSI Device Standards 24
3-4 Configurable Disk Drive SCSI Parameters 26
3-5 Configurable I/O Controller SCSI Parameters 27
3-6 RAID Controller Drive Maximum Limitations 28

Getting Started 1

Intended Audience

This documentation is intended for users who are experienced in configuring computer systems with new add-in cards or have had previous experience with Intel® Integrated RAID (IIR) Controllers.

Read and adhere to all warnings, cautions, and notices in this guide and the other documents in the user documentation set supplied with this product.

1.1 Using the User Documentation Set

User documentation for this product is provided in four separate documents:

Installation Quick Start Poster

The *Installation Quick Start Poster*, or *Quick Start Poster,* provides a high level view of installing and configuring a RAID controller. Refer to the accompanying *Software Guide* for more detailed information.

Hardware Installation and User's Guide

The *Hardware Installation and User's Guide*, or *Hardware Guide*, covers instructions for installing an IIR controller and provides a guide to its features and specifications. For a particular IIR controller, its hardware guide documents compatible RAID adapters, supported operating systems, standard features and optional features.

Software Installation and User's Guide

The *Software Installation and User's Guide*, or *Software Guide*, contains:

- Quick installation of the IIR controller software on a newly created bootable host drive with commonly used operating systems.
- Detailed instructions covering more complex software installation scenarios for all supported operating systems.
- Instructions for using the RAID Software Suite, the drivers, tools and utilities of the IIR controller.

The first part of the software guide provides an overview of RAID technology and its features. Next, the guide documents various installation procedures for an IIR controller and the RAID Software Suite, depending on the chosen OS configuration. The software guide then includes descriptions of the utilities, Storage Console (StorCon) and Storage Console Plus (StorCon+), to facilitate the configuration of the RAID subsystem. Finally, the guide provides details of all product features supported by the software and firmware For further information refer to the Optional Features section of the appropriate hardware guide since not all features are applicable to all IIR controllers.

Clustering Guide

The *Intel® Integrated RAID Controller Clustering Guide*, or *Clustering Guide*, describes how to set up clustering configurations using IIR Controllers and IIR controller software.

Information on Operating Systems, Cluster functionality, and other system details may be found in their corresponding system manuals.

1.1.1 Document Formats

All documents, with the exception of the quick start poster, are provided on the CD-ROM in both PDF and HTML format:

- **HTML**—To view online HTML documents, Click Documentation from the autorun menu or open <cdromdrive>:\docs\index.htm.
- **PDF**—Portable Document Format (PDF) documents can be opened, viewed, and printed with Adobe* Acrobat Reader* (not provided on the CD-ROM).

1.2 About This Guide

This guide contains three sections:

Chapter 1, Getting Started

This chapter covers how to use the different user documents in the user documentation set, customer support contact information, and regulatory and license agreements covering this product.

Chapter 2, Hardware Installation

This chapter contains the procedures for installing the IIR controller into a computer system.

Chapter 3, Hardware Specifications and Features

This chapter covers all the hardware specifications associated with the IIR controller and its components and any optional RAID features that are supported by the RAID Software. The software guide covers in detail all software features.

1.3 Customer Support Contact Information

For product support, visit http://suppport.Intel.com.

1.4 Regulatory and Certification Information

Note: This controller is intended for use in UL Listed computers or equivalent, that have instructions detailing installation.

1.4.1 Product Regulatory Compliance

The IIRZN1CHLS RAID controller, when correctly integrated per this guide, complies with the following safety and electromagnetic compatibility (EMC) regulations.

1.4.2 Product Safety Compliance

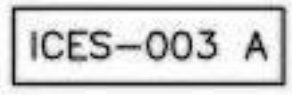
- CSA C22.2, No. UL 60950/60950, 3rd Edition (US/Canada)
- EN 60950 (European Union)
- IEC 60950 (International)
- CE - Low Voltage Directive (73/23/EEC) (European Union)

1.4.3 Product EMC Compliance

- FCC Part 15, Class A Emissions (USA)
- ICES-003, Class A Emissions (Canada)
- CISPR 22, 3rd Edition, Class A Emissions (International)
- EN55022: 1998, Class A Emissions
- EN55024: 1998, Immunity
- CE - EMC Directive 89/336/EEC
- AS/NZS 3548, Class A Emissions (Australia / New Zealand)
- BSMI CNS13438, Class A Emissions (Taiwan)
- RRL, MIC Notice No. 1997-41 (EMC) & 1997-42 (EMI) (Korea)

1.4.4 Product Regulatory Compliance Markings

The IIRZN1CHLS (SRCU42L) RAID controller is marked with the following regulatory markings:

Marking	Description
	UL Listed Accessory mark for USA and Canada
	CE mark for European Union
	C-Tick mark for Australia and New Zealand
	Taiwan BSMI Marking (Class A)
	Canada ICES Mark
	Korea MIC Mark

1.4.5 Electromagnetic Compatibility Notices

1.4.5.1 FCC Verification Statement (USA)

Product Type: IIRZN1CHLS (SRCU42L)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

If you make any modification to the equipment not expressly approved by Intel, you could void your authority to operate the equipment.

Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment. The customer is responsible for ensuring compliance of the modified product.

All cables used to connect to peripherals must be shielded and grounded. Operation with cables, connected to peripherals that are not shielded and grounded may result in interference to radio and TV reception.

1.4.5.2 ICES-003 (Canada)

This Class A digital apparatus complies with Canadian ICES-003.

Cet appereil numérique de la classe A est conforme à la norme NMB-003 du Canada.

1.4.5.3 CE Declaration of Conformity (Europe)

We, Intel Corporation, declare under our sole responsibility that the product:

Intel® IIRZN1CHLS (SRCU42L)

is in conformity with all applicable essential requirements necessary for CE marking, following the provisions of the European Council Directive 89/336/EEC (EMC Directive) and Council Directive 73/23/EEC (Safety/Low Voltage Directive).

The product is properly CE marked demonstrating this conformity and is for distribution within all member states of the EU with no restrictions.

CE

This product follows the provisions of the European Directives 89/336/EEC and 73/23/EEC.

Dansk Dette produkt er i overensstemmelse med det europæiske direktiv 89/336/EEC & 73/23/EEC.

Dutch Dit product is in navolging van de bepalingen van Europees Directief 89/336/EEC & 73/23/EEC.

Suomi Tämä tuote noudattaa EU-direktiivin 89/336/EEC & 73/23/EEC määräyksiä.

Français Ce produit est conforme aux exigences de la Directive Européenne 89/336/EEC & 73/23/EEC.

Deutsch Dieses Produkt entspricht den Bestimmungen der Europäischen Richtlinie 89/336/EEC & 73/23/EEC.

Icelandic Þessi vara stenst reglugerð Evrópska Efnahags Bandalagsins númer 89/336/EEC & 73/23/EEC.

Italiano Questo prodotto è conforme alla Direttiva Europea 89/336/EEC & 73/23/EEC.

Norsk Dette produktet er i henhold til bestemmelsene i det europeiske direktivet 89/336/EEC & 73/23/EEC.

Portuguese Este produto cumpre com as normas da Diretiva Européia 89/336/EEC & 73/23/EEC.

Español Este producto cumple con las normas del Directivo Europeo 89/336/EEC & 73/23/EEC.

Svenska Denna produkt har tillverkats i enlighet med EG-direktiv 89/336/EEC & 73/23/EEC.

1.4.5.4 BSMI (Taiwan)

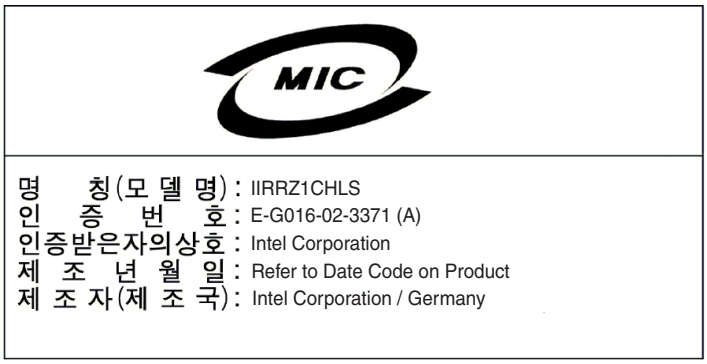
These products have been tested in accordance to, and complies with Taiwan BSMI certification requirements.

警告使用者:

這是甲類的資訊產品，在居住的環境中使用時，
可能會造成射頻干擾，在這種情況下，使用者會
被要求採取某些適當的對策。

1.4.5.5 RRL (Korea)

These products have been tested in accordance to, and complies with Korean RRL certification requirements.



1.5 Warnings and Cautions

This guide and all associated guides in the user documentation set (the Quick Start Guide, the Hardware Guide, and the Software Guide) should be used by qualified technical personnel with experience installing and configuring PCI controllers.

Read and adhere to all warnings, cautions, and notices in this guide and all the guides in the *user documentation set* supplied with this product.

Warnings

- The connection of a non-shielded equipment interface cable to this equipment will invalidate the FCC certification of this device and may cause interference levels that exceed the limits established by the FCC for this equipment. It is the responsibility of the user to obtain and use a shielded equipment interface cable with this device. If the equipment has more than one interface connector, do not leave cables connected to unused interfaces unless otherwise instructed to do so in the user manual.
- Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

Cautions

- Take precautions to prevent electrostatic discharge (ESD) damage before handling the IIR controller.
- ESD can damage controller components. Perform the described procedures in this guide only at an ESD workstation. If no such station is available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the computer chassis.

Hardware Installation 2

This chapter provides information on installing the IIR controller, programming the Flash memory, setting jumpers, using the LEDs and alarms to diagnose the controller, and general SCSI termination information.

2.1 Installation Procedures

Warning: **Shock hazards may be present inside the computer in which this controller is being installed. Disconnect all power cords to the computer before the removal of any covers.**

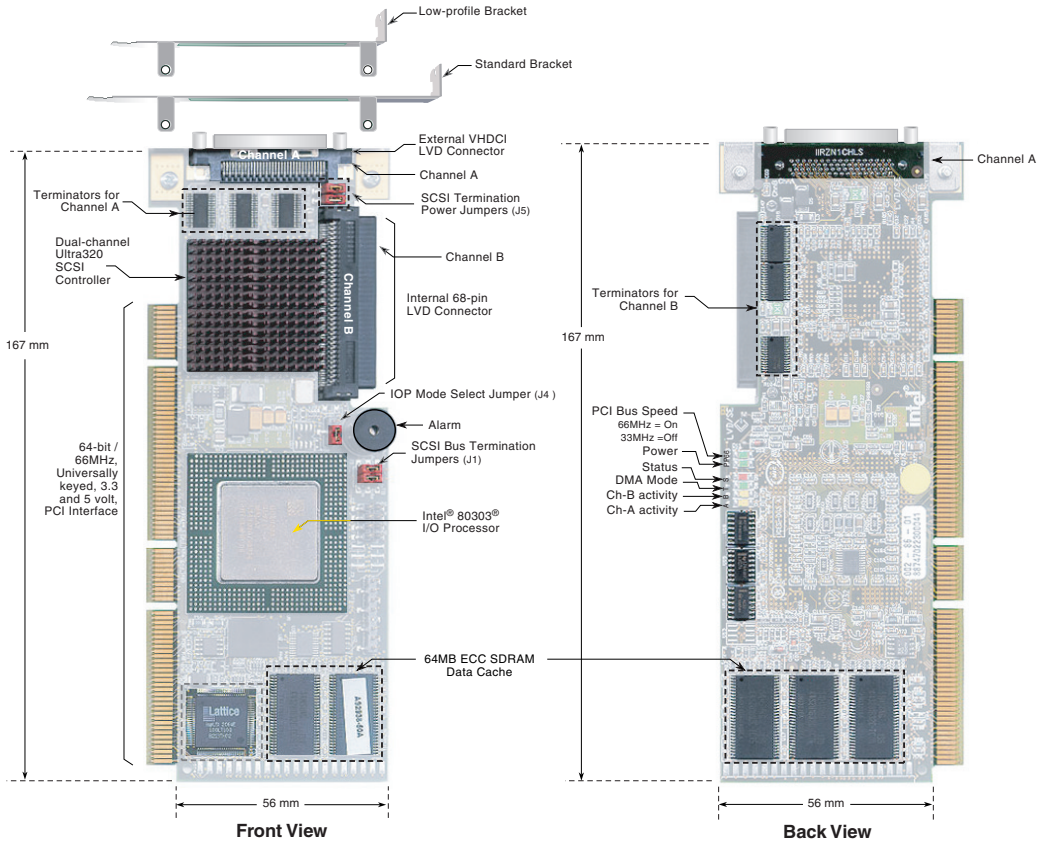
Follow the warnings noted in your computer's user manual before installing this board. ONLY after reinstallation of all the covers should you reconnect the power cords and power up the computer.

Note: Take precautions to prevent electrostatic discharge (ESD) damage before handling the IIR controller.

2.1.1 Computer System Hardware Requirements

- Computer with CD-ROM drive (not attached to the IIR controller)
- One available 64-bit/66MHz PCI slot for optimal performance; however, the controller is backwards compatible with all 33MHz PCI expansion slots.
- PCI 2.2 compliant system BIOS

Figure 2-1. IIR Controller Component Layout



2.1.2 Installing the IIR Controller

1. Power-off the computer system.
2. Disconnect power cord(s) and remove the system cover.
3. Install the IIR controller into an available PCI slot. See Figure 2-2.

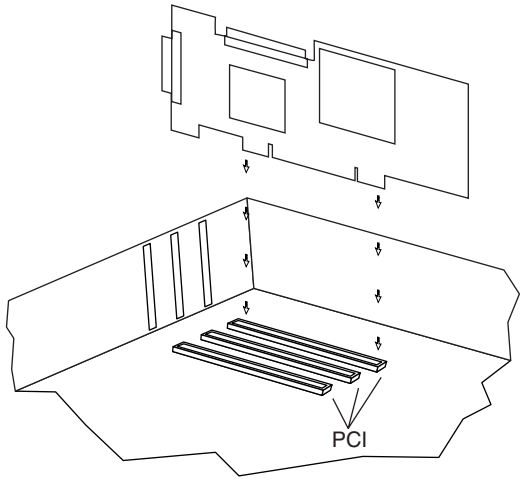
Note: Use the appropriate bracket on the controller for your server platform.

4. Connect one end of the SCSI cable to the external VHDCI 68-pin connector or internal 68-pin LVD SCSI connector located on the IIR controller. Connect the other end of the SCSI cable to the SCSI drives or drive enclosure.

Note: Ensure that the end of the SCSI bus is properly terminated. See Section 2.3 in this guide for termination details.

5. Replace the system cover and reconnect power cord(s).

Figure 2-2. Installing the IIR Controller into a Computer System



2.1.3 Changing Jumper Settings

The IIR controller normally comes ready to be installed into the computer motherboard immediately. However, jumper settings are available to:

- Reprogram the RAID firmware that is located in the flash memory of the IIR controller.
- Change the configuration for SCSI power and/or termination.

The board contains 3 jumper blocks to control the functions described in Table 2-1. See Figure 2-3 for jumper locations and pin numbers, and see Appendix A for a detailed description of jumper J4.

Figure 2-3. Jumper Locations and Pin Numbers

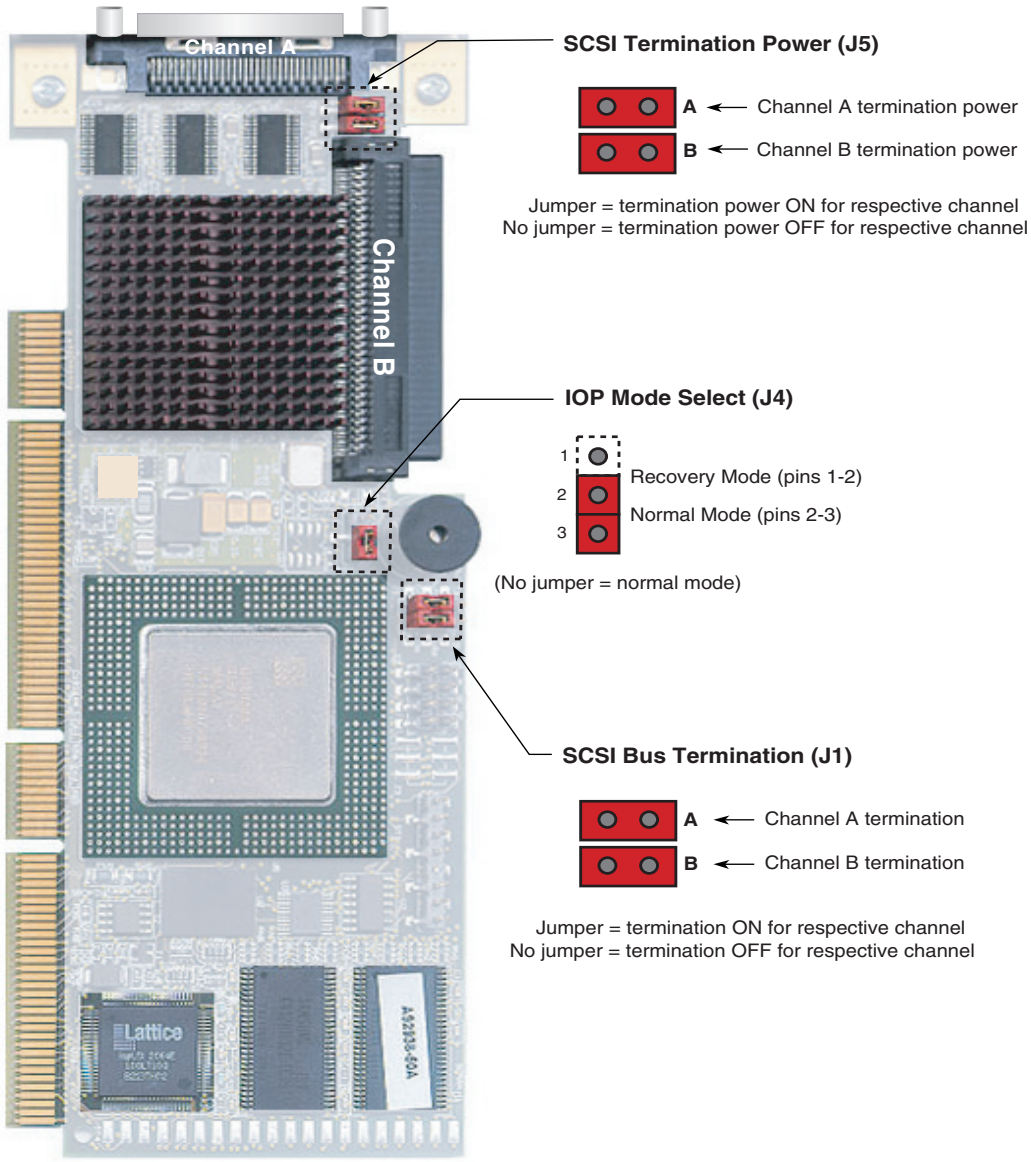


Table 2-1. Controller Jumper Settings

Jumper Block	Jumper Position	Definition
J1	Jumper on A	Termination for channel A is on.
	No jumper on A	Termination for channel A is off.
	Jumper on B	Termination for channel B is on.
	No jumper on B	Termination for channel B is off.
J4	Jumper on pins [1-2]	IOP is in reset mode with firmware recovery enabled.
	Jumper on pins [2-3]	IOP is in normal run mode.
	No jumpers	IOP is in normal run mode.
J5	Jumper on A	Controller supplies termination power to channel A.
	No jumper on A	Controller does not supply termination power to channel A.
	Jumper on B	Controller supplies termination power to channel B.
	No jumper on B	Controller does not supply termination power to channel B.

J1 - *SCSI bus termination jumper block.* These jumpers control SCSI termination for both channels.

J4 - *IOP mode select jumper block*: This jumper is used to place the IOP in reset, which enables the flash chip to be programmed to recover resident firmware. See Appendix A for a detailed description of jumper J4.

J5 - *SCSI termination power jumper block* - At least one device has to supply +5 volts termination power to the SCSI bus.

2.2 Diagnostic Features

The SRCU42L has LED indicators, an 80db audible alarm, and boot-up beep sequences that can help diagnose the controller.

2.2.1 LED Indicators

The LEDs on the controller indicate SCSI activity, data transfer, power status, PCI bus frequency, and reset mode.

Figure 2-4. LED Labels and Colors

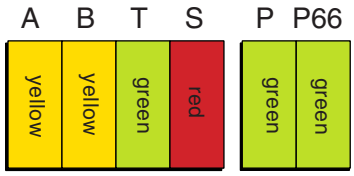


Table 2-2. LED Descriptions

LED	Description
A	Indicates SCSI activity on channel A.
B	Indicates SCSI activity on channel B.
T	Indicates data transfer to the controller's cache memory.
S	When illuminated, the controller's IOP is in reset mode. See J4 in Section 2.1.3, *Changing Jumper Settings*.
P	When illuminated, the controller is powered on.
P66	When illuminated, PCI bus frequency is 66Mhz. When not illuminated, PCI bus frequency is 33Mhz.

2.2.2 Audible Alarm

An 80db audible alarm, which is controlled by the RAID firmware, is mounted on the RAID controller to indicate any of the following events:

- State of controller upon boot-up
- Change in the normal state of the array
- Change of controller environmental status (during normal operation)
- Failure of hardware that the controller manages

If the cause of the event is resolved and/or removed, the audible alarm will cease. You can also turn off the audible alarm manually through StorCon or StorCon+. If you use these management tools to silence the alarm, it will only be disabled for the current event and will be ready to sound again at the next event.

2.2.2.1 Silencing the Audible Alarm in StorCon

In StorCon, under Advanced Setup > Configure Controller, press <F4> to silence alarm. Note: The <F4> option is only available if the alarm has been activated.

2.2.2.2 Silencing the Audible Alarm in StorCon+

In StorCon+, in the *Physical Configuration* view, right click on the icon of the controller requiring alarm deactivation. Click *Silence* to deactivate alarm. If the alarm has not been activated, the *Silence* option will be grayed out.

2.2.3 Beep Sequences During System Boot

During system POST, the audible alarm on the controller will produce one of a number of beep sequences to indicate the status of the controller. See Table 2-3 for a description of these beep sequences.

Table 2-3. Beep Sequences

Beep Sequence	Status
beep - pause - beep, beep, beep	Controller startup was successful.
beep, beep, beep, beep, ...	RAID controller has a problem. A possible cause is disk failure. To diagnose the problem, run the Storage Console to check the status of the RAID controller and array.
beep, beep - pause - beep, beep - pause -	Memory or firmware may have a problem. More details may be available from the boot message. If necessary, recover the firmware by following the procedure in Appendix A, “Flash Memory Programming”.

2.3 SCSI Termination

Termination is a commonly overlooked requirement when connecting SCSI devices together. When these devices are connected together, the resulting set of devices is typically referred to as a SCSI bus. SCSI devices such as hard disks and tape drives must be terminated if they are the last physical devices at either end of the SCSI bus (if nothing else is actively terminating the end of the bus such as a terminator or backplane). If a device is inserted into the middle of the SCSI bus, then it (the device itself) should not be terminated. Only terminate each end of the bus. See Table 2-1 for a list of jumper block (J1) SCSI bus termination settings.

Hardware Specifications and Features 3

This chapter covers all the hardware specifications associated with the IIR controller and its components. Section 3.5 covers optional RAID features that are supported by the RAID Software Suite. The accompanying *Software Guide* covers all software features.

3.1 IIR Controller Hardware Features

This section provides a summary of the key features, configuration options and support interface technology supported by the IIR controller.

3.1.1 Key Features

- Supports RAID levels 0, 1, 4, 5 and 10
- Supports a dual channel Ultra320 SCSI controller (one channel external and one channel internal with speeds up to 320 MB/second per channel)
- Online RAID level migration and capacity expansion without reboot
- RAID array roaming
- Instant availability and background initialization
- Automatic rebuild with private (dedicated) or pooled (global) hot fix (spare) drives
- Variable data strip size configurable per array
- Non hard disk drive SCSI device support (tape, CD-ROM, etc.)
- 64MB of ECC SDRAM support
- Read/write controller and disk caching
- SAF-TE intelligent enclosure support
- Hot plug disk drive auto detection configurable for non-intelligent enclosures
- Hot plug drive support
- PCI Hot plug support

Table 3-1. Hardware Architecture

Component	Features
I/O Microprocessor	The 80303 processor: 100MHz, RISC 64-bit core
Cache Memory	3.3V unbuffered, PC100, ECC SDRAM. 64MB embedded not upgradeable
Flash Memory	3.3v, 32Mb (4MB) flash memory chip is used to store the RAID firmware
I/O interface (PCI)	PCI 2.2 compliant, universally keyed for 3.3 and 5 volt PCI slots

Table 3-1. Hardware Architecture

Component	Features
PCI Transfer Rate	528 MB/sec (Burst) DMA to PCI and local buses
PCI Signaling	+5 or +3.3 volt
SCSI Controller	Dual channel, Ultra320

Table 3-2. Environmental Specifications

Environmental Stress Test	Meets Required Conditions
Operating Temperature	0° C to +55° C
Storage Temperature	-40° C to +70° C
Form Factor (physical dimensions)	Height: 56 mm (2.20 inches) Length: 167 mm (6.57 inches)

3.2 Operating System Support

The following operating systems are fully validated and supported:

- Microsoft* Windows* 2000 Advanced Server, Service Pack 3
- Novell* NetWare* 6.0
- SCO* Openserver* 5.0.6a
- Red Hat* Linux* 7.2 (2.4 kernel)
- SCO UnixWare* 8.0
- SuSe Linux 7.3 Professional

The following operating systems are supported with limited compatibility validation:

- Windows 2000 server
- Windows NT 4.0 Server and Enterprise Server, Service Pack 6a or higher
- Novell NetWare 5.1 (support pack 2a or higher)
- Linux (2.4 kernel)
  - — Red Hat Linux 7.1
  - — Debian* Linux 2.2r6
  - — Caldera Linux 3.1
  - — Mandrake* Linux 8.1
  - — TurboLinux* 7.0 Server
- SCO UnixWare 7.1.1
- FreeBSD* 4.4 and 4.5
- Linux (2.2 kernal)
  - — Red Hat Linux 7.0

3.3 Supported SCSI Technology

The RAID controller supports up to 15 physical SCSI devices per SCSI channel. It supports up to 15 hard disk drives (or 14 hard disk drives if one of the SCSI IDs is occupied by a SAF-TE processor) per channel, which means that the dual channel SRCU42L controller can support 30 disk drives maximum.

3.3.1 Supported Hard Drive Technology

The controller supports both **Single-ended (SE)** and **Low Voltage Differential (LVD)** devices but it is recommended that you use only one type of drive technology (SE or LVD) on any one channel at a time. See Table 3-3 for the Supported SCSI Device Standards. The controller is designed to optimally utilize Ultra320 SCSI devices; yet it is backward compatible with older SCSI hard disk drive specifications.

If both SE and LVD devices are attached to the same channel/bus, the entire bus must operate at the single ended mode speed of the slower device. See Table 3-3 for the maximum cable length distances that apply to each mode.

Table 3-3. Supported SCSI Device Standards

SCSI Drive Standard	Bus Speed (MB/Sec)	Bus Width (in Bits)	Maximum Cable Length (meters) (1)		Maximum Devices per SCSI Channel
			Single-Ended	LVD	
SCSI-1 (2)	5	8	6	(3)	8
Fast SCSI (2)	10	8	3	(3)	8
Fast Wide SCSI	20	16	3	(3)	16
Ultra SCSI (2)	20	8	1.5	(3)	8
Ultra SCSI (2)	20	8	3	N/A	4
Wide Ultra SCSI	40	16	N/A	(3)	16
Wide Ultra SCSI	40	16	1.5	N/A	8
Wide Ultra SCSI	40	16	3	N/A	4
Ultra 2 SCSI (2, 4)	40	8	(4)	12	8
Wide Ultra 2 (4)	80	16	(4)	12	16
Ultra160 (Ultra 3)	160	16	(4)	12	16
Ultra320	320	16	(4)	12	16

Notes:

(1) May be exceeded in Point-to-Point and engineered specific applications.

(2) Use of the word “Narrow”, preceding SCSI, Ultra SCSI, or Ultra2 SCSI (i.e. Narrow SCSI) is optional.

(3) LVD was not defined in the original SCSI standards for this speed. If all devices on the bus support LVD, then 12-meters operation is possible at this speed. However, if any device on the bus is singled-ended only, then the entire bus switches to single-ended mode and the distances in the single-ended column apply.

(4) Single-ended is not defined for speeds beyond Ultra.

After Ultra 2 all new speeds are wide only.

The preceding information is based on the *‘STA-Endorsed Terms & Terminology for SCSI Parallel Interface Technology’* specification published by the SCSI Trade Association. It can be viewed at: http://www.scsita.org/terms/scsiterms.html.

3.3.2 Support for Non-Hard-Disk-Drive SCSI Devices (Non-Direct-Access Devices)

The RAID controller will pass through to the host operating system direct access to non-direct-access SCSI devices which are connected to a SCSI bus (channel) of the RAID controller. The RAID controller passes through all control of these devices to the host operating system.

Types of supported non-Direct-Access SCSI devices (this does not cover specific vendors and models):

- SAF-TE Processors.
- Tape Backups. Check with your vendor. Some manufacturers recommend that you do not connect a tape backup drive directly to a RAID controller of any kind.
- CD-ROMs.

3.4 Array Roaming Compatibility

Array Roaming allows the user the ability to move a complete RAID array from one computer system to another computer system and preserve the RAID configuration information and user data on that RAID array. ††Compatible RAID controllers must control the RAID subsystems of the two computer systems (see list of compatible controllers in this section). The hard disk drives are not required to have the same SCSI ID in the target system that they did in the original system that they are removed from.

Note: For a migrated RAID array to be recognized by the new host operating system, the host system may need to be rebooted.

Warning: **†† The SRCU42L controller, with firmware 2.34.yy-Rzzz, is not compatible with the previous series of the GSU31 (SRCU31LA) controller (firmware versions 5.xx) and the previous series of the BNU31 (SRCU31A) controller (firmware versions 4.xx). Do not attempt RAID Array Drive Roaming between RAID controllers that are not compatible with the SRCU42L controller. Unpredictable behavior may include, but is not limited to, data loss or corruption.**

Compatible controllers include:

- SRCU42L – Firmware version 2.34.yy-Rzzz
- SRCU31LA - Firmware version 2.3x.yy-Rzzz
- SRCU31A– Firmware version 2.3x.yy-Rzzz
- SRCU32 – Firmware version 2.3x.yy-Rzzz
- SRCZCR – Firmware version 2.3x.yy-Rzzz

Note: Compatibility refers only to how data and RAID configuration information are written to the hard disks. Compatible controllers have the same data file format.

3.5 Optional Features

The SRCU42L supports the following optional features as described in the Software Guide:

- PCI Hot Plug
- Configurable SCSI parameters

3.5.1 PCI Hot Plug

The SRCU42L adapter supports PCI Hot Plug under the following OS's:

- Windows 2000 Advanced Server SP3, Windows 2000 Server, Windows 2000 Professional
- Novell NetWare 5.1 SP2a
- Novel NetWare 6.x

This IIR controller supports the PCI Hot Plug functionality for the Hot Replacement of an adapter. Hot Replacement assumes that the drivers for the adapter being replaced are already loaded.

3.5.2 Configurable Disk Drive SCSI Parameters

When a SCSI hard disk drive is initialized the first time by the RAID controller, its SCSI parameters are automatically set to their optimal settings. Most settings are set automatically and can not be configured manually. To view or configure disk drive SCSI parameters from the Storage Console, choose Advanced Setup → Configure Physical Devices → Select Physical Drive → SCSI Parameter/Initialize.

Table 3-4. Configurable Disk Drive SCSI Parameters

Parameter	Setting/ Value	Configuration	Description
Synch. Transfer	Enabled / Disabled	Automatic	This setting when enabled allows the controller to operate in synchronous transfer mode
Synch. Transfer Rate	Speed (MB/sec)	Automatic	Allows for the setting of the speed for the SCSI hard disks (up to 320 MB/sec for U320 drives). No matter the setting, the SCSI bus will negotiate the fastest speed up to this setting. Lowering the setting will force the disk drive to transfer at the lower speed.

Table 3-4. Configurable Disk Drive SCSI Parameters

Disconnect	Enabled / Disabled	Automatic	Enabling this setting allows for the disk drive to disconnect from the SCSI bus when it's not participating in a transfer. This allows for optimal bus utilization by all devices on the bus.
Tagged Queues	On / Off	Automatic	When enabled, this feature allows the SCSI disk drive to execute more than one command at a time.
Disk Read and Write Cache	On / Off	Configurable	For performance reasons, the *Read Ahead* and *Write* cache of the hard disk drives should always be on. This is the default setting.

3.5.3 Configurable I/O Controller SCSI Parameters

When the controller starts up, its SCSI parameters are automatically set to their optimal settings. Manual configuration is not required. However, you can customize I/O SCSI parameters for each channel on the controller by using the Storage Console menu Advanced Setup > Configure Controller > Controller Settings.

Table 3-5. Configurable I/O Controller SCSI Parameters

Parameter	Setting/Value	Description
Domain Validation	On / Off	When this is set to *On*, Domain validation allows for a cyclical check of the correct data transfer at a given rate for the respective channel.

3.6 RAID Controller Drive Limitations (Host, Array, Logical, and Physical)

The following are limitations assuming the following:

- U320 speed hard disk drives
- Dual channel SCSI controller
- Cabling that meets U320 specifications

Physical drives are limited by the number of SCSI channels being controlled by the RAID controller. The firmware/software supports a maximum of **15** hard disk drives per channel (or 14 if one SCSI ID is being occupied by an intelligent enclosure processor).

The maximum number of ***array drives*** is limited by the RAID firmware. The actual limit of the SRCU42L controller is ***15 array drives*** per dual-channel controller. A RAID array drive requires a minimum of two hard disk drives (or logical drives). Therefore the maximum RAID array drive limitation for the SRCU42L controller is the *physical drive* limit divided by two. A RAID array drive can contain (or have reside on it) up to a maximum of ***2*** *host drives*.

There is a maximum limitation of ***30*** *host drives* per SRCU42L controller. There is a minimum of at least one host drive per *array drive*. A host drive can only be associated with (or reside on) a single *array drive*.

Table 3-6. RAID Controller Drive Maximum Limitations

Drive Type	Per Channel	Per Controller	Per Array Drive	Per Host Drive
Physical Disk Drives	15	30	30	30
RAID Array Drives	7	15		1
RAID Host Drives		30	2	

Flash Memory Programming A

A.1 Firmware Update Procedure via XROM StorCon

The Storage Console (StorCon) is a full-featured monitoring and configuration utility with a text-based user interface. StorCon manages all aspects of the RAID subsystem as well as many features of the RAID adapter. Refer to the Software Guide for more details about StorCon.

You can use StorCon to update the firmware image. The menu option, Firmware Update, allows you to update the firmware, BIOS and XROM StorCon currently programmed on the flash memory of the RAID controller. Because the Flash-RAM can be reprogrammed many times, the software modules can be easily updated, without having to remove the controller from its PCI slot.

The firmware, BIOS and XROM StorCon are part of the file, SRC_RXFW.xxx, where the file extension xxx indicates the version stepping. The current firmware file can be found on the RAID Software Suite CD-ROM. To get the latest firmware for the RAID controller, visit our website at: http://support.Intel.com.

Note: The Firmware Update option is not available when StorCon is accessing the RAID Controller remotely.

Follow the procedure below to update the firmware via XROM StorCon.

1. Download the firmware image containing the latest programs/drivers from the website. Format a 3.5” HD disk (1.44MB) and copy the SRC_RXFW file onto the disk.
2. With the adapter installed in the system, boot the computer and press <Ctrl>+<G> when prompted to enter the BIOS version of StorCon.
3. Select the applicable RAID controller and press <Enter>.
4. If the Express Setup menu is displayed, press <F4> to display the Advanced Setup menu. Select the menu option, Configure Controller and press <Enter>. Insert the floppy containing the latest firmware file into the floppy disk drive.
5. From the Configure Controller submenu, select Firmware Update and press <Enter>.
6. XROM StorCon automatically searches for the firmware file from the floppy drive, a:\. After finding the file, StorCon displays the name, description and version of the firmware. Press <Enter>.
7. StorCon reads and checks the firmware file, then displays a warning. Press <Y> to confirm the firmware update.
8. StorCon programs the flash eprom.

Warning: **Do not interrupt the update process to avoid damaging the firmware image in the Flash. If the firmware is interrupted you will need to follow the firmware recovery process in the next section.**

After StorCon indicates that the update is complete, press any key.

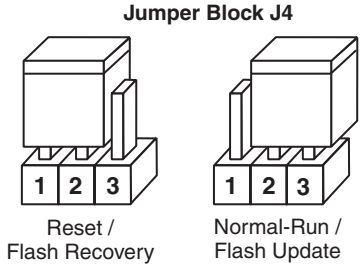
9. The focus returns to the Configure Controller submenu. Press <Esc> several times to close the menus and press <Y> to quit StorCon.
10. StorCon detects the firmware update and requires a system reboot. Press any key to reboot.

When the update process has completed, reboot the computer for the change to take effect. During boot up, the system displays the updated firmware version. You can also relaunch StorCon and select the applicable RAID controller to view its new firmware version at the bottom of the console (for example, FW:2.34.yy-Rzzz).

You can also use the OS version of StorCon to update the firmware. Refer to the Storage Console chapter of the Software Guide for more details.

A.2 Firmware Recovery Procedure via Flash Recovery Utility (FRU)

Figure A-1. Jumper Positions for Flash Update and Recovery



1. Set the IIR controller's IOP to Reset (Flash Recovery) mode:

Warning: **Shock hazards may be present inside the unit in which this controller is being installed. Disconnect all power cords to the unit before removal of any covers. Follow the warnings noted in your computer's user or service manual before installing this board. ONLY after all the covers are reinstalled should you reconnect the power cords and power up the unit for the software installation and use.**

a. Take all precautions to prevent ESD damage before handling the IIR controller.
b. Power off all system components and disconnect their power cords.
c. Remove the cover from the system to gain access to the PCI slots.
d. Remove the IIR controller from your system.

e. On jumper block J4, move the jumper from position 2-3 to position 1-2 (see Figure A-1 and Figure 2-3). Re-install the adapter in the PCI slot in which it was previously installed.

f. Replace the cover, reconnect all power cords and power up the system.

2. Change your computer's BIOS setting so that your system boots from the CD-ROM.

3. Use the RAID Software Suite CD-ROM to flash the firmware.

a. Boot the computer with the bootable RAID Software Suite CD-ROM that contains the version of the RAID firmware that you wish to recover.

b. At the ROM-DOS Startup menu, select the option, Flash Recovery Utility, and press <Enter>.

c. The Flash Recovery Utility detects any RAID controllers that are in reset mode and lists them in the order that they are found.

Note: Any RAID controllers that are not in reset mode will not be listed. If no controllers are listed, your controller may not be in reset mode. Shut down the system and start again with step 1 above. Refer to Figure A-1 and Figure 2-3 to set the jumper in reset mode.

d. Type a controller number to start the recovery process for the firmware on that controller. You do not need to press Enter after typing the number. You will see the messages shown below during a successful recovery. Each message provides a percent complete status while the action is in progress. The entire process may take several minutes.

```
Erasing flash memory
Downloading data to flash memory
Verifying flash content with input file
Flash upload complete
SUCCESS: Operation completed successfully
Download complete in <duration of flash recovery>
```

4. Reset the jumper to run mode.

a. Power off all system components and disconnect power cords.

b. Remove the system cover.

c. Remove the IIR controller from your system.

d. On Jumper block J4, move jumper from position 1-2 to position 2-3 (see Figure A-1). Reinstall the IIR controller in the PCI slot in which it was previously installed. Reconnect the SCSI drives to the controller.

e. Replace the cover, reconnect all power cords and power up the system.

5. Change your computer's system BIOS setting so that your system boots normally (not from the CD-ROM).

Note: The firmware recovery returns the controller to the default settings.

Index

A

adapter hardware
- architecture features 21
- system requirements 13

D

disk drive connectivity 23

F

flash memory
- recovering the firmware 30

I

installation
- raid adapter 14
- warnings and cautions 11

R

raid adapter
- hardware features 21
- hardware requirements 13
- installation 14
- intallation procedures 13
- system requirements 13

S

scsi termination 19
system requirements
- hardware 13

U

user's manual
- intended audience 5

W

warnings and cautions 11