intel ®

Intel® Integrated RAID Controllers SRCFC22, SRCFC22C and SRCFC22M

Dual Fibre Channel RAID Controllers
Hardware Installation and User's Guide, Version 0.9

November 2002

Hardware Installation and User's Guide

intel®

Contents

Figures

Tables

intel ®

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.

intel®

Clustering Guide

The Intel® Integrated RAID *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 may use the terms "IIR Controller," "RAID Controller," and "the controller" interchangeably. Each term represents the physical PCB that integrates all components of the RAID PCI add-in card.

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 Note:, This controller is intended for use in UL Listed computers, or equivalent, that have instructions detailing 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   Warnings and Cautions

This guide and all associated guides in the user documentation set (see Section 1.1) 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 Federal Communications Commission (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.

1.4   Customer Support Contact Information

For product support, visit http://support.intel.com.

1.5   Regulatory and Certification Information

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

1.5.1   Product Regulatory Compliance

The GDT8622RZ-I (SRCFC22, SRCFC22C, SRCFC22M) RAID controller, when correctly integrated per this guide, complies with the following safety and electromagnetic compatibility (EMC) regulations.

1.5.2 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)

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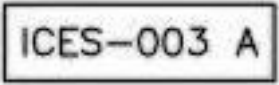
- FCC Part 15, Class A Emissions (USA)
- ICES-003, Class A Emissions (Canada)
- CISPR 22, 3rd Edition, Class A Emissions (International)
- EN55022: 1998, Class A Emissions
- EN55024: 1998, Immunity
- CE - EMC Directive 89/336/EEC
- AS/NZS 3548, Class A Emissions (Australia / New Zealand)
- BSMI CNS13438,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

1.5.4 Product Regulatory Compliance Markings

The GDT8622RZ-I (SRCFC22, SRCFC22C, SRCFC22M) RAID controller is marked with the following regulatory markings:

Marking	Description
C **UL** US — LISTED ACCESSORY ITE E139761	UL Listed Accessory mark for USA and Canada
CE	CE mark for European Union
C-Tick N232	C-Tick mark for Australia and New Zealand

intel ®

Marking	Description
D33025	Taiwan BSMI Marking (Class A)
ICES–003 A	Canada ICES Mark
MIC	Korea MIC Mark

1.5.5 Electromagnetic Compatibility Notices

1.5.5.1 FCC Verification Statement (USA)

Product Type: GDT8622RZ-I (SRCFC22, SRCFC22C, SRCFC22M)

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.

1.5.5.2   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.

1.5.5.3   CE Declaration of Conformity (Europe)

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

Intel$^®$ GDT8622RZ-I (SRCFC22, SRCFC22C, SRCFC22M)

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.

$C\mathcal{E}$

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.

intel ®

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

1.5.5.4   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。

1.5.5.5   RRL (Korea)

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

명   칭(모델명)： GDT8622RZ-I
인   증   번   호： E-G016-02-3372 (A)
인증받은자의상호： Intel Corporation
제 조 년 월 일： Refer to Date Code on Product
제 조 자(제 조 국)： Intel Corporation / Germany

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

intel®

Hardware Installation 2

This chapter provides information on installing the SRCFC22, SRCFC22C, SRCFC22M IIR Controller products as well as configuring single or dual loop Fibre Channel connections. (See the *Clustering Addendum* in the user documentation set for information about clustering with IIR Controllers).

This chapter also provides a diagram of SRCFC22, SRCFC22C, SRCFC22M IIR Controller product components as well as information about using components to diagnose the controller.

2.1   Installation Introduction

Review the warnings in your computer's user manual before installing the IIR Controller. You should not attempt to connect power cords to the computer on turn on the computer until IIR Controller installation is complete and the computer cover is on.

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

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

2.1.1   Computer System Hardware Requirements

- Computer with CD-ROM drive.
- Computer with one available 64-bit / 66MHz PCI slot for optimal performance.

Note: The IIR Controller is backward compatible with all 33MHz PCI expansion slots.

- PCI 2.2 compliant system BIOS.

2.1.2   IIR Controller Component Layout

See Figure 2-1 for a view of the card components for the SRCFC22, SRCFC22C, SRCFC22M IIR Controller products.

Figure 2-1. IIR Controller Component Layout (Front)

Front View

intel ®
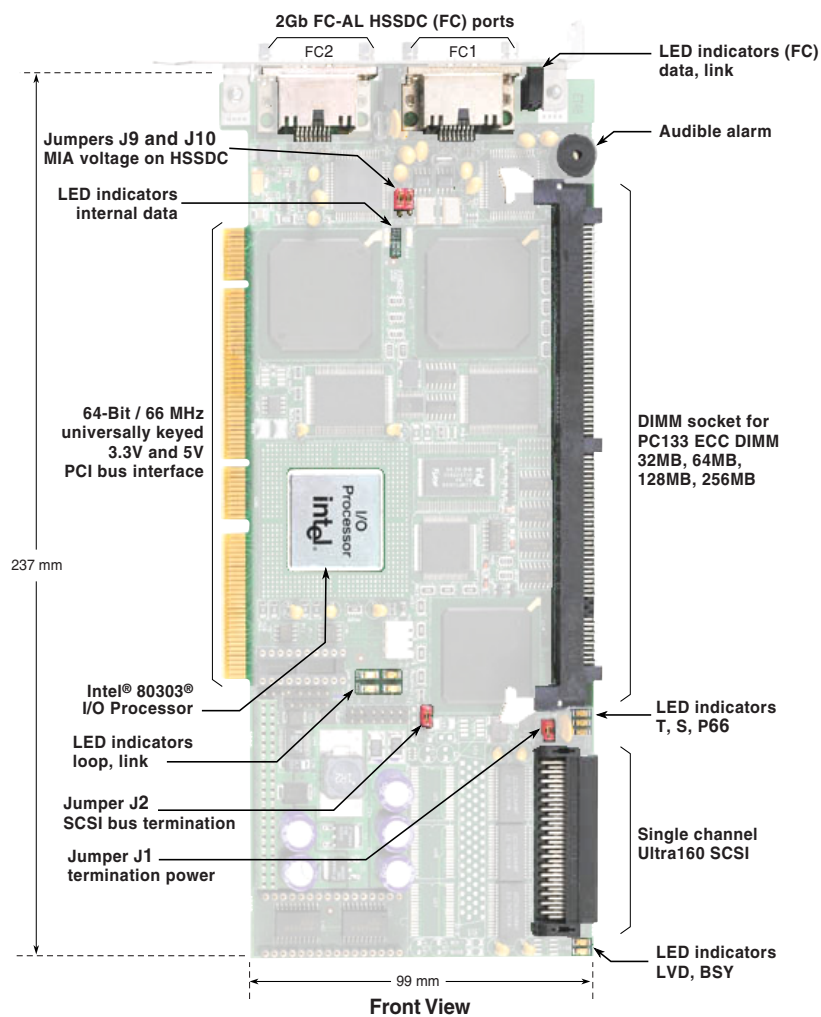
Figure 2-2. IIR Controller Component Layout (Bracket)

Link LED for FC1 ———————— Data LED for FC1

FC1 (Loop A)

Data LED for FC2 ————————

Link LED for FC2 ———————— 2Gb FC-AL HSSDC (FC) ports

FC2 (Loop B)
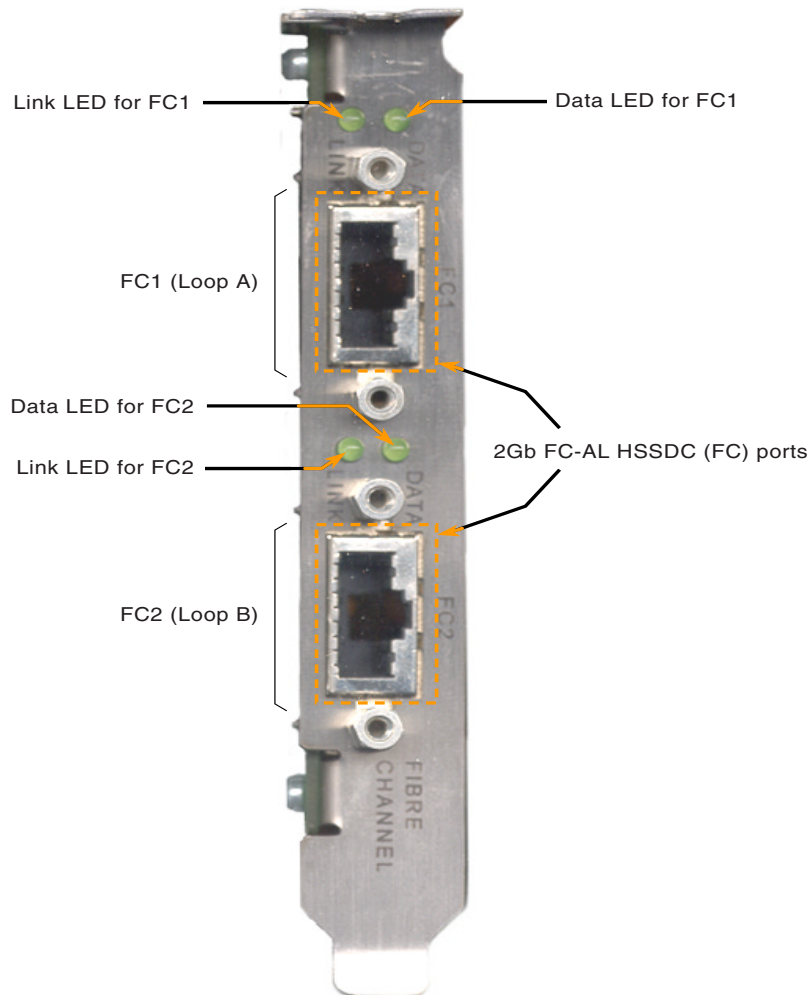
2.2 IIR Controller Installation

This section provides general instructions for installing most IIR Controller cards into a standard PCI slot. (See the user manual for your workstation or server for more information about PCI card installation).

2.2.1 Installing the IIR Controller Card

1. Turn off the computer system.

2. Disconnect all power cords and remove the system cover.

3. Change jumper settings on the IIR Controller card (if required). See Section 2.2.2 for jumper setting details.

4. Insert the IIR Controller card into an available PCI slot until it is firmly seated. See Figure 2-4.

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

Figure 2-3. Installing the IIR Controller into a Computer System

PCI
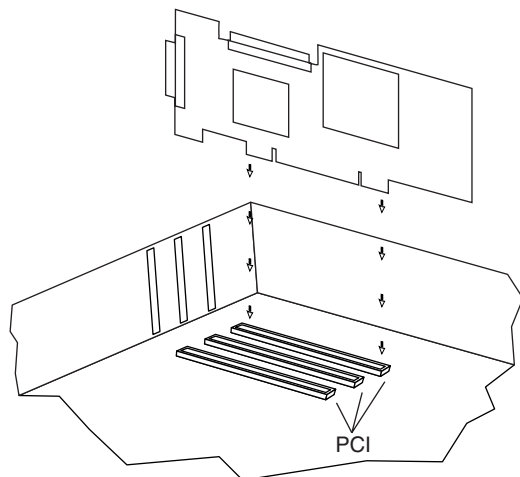
5. For internal SCSI channel connection:

   a. Connect one end of the SCSI cable to the internal 68 pin LVD SCSI connector located on the IIR Controller card.

   b. Connect the other end of the SCSI cable to the SCSI device.

      Note: Ensure that the end of the SCSI bus is properly terminated. See Section 2.2.3 for termination details.

6. Replace the system cover and reconnect power cords.

intel ®

Figure 2-4. Installing the IIR Controller into a Computer System
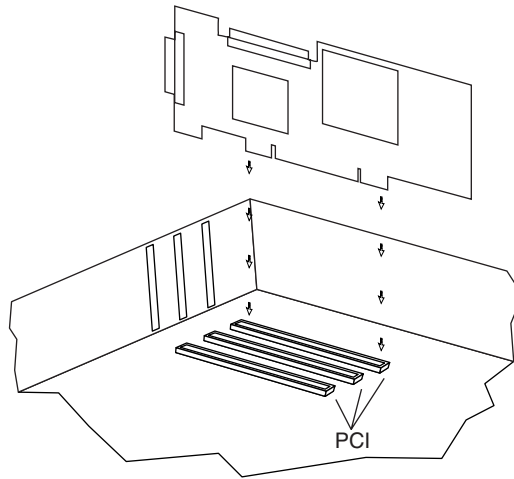
2.2.2   Jumper Settings

The SRCFC22, SRCFC22C, SRCFC22M IIR Controller products contain four jumpers. See Figure 2-5 for jumper locations and settings, and see Table 2-1 for jumper descriptions.

intel ®

Figure 2-5. Jumper Settings and Locations

MIA voltage on HSSDC (J9 and J10)
  J9 controls FC2
  J10 controls FC1

  J9 J10

  1   3.3 volts (pins 1-2)
  2   5 volts (pins 2-3)
  3

SCSI bus termination (J2)

  1   Termination AUTO (pins 1-2)
  2   Termination ON (pins 2-3)
  3

No jumper = termination OFF

SCSI termination power (J1)

Jumper = termination power provided by controller
No jumper = termination power provided by cable

intel. ®
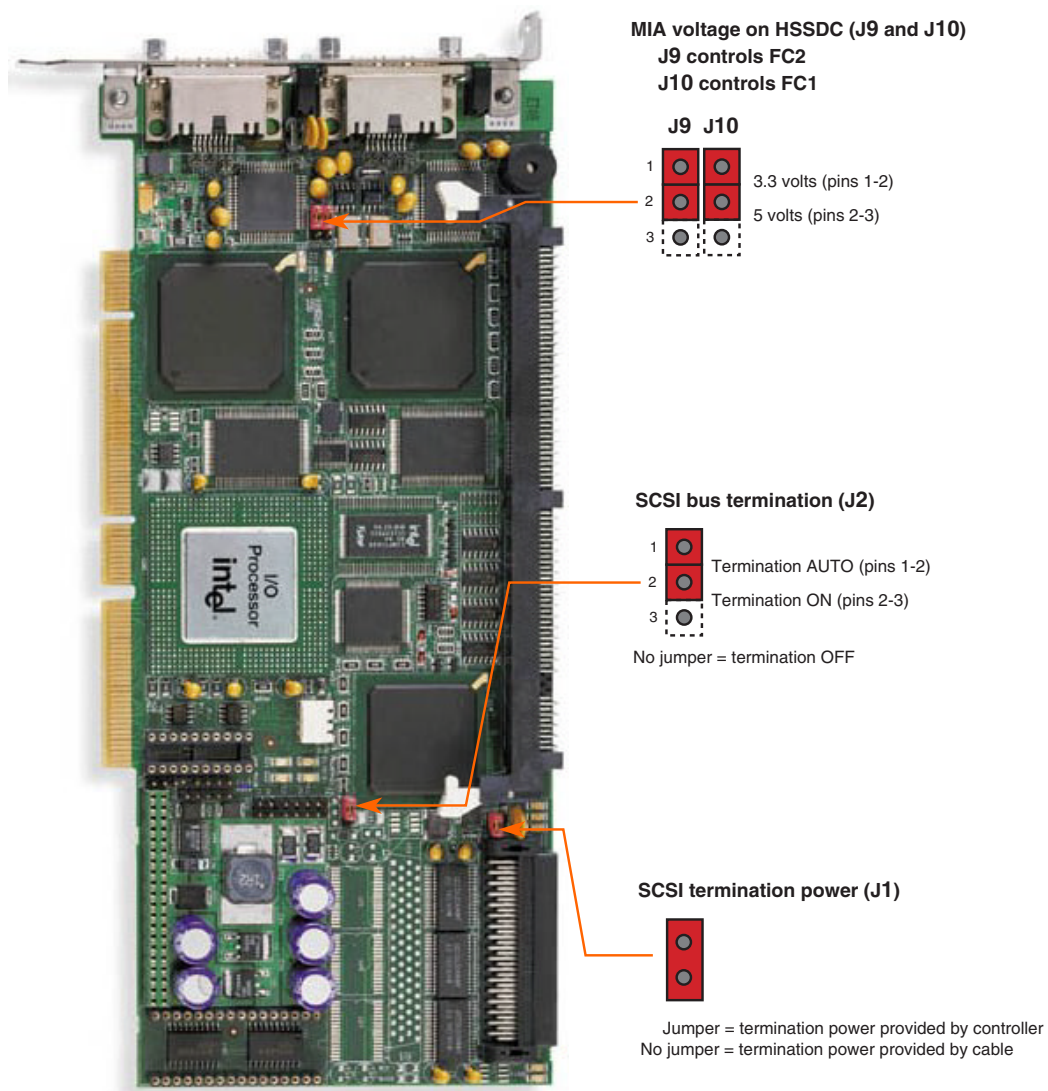
Table 2-1. Jumper Descriptions

Jumper Block	Jumper Position	Definition
J1	Jumper ON	SCSI termination power provided by controller.
	Jumper OFF	SCSI termination power provided by cable.
J2	Jumper on pins [1-2]	SCSI bus termination AUTO.
	Jumper on pins [2-3]	SCSI bus termination ON.
	No jumpers	SCSI bus termination OFF.
J9	Jumper on pins [1-2]	MIA voltage on HSSDC port 2 (FC2) set to 3.3 volts.
	Jumper on pins [2-3]	MIA voltage on HSSDC port 2 (FC2) set to 5 volts.
	No jumpers	No MIA voltage supplied to HSSDC port 2 (FC2).
J10	Jumper on pins [1-2]	MIA voltage on HSSDC port 1 (FC1) set to 3.3 volts.
	Jumper on pins [2-3]	MIA voltage on HSSDC port 1 (FC1) set to 5 volts.
	No jumpers	No MIA voltage supplied to HSSDC port 1 (FC1).

J1—*SCSI termination power:* If the SCSI port is used, at least one device has to supply +5 volts termination power to the SCSI bus.

J2—*SCSI bus termination:* If the SCSI port is used, use this jumper to set termination.

J9—*MIA voltage on HSSDC 2 (FC2):* If you are using a 5 volt MIA in the FC-AL port, you must change the jumper to the 5 volt setting.

J10—*MIA voltage on HSSDC 1 (FC1):* If you are using a 5 volt MIA in the FC-AL port, you must change the jumper to the 5 volt setting.

2.2.3   SCSI Termination

Termination is critical when connecting SCSI devices together. Connected SCSI devices are typically called a SCSI bus, and termination is required at the each end of the SCSI bus. Use a high-quality terminator at the end of the SCSI cable after the last device in the bus to ensure proper termination.

2.3   Fibre Channel Configuration

This section provides general instructions for connecting Fibre Channel (FC) enclosures to an FC-enabled IIR Controller.

2.3.1   Configuring Single and Dual Loop Connections

The SRCFC22, SRCFC22C, SRCFC22M IIR Controller products each provide a 2Gb serial interface and contain 2 HSSDC ports.

Note: Use connectors that are appropriate for your FC-enabled IIR Controller, FC cabling, and FC enclosure. See Appendix B for information about Fibre Channel cabling and connectors.

1. Install the IIR Controller card into the computer. (See Section 2.2.1 for details).

2. Connect one end of the FC cable to one port on the IIR Controller card.

3. Connect the other end of the FC cable to one port on the FC enclosure.

4. Verify loopback requirements on the FC enclosure. (See Section 2.3.2 for details).

To configure a second loop:

5. Connect one end of the FC cable to the second port on the IIR Controller card.

6. Connect the other end of the FC cabling to the second channel on the FC enclosure.

7. Verify loopback requirements on the FC enclosure. (See Section 2.3.2 for details).

2.3.2   Fibre Channel Loopback

In Fibre Channel configurations, loopback (or loop completion) is always required. Loopback sends data from an FC connector's "send" side to its "receive" side, effectively completing the loop. Many manufacturers of FC enclosures use a backplane with built-in fibre channel loopback capability. (Check your drive enclosure users manual for details). If loopback is not handled by the FC enclosure, you must attach a loopback connector on the enclosure port you are using to configure a fibre channel loop. If your fibre channel configuration includes multiple chained enclosures, loopback is required on the last device in the chain.

2.4   IIR Controller Diagnostic Features

The SRCFC22, SRCFC22C, SRCFC22M IIR Controller products have LED indicators, an 80db audible alarm, and boot-up beep sequences that can help diagnose the RAID Controller.

2.4.1 LED Indicators

There are several sets of LED indicators on the SRCFC22, SRCFC22C, SRCFC22M IIR Controller products. Some LED indicators reside near the ports on the IIR Controller card bracket (see Figure 2-6) while all other LEDs reside on the front of the IIR Controller card (see Figure 2-7). See Table 2-2 for descriptions of the LED indicators.

Figure 2-6. IIR Controller LED Indicators (Bracket)

Figure 2-7. IIR Controller LED Indicators (Front)
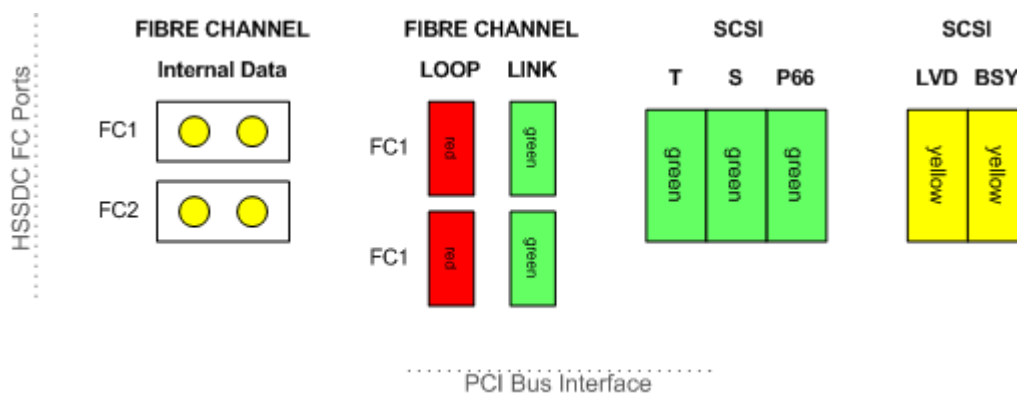
Table 2-2. IIR Controller LED Descriptions

LED	Color	Description
DATA	green	Illuminated LED indicates that data transfer is occurring on Fibre Channel loop. Located beside each port on IIR Controller.
LINK	green	Illuminated LED indicates that Fibre Channel loop is closed. Located beside each port on IIR Controller.
T	green	Illuminated LED indicates that PCI transfer is on. Located on front of IIR Controller.
S	green	Illuminated LED indicates that IIR Controller is online. Located on front of IIR Controller.

Table 2-2. IIR Controller LED Descriptions

LED	Color	Description
P66	green	Illuminated LED indicates that PCI bus frequency is 66Mhz. Non-illuminated LED indicates that PCI bus frequency is 33Mhz. Located on front of IIR Controller.
LVD	yellow	Illuminated LED indicates that all devices in the SCSI bus are in Low Voltage Differential (LVD) mode. Located on front of IIR Controller.
BSY	yellow	Illuminated LED indicates that SCSI bus is in use. Located on front of IIR Controller.
Internal DATA	yellow	Illuminated LED indicates that data transfer is occurring on FIbre Channel loop. Located on front of IIR Controller.
LOOP Error	red	Illuminated LED indicates that Fibre Channel loop is in error state. Located on front of IIR Controller.
Internal LINK	green	Illuminated LED indicates that Fibre Channel loop is closed. Located on front of IIR Controller.

2.4.2   Audible Alarm

The SRCFC22, SRCFC22C, SRCFC22M IIR Controller products contain an 80db audible alarm that is controlled by the RAID firmware. The alarm indicates these 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.

2.4.2.1   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.

intel®

2.4.2.2 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.

2.4.3 Beep Sequences During System Boot

During system POST, the audible alarm on the SRCFC22, SRCFC22C, SRCFC22M IIR Controller products sounds a beep sequence to indicate the status of the RAID 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	RAID Controller startup was successful.
beep – pause – beep, beep	Wrong memory size, note enough memory, or iBIOS detected a critical error.
beep, beep, beep - 10 sec pause - beep, beep, beep . . .	Memory error.
beep, beep – short pause – beep, beep – long pause . . .	No memory is on the RAID Controller or the RAID Controller did not detect the memory. A message displays on screen and the boot process stops. To fix the problem, install memory on the RAID Controller or try a different module.
beep - or - series of clicks	Buzzer may be defective. If the buzzer makes a series of mechanical clicks instead of beeps, the buzzer is defective and should be replaced.
beep, beep, beep, beep, beep . . .	Array failure.

Hardware Installation and User's Guide

Hardware Specifications and Features **3**

This chapter covers hardware specifications associated with the SRCFC22, SRCFC22C, SRCFC22M IIR Controller products and their components. See Section 3.7 for information about configurable RAID parameters 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, configurable parameters, and support interface technology supported by the SRCFC22, SRCFC22C, SRCFC22M IIR Controller products.

3.1.1 IIR Controller Key Features

This section describes key features of the SRCFC22, SRCFC22C, SRCFC22M IIR Controller products.

3.1.1.1 Product-Specific IIR Controller Features

SRCFC22 - Supports RAID levels 0, 1, 4, 5, 10.

SRCFC22C - Supports RAID levels 0, 1, 4, 5, 10 and storage clustering.

SRCFC22M - Supports RAID levels 0, 1.

Note: See the *Clustering Guide* for more information about using the clustering capabilities of IIR Controller products.

3.1.1.2 Shared IIR Controller Features

These features are shared by the SRCFC22, SRCFC22C, SRCFC22M IIR Controller products:
- Fibre Channel-Arbitrated Loop (FC-AL) topology
- Two 2Gb/sec Fibre Channel ports with Agilent* chip
- Two external HSSDC connectors
- Up to two RAID controller cards of similar model, brand, and firmware in the same system.
- Online RAID level migration and capacity expansion without reboot
- RAID array roaming
- SES support
- Single Ultra160 SCSI controller (one internal channel with speeds up to 160MB/sec)

- Non-HDD SCSI device support on internal SCSI channel for SCSI CD-ROM drives, CDRW recorders, and tape drives
- SAF-TE intelligent enclosure support
- Instant availability and background initialization
- Automatic rebuild with private (dedicated) or pooled (global) hot fix (spare) drives
- Variable data strip size configurable per array
- 32MB, 64MB, 128MB, and 256MB of ECC SDRAM support
- Read/write controller and disk caching
- Hot plug disk drive auto detection configurable for non-intelligent enclosures
- Hot plug drive support

Table 3-1. Hardware Architecture

Component	Features
I/O Microprocessor	Intel 80303 processor 100MHz
Cache Memory	3.3V unbuffered PC133 ECC SDRAM (32MB, 64MB, 128MB, 256MB)
Flash Memory	3.3V, 16Mb (2MB) flash memory chip used to store the RAID firmware
I/O interface (PCI)	PCI 2.2 compliant, universally keyed for 3.3V and 5V PCI slots
PCI Transfer Rate	528 MB/sec (Burst) DMA to PCI and local buses
PCI Signaling	+5V or +3.3V
SCSI Controller	LSI* 53C1000* Single Channel Ultra160 SCSI controller
Dual Fibre Channel Controller	Two 2Gb Fibre Channel (FC) HSSDC external connectors

Table 3-2. Environmental Specifications

Specification	Range or Dimension
Operating Temperature	0° C to +55° C
Storage Temperature	-40° C to +70° C
Form Factor (physical dimensions)	Height: 99 mm (3.90 inches) Length: 237 mm (9.33 inches)

3.2   Operating System Support

These operating systems are fully validated and supported for the SRCFC22, SRCFC22C, SRCFC22M IIR Controller products:

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

These 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)
- SCO UnixWare 7.1.1
- Red Hat* Linux* 7.0
- Red Hat Linux* 7.2 (2.4 kernel)
- Debian Linux 3.0
- Caldera Linux 3.1
- Mandrake* Linux 8.2
- TurboLinux* 7.0 Server
- FreeBSD* 4.5
- FreeBSD 4.6

3.3   Supported Fibre Channel Technology

Fibre Channel (FC) is an open industry-standard, high-speed serial data transfer interface technology that can be used to connect systems and storage in a number of topologies. FC can be viewed simply as a transport vehicle for the supported command set (such as SCSI) and is, in fact, unaware of the content of the information being transported. FC simply packs data in frames, transports them to the appropriate devices, and provides error checking.

3.3.1   IIR Controllers and Fibre Channel Arbitrated Loop (FC-AL)

The SRCFC22, SRCFC22C, SRCFC22M IIR Controller products have two 2Gb Fibre Channel (FC) HSSDC external connectors. The controllers support a Fibre Channel Arbitrated Loop (FC-AL) topology that uses the SCSI FCP protocol while operating in half duplex mode.

See Table 3-3 for general information about FC-AL specifications.

Table 3-3. FC-AL Specifications

Feature	Description
Connectivity	126 Devices per loop See Section 3.8.1 for information about maximum drive quantities in an FC configuration for the IIR Controller products detailed in this guide.
Cable Media	Optical (fibre) or Electrical (copper) See Appendix B for more information about FC-AL cabling and connectors.
Cable Distance	Optical Single Mode - 10km Optical Multimode - 500m Electrical - 25m See Appendix B for more information about FC-AL cabling and connectors.
Speed	Up to 2Gb/sec per loop (Half Duplex) See Section 3.1.1 for information about speed and other key features of the IIR Controller products detailed in this guide.
Fault Tolerance	Hot Plugging Dual Porting

3.3.2 FC-AL Single and Dual Loop Configurations

Fibre Channel Arbitrated Loop (FC-AL) refers to a simple closed serial loop in which an FC-enabled RAID Controller is connected to an FC enclosure. Dual loops are two single loops working in conjunction. This allows a RAID Controller with two FC ports to connect to two separate channels on an FC enclosure. While only one loop can access the drive at any given moment, dual loops allow both channels to share the device without manually switching. This configuration allows for full cable redundancy in Fibre Channel systems.

Dual loops typically improve performance by sharing data. Because data can be stored in a single location and accessed by both loops, there is no need to duplicate or synchronize data. (A dual loop configuration can also connect independently to two separate FC enclosures).

In a traditional FC configuration, the controller can access only one loop at a time. In an FC RAID system, however, the maximum transfer rate can increase significantly depending on the number of drives. (The more drives that are present, the faster the data transfer rate). See Section 3.8.1 for information about maximum drive quantities in an FC-AL configuration.

3.4 Supported SCSI Technology

The SRCFC22, SRCFC22C, SRCFC22M IIR Controller products support up to 15 physical SCSI devices for the internal SCSI channel. They support up to 15 hard disk drives or 14 hard disk drives if one of the SCSI IDs is occupied by a SAF-TE processor.

3.4.1   Supported Hard Drive Technology

The SRCFC22, SRCFC22C, SRCFC22M IIR Controller products support 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 3-4 for the Supported SCSI Device Standards. These IIR Controller products are designed to optimally utilize Ultra160 SCSI devices, yet they are backward compatible with older SCSI hard drive specifications.

Note: 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 3-4 for the maximum cable length distances that apply to each mode.

Table 3-4. 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

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 information in Table 3-4 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.

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

RAID Controllers 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.

See Section 3.1.1 for information about supported non-HDD devices for the IIR Controller products detailed in this guide.

3.5 Array Roaming Compatibility

Array Roaming allows users the ability to move a complete RAID array from one computer system with a RAID Controller to another computer system with a RAID Controller 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: **†† Do not attempt RAID Array Drive Roaming between RAID Controllers that are not compatible with the IIR Controller products detailed in this guide. Unpredictable behavior may include, but is not limited to, data loss or corruption.**

The SRCFC22, SRCFC22C, SRCFC22M IIR Controller products, all with firmware version 2.34.yy-Rzzz, are compatible with these RAID Controllers:

- SRCFC22 – Firmware version 2.34.yy-Rzzz
- SRCFC22C - Firmware version 2.34.yy-Rzzz
- SRCFC22M - Firmware version 2.34.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.

3.6 Fibre Channel Hot-Plug Disk Drive Support

Use one of the following three options to replace a failed drive in a FC enclosure with SES support:

- **Option #1**—Auto-rebuild by inserting a new drive (with sufficient capacity) in the same slot as the failed drive. The array will auto-rebuild.

- **Option #2**—Rebuild manually to an unused drive already in the enclosure by using the "Replace Array Component" option under the "Array Drive" menu in Storage Console or Storage Console Plus.

Note: Do not move the unused drive from it's current slot in the enclosure to the slot of the failed drive as this will not work.

Note: Do not use the "Repair Array Drive" option in this situation as it will not work. You must use the "Replace Array Component" option under the "Array Drive" menu.

- **Option #3**—Rebuild manually to a new drive inserted into a slot other than the slot of the failed drive. This requires two steps in Storage Console or Storage Console Plus. First rescan the FC loop by using the "Rescan for new device" option under the "Configure Physical Devices" menu. Second manually rebuild by using the "Replace Array Component" option under the "Array Drive" menu.

Note: Do not use the "Repair Array Drive" option in this situation as it will not work. You must use the "Replace Array Component" option under the "Array Drive" menu.

3.7 Configurable Parameters

This section describes configurable Fibre Channel and SCSI parameters for the SRCFC22, SRCFC22C, SRCFC22M IIR Controller products.

3.7.1 Configurable Fibre Channel Parameters

See Table 3-5 for information about configurable Fibre Channel parameters for the SRCFC22, SRCFC22C, SRCFC22M IIR Controller products.

Table 3-5. Configurable Fibre Channel Parameters

Parameter	Setting/Value	Description
Disk Read Cache	On / Off	For performance reasons, this setting should always be on. Default setting is On.
Disk Write Cache	On / Off	For performance reasons, this setting should always be on. Default setting is On.

3.7.2 Configurable SCSI Parameters

This section describes configurable SCSI parameters for the SRCFC22, SRCFC22C, SRCFC22M IIR Controller products.

3.7.2.1 Configurable Hard Drive SCSI Parameters

When a SCSI hard drive is initialized the first time by an IIR Controller with an Ultra160 SCSI channel, its SCSI parameters are automatically set to their optimal settings. Manual configuration is not required. However, the RAID Controller allows for the custom configuration of several SCSI parameters dependent on the particular SCSI hard drive. See Table 3-6 for information about configurable SCSI hard drive parameters.

To view or configure hard drive SCSI parameters from the Storage Console, choose Advanced Setup > Configure Physical Devices > Select Physical Drive > SCSI Parameter/ Initialize.

Table 3-6. 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 drives (up to 160 MB/sec for U160 drives). No matter the setting, the SCSI bus will negotiate the fastest speed up to this setting. Lowering the setting will force the hard drive to transfer at the lower speed.
Disconnect	Enabled / Disabled	Automatic	Enabling this setting allows for the hard 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 hard 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 drives should always be on. The default setting is On.

3.7.2.2 Configurable I/O Controller SCSI Parameters

When the IIR 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. Choose Advanced Setup > Configure Controller > Controller Settings. See Table 3-7 for information about configurable SCSI I/O parameters.

Table 3-7. 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.

intel ®

3.8 RAID Controller Drive Maximum Quantities (Host, Array, Logical, and Physical)

This section provides information on the maximum drive quantities for Fibre Channel Arbitrated Loop (FC-AL and SCSI) connections with the SRCFC22, SRCFC22C, SRCFC22M IIR Controller products.

3.8.1 RAID Controller Drive Quantities with Fibre Channel

See Table 3-8 for information about maximum drive quantities in an FC-AL configuration that includes the SRCFC22, SRCFC22C, SRCFC22M IIR Controller products.

Table 3-8. RAID Controller Drive Maximum Quantities with Fibre Channel

Drive Type	Per Loop	Per Controller	Per Array Drive	Per Host Drive
Physical Disk Drives	126	252 (see note)	252	252
RAID Array Drives	63	126		1
RAID Host Drives		252	2	

Note: Because a single loop can connect 126 devices, you can configure two independent loops to connect 252 devices. In a dual loop configuration, however, the maximum connectivity is 126 devices where all devices share the loops and bandwidth is doubled.

where all devices share bandwidth.

3.8.2 RAID Controller Drive Quantities with SCSI

This section describes the maximum drive quantities in a SCSI connection that includes the SRCFC22, SRCFC22C, SRCFC22M IIR Controller products. These assumptions apply:

- U160 speed hard disk drives
- Single channel SCSI controller
- Cabling that meets U160 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 RAID Controller is 7 array drives per single 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 RAID 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 15 host drives per IIR 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 3-9. RAID Controller Drive Maximum Quantities with SCSI

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

Flash Memory Programming A

A.1 About Firmware Files

The firmware image that is stored in the flash memory of the RAID controller includes the controller BIOS and the Storage Console (StorCon) software. Refer to the Software Guide for more details about StorCon.

The current firmware file is on the RAID Software Suite CD-ROM. To get the latest firmware for the RAID controller, visit our web site at: http://support.intel.com. You can use firmware files to update the firmware image on the controller. See Section A.2 for more information.

Firmware files are in the format SRC_RXFW.xxx, where the file extension xxx indicates the version stepping. From StorCon or StorCon+, the firmware version is displayed in the format x.yy.zz-A000 (for example, 2.34.00-R02D).

A.2 Updating Firmware Using the FRUU

This section explains how to use the Firmware Recovery and Update Utility (FRUU) to update the firmware on the RAID controller. The firmware recovery part of this utility is not used.

The FRUU is available from these locations:

Table A-1. FRUU Locations and Descriptions

FRUU Location	Summary	More Information
Run the FRUU on diskettes created from: • The Windows autorun menu of the RAID Software Suite CD-ROM OR • The 'Create Diskettes' option from the bootable CD	Create the two diskettes described below and then boot the computer with diskette 1: • **Diskette 1**—The bootable Firmware Recovery and Update Utility (FRUU). • **Diskette 2**—The firmware file. You can: — Create the firmware diskette from the firmware file that is on the CD-ROM. OR — Download the latest firmware file from http://support.intel.com.	• See Section A.2.1 to create the diskettes from the Windows autorun menu. • See Section A.2.2 to create the diskettes from the Bootable RAID Software Suite CD-ROM. • See Section A.2.3 for information on running the FRUU.
Run the FRUU directly from the bootable RAID Software Suite CD-ROM	Boot directly from the RAID Software Suite CD-ROM to update the firmware image on the controller with the original firmware file that shipped on the CD.	See Section A.2.3 for information on running the FRUU.

A.2.1 Creating Firmware Diskettes from the CD-ROM Autorun Menu

1. Insert the RAID Software Suite CD-ROM into a Windows computer.

2. After the Main Menu loads automatically, click 'Utility Diskettes.'

3. Click 'Firmware Recovery Utility.' A DOS window will display prompting you to insert a blank floppy diskette.

4. Insert the blank diskette, then press Enter.

5. After the file transfer is complete, remove the diskette from the computer and label it.

6. Insert a second blank diskette into the computer.

7. Download the latest firmware file from http://support.intel.com and copy it to the second floppy diskette. Proceed to Section A.2.3 for information on running the FRUU.

   OR

   Click Firmware Diskette to get the firmware file from the RAID Software Suite CD-ROM, then complete the remaining steps in this procedure.

8. Click 'Firmware Diskette.' A DOS window will display prompting you to insert a blank floppy diskette.

9. Verify that a blank diskette is inserted, then press Enter.

10. After the file transfer is complete, remove the firmware diskette from the computer and label it.

A.2.2 Creating Firmware Diskettes from the Bootable RAID Software Suite CD-ROM

1. If necessary, change your computer's BIOS setting so that the system boots from the CD-ROM.

2. Boot the computer from the RAID Software Suite CD-ROM.

3. Select 'Create Diskettes' and press Enter.

4. Select 'Firmware Diskettes' and press Enter.

5. Select 'Bootable Firmware Recovery Floppy' and press Enter.

6. Insert a blank floppy Diskette, then select 'Yes' and press Enter to begin the file transfer.

7. After the file transfer is complete, select 'OK', then press Enter.

8. Remove the first diskette and label it.

9. From a computer that has an internet connection, download the latest firmware file from http://support.intel.com and copy it to a second floppy diskette. Proceed to Section A.2.3 for information on running the FRUU.

   OR

Insert a second blank diskette into the computer, then complete the remaining steps in this procedure.

10. Select 'Create Diskettes' and press Enter.

11. Select 'Firmware Diskettes' and press Enter.

12. Select 'Firmware File' and press Enter.

13. Verify that your second blank floppy Diskette is inserted, then select 'Yes' and press Enter to begin the file transfer.

14. After the file transfer is complete, select 'OK', then press Enter.

15. Remove the first diskette and label it.

16. Proceed to Section A.2.3 for information on running the FRUU.

A.2.3 Running the FRUU

1. If running the FRUU from the RAID Software Suite CD-ROM, change your computer's BIOS setting so that your system boots from the CD-ROM.

2. Insert the RAID Software Suite CD-ROM.

   OR

   Insert the bootable FRUU floppy.

3. Boot the computer.

4. If booting from the RAID Software Suite CD-ROM, select Firmware Management from the Main Menu and press <Enter>.

   OR

   If booting from the FRUU bootable floppy diskette, insert the second firmware diskette after the computer finishes booting from the first diskette, then select "Y" (for Yes) and press Enter to load the firmware file.

5. View the summary information on the screen. The Firmware Recovery and Update Utility detects any RAID controllers and lists them in the order that they are found.

6. Type a controller number to start the update process for the firmware on that controller. You do not need to press Enter after typing the number. You will see messages showing the progress of the firmware update. The entire process may take several minutes.

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

A.3 Firmware Update Procedure via XROM StorCon

There are two options for updating the firmware, BIOS and XROM StorCon currently programmed on the flash memory of the RAID controller:

- Use the Storage Console (StorCon) to update the firmware image as explained in this section. If your OS does not support the firmware update with StorCon, use the Firmware Update and Recovery Utility (FRUU) as described in the next bullet item.
- Run the Firmware Recovery and Update Utility (FRUU) from a bootable CD or diskette as explained in Section A.2.

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 web site. 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.

Note: When upgrading a major firmware version number (e.g. 2.32.00 to 2.33.00), it will be necessary to boot to DOS and run StorCon.exe in order to perform your firmware upgrade.

3. Select the applicable IIR 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 update is interrupted and/or the firmware becomes unusable, please contact your RAID Controller vendor. See Section A.4 before contacting your RAID controller vendor.**

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 IIR Controller to view its new firmware version at the bottom of the console (for example, FW:2.32.00-Rxxx).

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.

intel®

A.4　Firmware Recovery

In the event your firmware has been corrupted, the following procedure may be helpful before contacting your RAID controller vendor:

Before you begin:

- Have a DOS bootable diskette available
- Have the DOS version of Storage Console executable (StorCon.EXE, obtained from web site or CD) available.
- IIR firmware file (e.g. SRC_RXFW.???), obtained from web site or CD (in directory \embedded\firmware) available.

Procedure:

1. Copy StorCon.EXE and the IIR firmware file on to bootable DOS diskette.

2. Place diskette in drive A: and boot your system.

3. Once booted, type "StorCon /defect" at the A:\ prompt.

4. When Storage Console loads, perform firmware update procedure, starting at step 3, as described in Section A.3.

Fibre Channel Cabling and Connections   B

Fibre Channel Arbitrated Loop (FC-AL) configurations that include IIR Controller products can use both optical and copper cabling media.

B.1   Optical Cabling

Fiber optic cabling provides a reliable way to transmit data over long distances in an FC-AL configuration. Fiber optic cables are often more expensive than copper, but they provide greater distance and are less susceptible to EMI (Electro Magnetic Interference).

B.1.1   Multimode Cable

Multimode cable is the dominant fiber optic cabling for short distances of 2Km or less. This cable can have an inner diameter of either 62.5 or 50 microns. Although light enters the cable in multiple modes, modal dispersion limits the distance for this cable.

B.1.2   Single Mode Cable

Single mode fiber optic cabling is typical for long distance cable runs. This cable can have an inner diameter of either 7 or 9 microns. Because only a single ray of light enters the cable, there is no dispersion, distance is limited only by the power of the laser at the transmitter and the sensitivity of the receiver.

B.2   Copper Cabling

The most common copper cabling in Fibre Channel configurations is shielded twisted-pair. Copper cabling is a viable and less expensive solution that fibre optic cabling. However, copper is limited to shorter cable runs and is highly susceptible to Electro Magnetic Interference.

B.3　Fibre Channel Adapters and Connectors

B.3.1　Adapters

B.3.1.1.　Media Interface Adapter (MIA)

A Media Interface Adapter (MIA) attaches to the electrical connector on a Fibre Channel device to provide electrical-to-optical conversion. The MIA is hot-swappable and located on the outside of the fibre channel device. See Figure B-1 for an example of an MIA.

Figure B-1. MIA - Media Interface Adapter (Example)

B.3.1.2.　Small Form-Factor Plug (SFP)

A Small Form-Factor Plug (SFP) provides serial-to-serial connection on an optical modular transceiver by attaching to the port of a Fibre Channel device. The SFP is hot-swappable, offers high speed, and is physically compact. See Figure B-2 for an example of an SFP.

Figure B-2. SFP - Small Form-Factor Plug (Example)

B.3.1.3.　Gigabit Interface Converter (GBIC)

A Gigabit Interface Converter (GBIC) can provide electrical-to-optical conversion or optical-to-electrical conversion in a Fibre Channel configuration.

B.3.2   Optical Cabling Connectors

B.3.2.1.   LC-Style Connector

An LC-style connector is a compact optical connector used primarily with 2 Gb Fibre Channel devices. This connector can be fixed or pluggable, and is approximately half the size of the SC-style connector. This connector provides a latching mechanism for easy attachment and polarity. See Figure B-3 for an example of an LC-style connector.

Figure B-3. LC-Style Connector (Example)

B.3.2.2.   SC-Style Connector

An SC-style connector is a standard connector for fibre optic cables. If a cable with the SC-style connector is pulled, the tip of the connector does not move which prevent loss of signal quality. See Figure B-4 for an example of an SC-style connector.

Figure B-4. SC-Style Connector (Example)

intel

B.3.3   Electrical Cabling Connectors

B.3.3.1.   DB9 (Style-1)

The DB9 connector is mechanically robust and attaches securely with screws. This is the original Fibre Channel connector, and some equipment manufactures continue to use this style connector instead of the increasingly popular HSSDC. See Figure B-5 for an example of a DB9 connector.

Figure B-5. DB9 Connector

B.3.3.2.   HSSDC

The High Speed Serial Data Connector (HSSDC) is a popular FC-AL standard designed for 150 ohms and 1 Gb/sec and higher data transmission. This connector has higher density and performance than the DB9 connector. See Figure B-6 for an example of an HCCDC-style connector.

Figure B-6. HSSDC- Style Connector (Example)

B.3.3.3.   HSSDC2

The High Speed Serial Data Connector 2 (HSSDC2) is designed for data transfer rates up to 5 Gb/sec. This connector uses a smaller form factor than HSSDC connectors. See Figure B-7 for an example of an HSSDC2 connector.

Figure B-7. HSSDC2 Connector (Example)

intel®

Index