Hardware
User's Guide

Intel® RAID Controller
SRCZCRX

July 2004

Safety Warnings

WARNUNG: Deutsch

Wichtige Sicherheitshinweise

Lesen Sie zunächst sämtliche Warn- und Sicherheitshinweise in diesem Dokument, bevor Sie eine der Anweisungen ausführen. Beachten Sie hierzu auch die Sicherheitshinweise zu Intel-Serverplatinen und -Servergehäusen auf der Ressourcen-CD oder unter http:\\support.intel.com\support\motherboards\server\safecert.htm.

	SICHERHEISMASSNAHMEN: Immer wenn Sie die Gehäuseabdeckung abnehmen um an das Systeminnere zu gelangen, sollten Sie folgende Schritte beachten: 1. Schalten Sie alle an Ihr System angeschlossenen Peripheriegeräte aus. 2. Schalten Sie das System mit dem Hauptschalter aus. 3. Ziehen Sie den Stromanschlußstecker Ihres Systems aus der Steckdose. 4. Auf der Rückseite des Systems beschriften und ziehen Sie alle Anschlußkabel von den I/O Anschlüssen oder Ports ab. 5. Tragen Sie ein geerdetes Antistatik Gelenkband, um elektrostatische Ladungen (ESD) über blanke Metallstellen bei der Handhabung der Komponenten zu vermeiden. 6. Schalten Sie das System niemals ohne ordnungsgemäß montiertes Gehäuse ein.
	Der Mikroprozessor und der Kühler sind möglicherweise erhitzt, wenn das System in Betrieb ist. Außerdem können einige Platinen und Gehäuseteile scharfe Spitzen und Kanten aufweisen. Arbeiten an Platinen und Gehäuse sollten vorsichtig ausgeführt werden. Sie sollten Schutzhandschuhe tragen.

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AVERTISSEMENT: Français

Consignes de sécurité

Lisez attention toutes les consignes de sécurité et les mises en garde indiquées dans ce document avant de suivre toute instruction. Consultez Intel Server Boards and Server Chassis Safety Information sur le CD Resource CD ou bien rendez-vous sur le site http:\\support.intel.com\support\motherboards\server\safecert.htm.

	CONSIGNES DE SÉCURITÉ: Lorsque vous ouvrez le boîtier pour accéder à l'intérieur du système, suivez les consignes suivantes: 1. Mettez hors tension tous les périphériques connectés au système. 2. Mettez le système hors tension en mettant l'interrupteur général en position OFF (bouton-poussoir). 3. Débranchez tous les cordons d'alimentation c.a. du système et des prises murales. 4. Identifiez et débranchez tous les câbles reliés aux connecteurs d'E-S ou aux accès derrière le système. 5. Pour prévenir les décharges électrostatiques lorsque vous touchez aux composants, portez une bande antistatique pour poignet et reliez-la à la masse du système (toute surface métallique non peinte du boîtier). 6. Ne faites pas fonctionner le système tandis que le boîtier est ouvert.
	Le microprocesseur et le dissipateur de chaleur peuvent être chauds si le système a été sous tension. Faites également attention aux broches aiguës des cartes et aux bords tranchants du capot. Nous vous recommandons l'usage de gants de protection.

AVVERTENZA: Italiano

	PASSI DI SICUREZZA: Qualora si rimuovano le coperture del telaio per accedere all'interno del sistema, seguire i seguenti passi: 1. Spegnere tutti i dispositivi periferici collegati al sistema. 2. Spegnere il sistema, usando il pulsante spento/acceso dell'interruttore del sistema. 3. Togliere tutte le spine dei cavi del sistema dalle prese elettriche. 4. Identificare e sconnettere tutti i cavi attaccati ai collegamenti I/O od alle prese installate sul retro del sistema. 5. Qualora si tocchino i componenti, proteggersi dallo scarico elettrostatico (SES), portando un cinghia anti-statica da polso che è attaccata alla presa a terra del telaio del sistema - qualsiasi superficie non dipinta - . 6. Non far operare il sistema quando il telaio è senza le coperture.
	Se il sistema è stato a lungo in funzione, il microprocessore e il dissipatore di calore potrebbero essere surriscaldati. Fare attenzione alla presenza di piedini appuntiti e parti taglienti sulle schede e sul telaio. È consigliabile l'uso di guanti di protezione.

Regulatory and Certification Information

Product Regulatory Compliance

This RAID Controller Card complies with the following safety and electromagnetic compatibility (EMC) regulations.

Product Safety Compliance

- UL 1950 - CSA 950 (US/Canada)
- EN 60 950 (European Union)
- IEC60 950 (International)
- CE - Low Voltage Directive (73/23/EEC) (European Union)

Product EMC Compliance - Class B

- FCC /ICES-003 (USA/Canada)
- CISPR 22 (International)
- EN55022 (Europe)
- EN55024 (Europe)
- CE - EMC Directive 89/336/EEC (Europe)
- VCCI (Japan)
- AS/NZS 3548 (Australia / New Zealand)
- BSMI CNS13438 (Taiwan)
- RRL, MIC Notice No. 1997-41 (EMC) & 1997-42 (EMI) (Korea)

Product Regulatory Compliance Markings

The RAID Controller Card is marked with the following compliance markings. Some marking information may be provided on the packaging and/or in the product documentation due to limited marking space on the product.

- ETL NRTL Mark (US/Canada)
- FCC Mark (US)
- ICES-003 (Canada)
- CE Mark (Europe)
- VCCI Mark (Japan)
- MIC Mark (Korea)
- BSMI DOC Mark (Taiwan)
- ACS C-Tick Mark (Australia)

Regulatory Compliance	Country	Marking
cULus Listing Marks	USA/Canada	
ETL (NRTL) Mark	USA/Canada	
CE Mark	Europe	
FCC Marking (Class A)	USA	This device complies with Part 15 of the FCC Rules. Operation of this device 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.
FCC Marking (Class B)	USA	Tested to Comply With FCC standards FOR HOME OR OFFICE USE
EMC Marking (Class A)	Canada	CANADA ICES-003 CLASS A CANADA NMB-003 CLASSE A
EMC Marking (Class B)	Canada	CANADA ICES-003 CLASS B CANADA NMB-003 CLASSE B
VCCI Marking (Class A)	Japan	この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。
VCCI Marking (Class B)	Japan	この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＢ情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。 取扱説明書に従って正しい取り扱いをして下さい。
BSMI Marking (Class A or B) and Class A EMC Warning	Taiwan	 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
RRL MIC Mark	Korea	
C-Tick Mark	Australia	

Electromagnetic Compatibility Notices

FCC Verification Statement (USA)

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.

Intel Corporation
5200 N.E. Elam Young Parkway
Hillsboro, OR 97124-6497
Phone: 1-800-628-8686

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Intel is not responsible for any radio or television interference caused by unauthorized modification of this equipment for substitution or attachment of connecting cables and equipment other than those specified by Intel. The correction of interferences caused by such unauthorized modification, substitution, or attachment will be the responsibility of the user.

This RAID Controller Card has been tested to comply with FCC Standards for home or office use.

ICES-003 (Canada)

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the interference-causing equipment standard entitled "Digital Apparatus," ICES-003 of the Canadian Department of Communications.

Cet appareil numérique respecte les limites bruits radioélectriques applicables aux appareils numériques de Classe Aprescrites dans la norme sur le matériel brouilleur: "Appareils Numériques", NMB-003 édictée par le Ministre Canadien des Communictations.

Europe (CE Declaration of Conformity)

This product has been tested in accordance too, and complies with the Low Voltage Directive (73/23/EEC) and EMC Directive (89/336/EEC). The product has been marked with the CE Mark to illustrate its compliance.

RRL (Korea)

English translation of the notice above:

1. Type of Equipment (Model Name): Model name on product

2. Certification No.: On RRL certificate. Obtain certificate from local Intel representative

3. Name of Certification Recipient: LSI Logic Corporation

4. Date of Manufacturer: Refer to date code on product

5. Manufacturer/Nation: LSI Logic Corporation / Refer to country of origin marked on product

Preface

This guide is the hardware reference and user's guide for the Intel® RAID Controller SRCZCRX. It contains complete installation instructions and specifications.

For information about how to configure the SRCZCRX controller, and for an overview of the software drivers, see the *Intel RAID Software User's Guide*.

Audience

This document assumes that you have some familiarity with RAID controllers and related support devices. The people who benefit from this book are:

- Engineers who are designing an SRCZCRX controller into a system
- Anyone installing an SRCZCRX controller in their RAID system

Organization

This document has the following chapters and appendixes:

- Chapter 1, "Overview," provides a general overview of the SRCZCRX controller.
- Chapter 2, "Hardware Installation,"describes the procedures for installing the SRCZCRX controller.
- Chapter 3, "Intel RAID Controller SRCZCRX Technical Reference,"describes the technical specifications for the SRCZCRX controller.
- Chapter A, "Glossary of Terms and Abbreviations,"lists and explains the terms and abbreviations used in this manual.

Related Publications

Intel® RAID Software User's Guide on the Resource CD included with the RAID controller.

Safety Instructions

Use the following safety guidelines to help protect your computer system from potential damage and to ensure your own personal safety.

When Using Your Computer System

As you use your computer system, observe the following safety guidelines:

CAUTION: Do not operate your computer system with any cover(s) (such as computer covers, bezels, filler brackets, and front-panel inserts) removed:

- To help avoid damaging your computer, be sure the voltage selection switch on the power supply is set to match the alternating current (AC) power available at your location:

    – 115 volts (V)/60 hertz (Hz) in most of North and South America and some Far Eastern countries such as Japan, South Korea, and Taiwan

    – 230 V/50 Hz in most of Europe, the Middle East, and the Far East. Also be sure your monitor and attached peripherals are electrically rated to operate with the AC power available in your location.

- To help avoid possible damage to the server board, wait five seconds after turning off the system before removing a component from the server board or disconnecting a peripheral device from the computer.
- To help prevent electric shock, plug the computer and peripheral power cables into properly grounded power sources. These cables are equipped with 3-prong plugs to ensure proper grounding. Do not use adapter plugs or remove the grounding prong from a cable. If you must use an extension cable, use a 3-wire cable with properly grounded plugs.
- To help protect your computer system from sudden, transient increases and decreases in electrical power, use a surge suppressor, line conditioner, or uninterruptible power supply.
- Be sure nothing rests on your computer system's cables and that the cables are not located where they can be stepped on or tripped over.
- Do not spill food or liquids on your computer. If the computer gets wet, consult the documentation that came with it.
- Do not push any objects into the openings of your computer. Doing so can cause fire or electric shock by shorting out interior components.
- Keep your computer away from radiators and heat sources. Also, do not block cooling vents. Avoid placing loose papers underneath your computer; do not place your computer in a closed-in wall unit or on a rug.

When Working Inside Your Computer

Notice: Do not attempt to service the computer system yourself, except as explained in this guide and elsewhere in Intel documentation. Always follow installation and service instructions closely.

1. Turn off your computer and any peripherals.

2. Disconnect your computer and peripherals from their power sources. Also disconnect any telephone or telecommunications lines from the computer.

    Doing so reduces the potential for personal injury or shock.

Also note these safety guidelines:

- When you disconnect a cable, pull on its connector or on its strain-relief loop, not on the cable itself. Some cables have a connector with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before disconnect the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, make sure both connectors are correctly oriented and aligned.
- Handle components and cards with care. Don't touch the components or contacts on a card. Hold a card by its edges or by its metal mounting bracket. Hold a component such as a microprocessor chip by its edges, not by its pins.

Protecting Against Electrostatic Discharge

Static electricity can harm delicate components inside your computer. To prevent static damage, discharge static electricity from your body before you touch any of your computer's electronic components, such as the microprocessor. You can do so by touching an unpainted metal surface, such as the metal around the card-slot openings at the back of the computer.

As you continue to work inside the computer, periodically touch an unpainted metal surface to remove any static charge your body may have accumulated. In addition to the preceding precautions, you can also take the following steps to prevent damage from electrostatic discharge (ESD):

- When unpacking a static-sensitive component from its shipping carton, do not remove the component from the antistatic packing material until you are ready to install the component in your computer. Just before unwrapping the antistatic packaging, be sure to discharge static electricity from your body.
- When transporting a sensitive component, first place it in an antistatic container or packaging.
- Handle all sensitive components in a static-safe area. If possible, use antistatic floor pads and workbench pads.

Contents

Chapter A
Glossary of Terms and Abbreviations

Figures

Tables

Chapter 1
Overview

This section provides a general overview of the Intel® RAID Controller SRCZCRX . It consists of the following sections.

- Section 1.1, "Overview," page 15
- Section 1.2, "Features," page 16
- Section 1.3, "Hardware," page 16

1.1 Overview

The Intel RAID Controller SRCZRCX is a high-performance intelligent Peripheral Component Interconnect to MROMB-based host adapter with Redundant Array of Independent Disks (RAID) control capabilities. The SRCZRCX controller provides reliability, high performance, and fault-tolerant disk subsystem management. It is an ideal RAID solution for the internal storage of workgroup, departmental, and enterprise systems. The SRCZRCX controller offers a cost-effective way to implement RAID in a server.

For optimum Ultra320 SCSI performance off of the server board, you must connect only LVD devices to the bus. Do not mix SE with LVD devices, or the bus speed will be limited to the slower SE (Ultra SCSI) SCSI data transfer rates.

The Intel RAID Controller SRCZRCX supports major operating systems, such as Microsoft* Windows* XP, Microsoft* Windows* 2000, Microsoft* Windows Server* 2003, Novell* NetWare*, Red Hat* Linux*, and SuSE* Linux*.

Note: The operating systems supported by this controller may not be supported by your server board. Please refer to the tested OS list for your server board at http://support.intel.com/support/motherboards/server/. See also the tested hardware and operating system list for the SRCZRCX controller to make sure the RAID card supports your operating system.

1.2   Features

Features of the Intel RAID Controller SRCZRCX include:

- Support for hard disk drives with capacities greater than 8 Gbytes
- Online RAID level migration
- RAID remapping
- No reboot necessary after expansion (for NT 4.0: if virtual sizing is enabled)
- More than 200 Qtags per array
- User-specified rebuild rate
- Cache memory of 128 Mbyte.
- Support for a MROMB-enabled PCI-X host interface
- Support for RAID levels 0 (striping), 1 (mirroring), 5 (striping and parity data across all drives), 10 (mirroring and striping), and 50 (RAID 5 and striping)
- Advanced array configuration and management utilities
- Up to 40 logical drives allowed per controller
- 32 Kbyte NVRAM for storing RAID system configuration information; the firmware is stored in flash ROM for easy upgrade
- Battery backup for the onboard cache SDRAM when a daughter card with a battery is used (optional accessory).

1.3   Hardware

You can install the SRCZRCX controller in a Modular RAID on Motherboard (MROMB)-enabled PCI-X expansion slot in a server board that has either the LSI Logic* 53C1020 or 53C1030 SCSI chip on it.

Note: This RAID controller is not supported by all server boards. Please refer to the tested hardware and operating system list to make sure this RAID controller can be used with your server board. The tested hardware and operating list is available at http://support.intel.com/support/motherboards/server/.

The following subsections describe the hardware configuration and configuration-on-disk.

1.3.1   Storage Adapter Configurations

Table 1-1 describes the features for the Intel RAID Controller SRCZRCX as it works with the SCSI controller on the server board.

Table 1-1   Intel Raid SRCZCRX Adapter Features

Feature	Description
RAID Levels	0, 1, 5, 10, 50
SCSI Device Types	Synchronous or Asynchronous
Devices per SCSI Channel	Up to 15 Wide SCSI devices
SCSI Channels	0 channel, dependent on the SCSI controller on the server board
SCSI Data Transfer Rate	Up to 320 Mbytes/s per channel

Table 1-1   Intel Raid SRCZCRX Adapter Features

Feature	Description
SCSI Bus	LVD or SE
Cache Function	Write-back (requires Battery Backup Unit), Write-through, Adaptive Read Ahead, Non Read Ahead, Read Ahead, Cache I/O, Direct I/O
Multiple Logical Drives/Arrays per Controller	Up to 40 logical drives per controller
Maximum # of Intel Raid SRCZCRX Adapters per System	One SRCZCRX adapter
Online Capacity Expansion	Yes
Dedicated and Pool Hot Spare	Yes
Hot Swap Devices Supported	Yes
Non-Disk Devices Supported	Yes
Mixed Capacity Hard Disk Drives	Yes
Cluster Support	No
Hardware Exclusive OR (XOR) Assistance	Yes
Direct I/O	Yes
Architecture	Fusion-MPT™

1.3.2   Drive Migration

The Intel RAID Controller SRCZRCX supports drive migration. This is the transfer of a set of hard drives in an existing configuration from one Intel RAID controller to another. The SRCZRCX controller requires that the drives remain on the same channel and be reinstalled in the same order as they were in on the original configuration.

> Note: Some Intel RAID controllers do not support drive migration. See the *Software User's Guide* to determine which Intel RAID controllers support this feature.

Chapter 2
Hardware Installation

This chapter describes the procedures for installing the Intel RAID Controller SRCZCRX. It contains the following sections:

- Section 2.1, "Requirements," page 18
- Section 2.2, "Quick Installation," page 18
- Section 2.3, "Detailed Installation," page 19
- Section 2.4, "After You Have Installed the Storage Adapter," page 22

2.1   Requirements

The following items are required to install the RAID controller:

- An Intel RAID Controller SRCZCRX
- A host computer with the following:
    – Server board with interrupt routing circuitry (INT) routing
    – 64-bit, MROMB-enabled PCI expansion slot

    Note: Refer to the *Tested Hardware and Operating System List* to see which server boards are supported.

- The Resource CD

Intel strongly recommends using an uninterruptible power supply (UPS).

2.2   Quick Installation

The following steps are for for experienced computer users/installers. Section 2.3, "Detailed Installation", contains detailed steps.

Note: All work must be performed at an ESD-safe workstation that meets the requirements of EIA-625: *Requirements for Handling Electrostatic Discharge Sensitive Devices*. All actions must be done following the latest revision of the IPC-A-610 for ESD recommended practices.

1) (Optional, required to enable Write Back Cache) Attach the Battery Backup Unit to the RAID adapter.

2) (Optional, required for some chassis) Replace the bracket on the RAID adapter with the low-profile bracket.

3) Power off the server and all hard disk drives, enclosures, and system components. Remove the power cord from the server.

4) Follow the instructions in the host system documentation to open the cabinet of the host system.

5) Check the jumper settings on the RAID adapter.

6) Install the SRCZCRX controller in an available MROMB-enabled PCI slot.

    Note: See your server board documentation to detemine which PCI slot(s) are MROMB enabled.

7) Perform a safety check:
   - Ensure that the Intel RAID Controller SRCZCRX is properly installed.
   - Close the cabinet of the host system.

8) Turn power on after completing the safety check.

2.3   Detailed Installation

This section provides detailed instructions for installing a Intel RAID Controller SRCZCRX.

    Note: All work must be performed at an ESD-safe workstation that meets the requirements of EIA-625: *Requirements for Handling Electrostatic Discharge Sensitive Devices*. All actions must be done following the latest revision of the IPC-A-610 for ESD recommended practices.

1) Unpack

   Unpack and remove the SRCZCRX controller. Inspect it for damage. If it appears damaged, or if any items listed below are missing, contact your Intel support representative. The Intel RAID Controller SRCZCRX is shipped with:
   - ◊ The Resource CD, which contains Intel RAID drivers for supported operating systems, an electronic version of this guide, and other related documentation.
   - ◊ A license agreement

2) (Optional, required to enable Write Back Cache) Attach the Battery Backup Unit (BBU) to the adapter.
   a. Remove the Battery Backup Unit from its packaging.
   b. Connect the wire from the battery to the circuit board (A).
   c. Position the BBU over the RAID adapter so the connectors line up (B). Press the BBU onto the adapter.
   d. Turn the adapter over.
   e. Using three screws (C), secure the BBU to the RAID adapter.

Figure 2.1Install the Battery Backup Unit
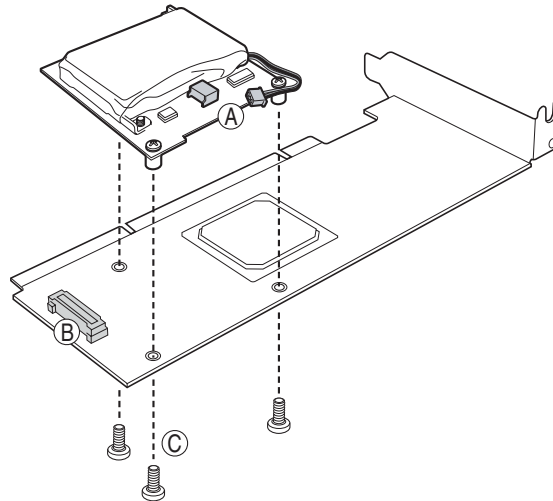
TP00857

3) (Optional / chassis-dependent) Replace the bracket on the RAID adapter with the low-profile bracket.

Notes: Do not exceed the torque specifications in these instructions. Exceeding the torque specifications may damage the board, connectors, or screws and will void the warranty.

Make sure the screwdriver is centered in the screw slot to prevent damage to the screw and voiding the warranty.

Boards returned without a mounted bracket will not be accepted.

a. Use an EDD-safe 1/8-inch slotted screwdriver to carefully remove the two board lock screws at the top and the bottom of the connector.

b. Use an ESD-safe #1 Phillips* screwdriver to carefully remove the two screws that connect the bracket to the RAID controller.

c. Lift the bracket from the board, using caution not to damage the board or the connector.

d. Place the low-profile bracket over the connector, using caution not to damage the connector or the board. and lining up the bracket to match the screw holes on the board and bracket.

e. Use an ESD-safe #1 Phillips torque screwdriver that is set to a maximum torque of 4.8 +/- 0.5 inch pounds to replace the two Phillips screws that were removed in step 3b.

f. Use an ESD-safe 1/8-inch slotted torque screwdriver that is set to a maximum torque of 3.0 +/- 0.5 inch pounds to replace the two board lock screws that were removed in step 3a.

4) Power Down the System

Turn off the computer and remove the AC power cord. Remove the system's cover. See the system documentation for instructions.

5) Check the Jumpers

   Ensure that the jumper settings on the SRCZCRX controller are correct. See Chapter 3,
   "Intel RAID Controller SRCZCRX Technical Reference," for diagrams of the SRCZCRX
   controllers with their jumpers and connectors.

6) Install the SRCZCRX controller in an available MROMB-enabled PCI slot. Press down
   gently but firmly to ensure that the card is properly seated in the slot, as shown in Section
   Figure 2.2, "Inserting the SRCZCRX Adapter Card in an MROMB-enabled PCI-X Slot,"
   page 21. Screw the bracket into the computer chassis.

   Note: See your server board documentation to detemine which PCI-X slot(s) are
           MROMB enabled.

Figure 2.2   Inserting the SRCZCRX Adapter Card in an MROMB-enabled PCI-X Slot
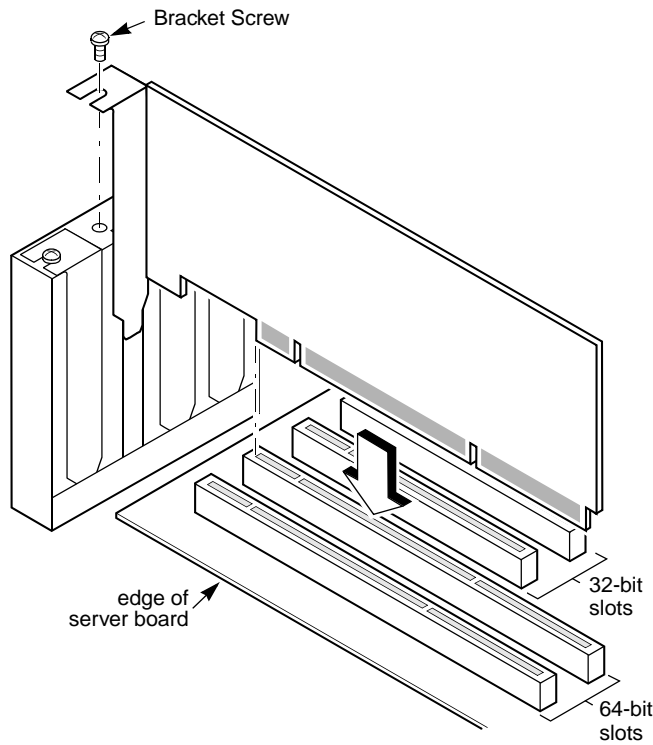
7) Set the Target IDs.

Set target identifiers (TIDs) on the SCSI devices. Each device in a channel must have a unique TID. Provide unique TIDs for non-disk devices (CD-ROM or tapes), regardless of the channel where they are connected. The Intel RAID Controller SRCZCRX automatically occupies TID 7, which is the highest priority. The arbitration priority for a SCSI device depends on its TID.

Table 2-1   Target ID's

Priority	Highest										Lowest
TID	7	6	5	. . .	2	1	0	15	14	. . .	9	8

8) Power On Host System

Replace the computer cover, and reconnect the AC power cords. Turn power on to the host computer. Ensure that the SCSI devices are powered up at the same time as, or before, the host computer. If the computer is powered up before a SCSI device, the device might not be recognized.

During boot, a BIOS message appears.

The firmware takes several seconds to initialize. During this time, the SRCZCRX controller scans the SCSI channel(s).

The BIOS Configuration utility prompt times out after several seconds. The second portion of the BIOS message displays the Intel RAID Controller SRCZCRX number, firmware version, and cache SDRAM size. The numbering of the controllers follows the PCI slot scanning order used by the host motherboard.

```
Press <CTRL><G> to run BIOS Console
```

2.4   After You Have Installed the Storage Adapter

After installation, you must configure the SRCZCRX controller and install the operating system driver. The *Intel RAID Software User's Guide* instructs you about the configuration options and how to set them on your SRCZCRX controller.

Chapter 3
Intel RAID Controller SRCZCRX Technical Reference

This chapter describes the characteristics of the Intel RAID Controller SRCZCRX. This chapter contains the following sections:

- Section 3.1, "Overview," page 23
- Section 3.2, "Intel RAID Controller SRCZCRX Characteristics," page 24
- Section 3.3, "Technical Specifications," page 25

3.1 Overview

PCI-X is a high-speed standard local bus for interfacing I/O compoents to the processor and memory subsystems in a server. The component height on the top and bottom of the SRCZCRX controller follow the *PCI Local Bus Specification, Revision 2.2,* and *PCI-X Addendum to the PCI Local Bus Specification, Revision 1.0a*. The Intel RAID Controller SRCZCRX is used in PCI-X and PCI computer systems with PCI standard and low-profile bracket types.

The Intel RAID Controller SRCZCRX installs into an MROMB-enabled PCI-X slot on the server board. The server board must include an onboard SCSI controller that supports this RAID solution.

Figure 3.1   Intel RAID Controller SRCZCRX Layout
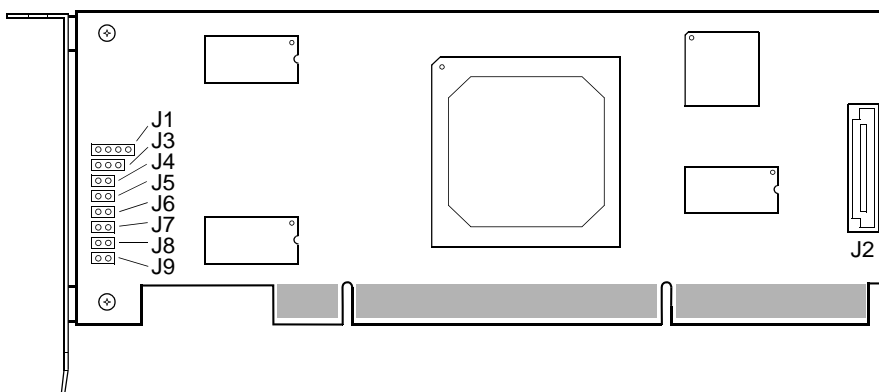
Table 3-1Intel RAID Controller SRCZCRX Headers and Connectors

Connector	Description	Type	Comments
J1	I^2C	3-pin header	Reserved
J2	Connector for optional battery backup unit	Header	Header for optional daughter card that provides a battery backup for the onboard cache SDRAM.

Table 3-1Intel RAID Controller SRCZCRX Headers and Connectors (Cont.)

Connector	Description	Type	Comments
J3	Universal Asynchronous Receiver/Transmitter (UART) debugging	3-pin connector	Reserved
J4	Mode select	2-pin connector	Reserved
J5	Clear NVRAM	2-pin connector	Used to clear the contents of the non-volatile random access memory (RAM)
J6	Write-pending Indicator (dirty cache) LED	2-pin header	Connector for an LED mounted on the system enclosure. THe LED indicate when data in the cache has not been written to the storage devices.
J7	Onboard BIOS disabled	2-pin header	Disables the BIOS so it will not run on the firmware. When no jumper is installed (default), the BIOS is enabled. When jumpered, the BIOS is disabled.
J8	Serial EEPROM	2-pin connector	Provides board information, such as the serial number, OEM number, revision number, and manufacturing data, eliminating the need to open the server chassis to obtain this board information.
J9	Non-maskable interrupt (NMI)	2-pin connector	Reserved

3.2   Intel RAID Controller SRCZCRX Characteristics

The SRCZCRX controller ensures data integrity by intelligently validating the compatibility of the SCSI domain. The storage adapter uses Fusion-MPT architecture that allows for thinner drivers and better performance.

Table 3-2 shows the general characteristics for the SRCZCRX controller.

Table 3-2   Storage Adapter Characteristics

Flash ROM[1]	Serial EEPROM[2]	LVD/SE Signaling	Ultra320 SCSI Data Transfers	SCSI Features	SCSI Termination
Yes	Yes	16-bit SE or LVD interfaces	Up to 320 Mbytes/s as well as Fast, Ultra, Ultra2, and Ultra160 speeds; Synchronous offsets up to 62.	Plug n Play Scatter/Gather Activity LED	Active, Single Ended, or LVD

1. For boot code and firmware
2. For BIOS configuration storage

3.3   Technical Specifications

The design and implementation of the SRCZCRX controller minimizes electromagnetic emissions, susceptibility to radio frequency energy, and the effects of electrostatic discharge. The SRCZCRX controller carries the CE mark, C-Tick mark, FCC Self-Certification logo, Canadian Compliance Statement, Korean MIC, Taiwan BSMI, and Japan VCCI, and they meet the requirements of CISPR Class B.

3.3.1   Storage Adapter Specifications

Table 3-3 lists the specifications for the SRCZCRX controller.

Table 3-3   Storage Adapter Specifications

Specification	Description
Processor (PCI Controller)	Intel GC80321 64-bit RISC processor @ 400 MHz
Operating Voltage	3.3 V, 5 V, +12 V, -12 V
Card Size	Low-profile, half-length PCI adapter card size (6.6" X 2.536")
Array Interface to Host	MROMB-enabled slot
PCI Bus Data Transfer Rate	Up to 1023 Mbytes/second at 64-bit/133 MHz (theoretical maximum)
Serial Port	3-pin RS232C-compatible connector (for manufacturing use only)
SCSI Controller(s)	Utilizes the LSI Logic* 53C1020 or LSI Logic 53C1030 SCSI controller on the server board
SCSI Bus Termination	Active, single-ended or LVD
Termination Disable	Automatic through cable and device detection
Cache Configuration	Integrated 64-bit 128 Mbyte PC 200 DDR SDRAM
Memory on board (DIMMs)	128 Mbyte
Size of Flash ROM for Firmware	1 Mbyte flash ROM
Nonvolatile Random Access Memory (RAM)	32 Kbyte for storing RAID configuration

3.3.2 Array Performance Features

Table 3-4 shows the SRCZCRX controller array performance features:

Table 3-4   Array Performance Features

Specification	Intel RAID Controller SRCZCRX
PCI Host Data Transfer Rate	Up to 1033 Mbytes/s
Drive Data Transfer Rate	320 Mbytes per channel or 640 Mbytes/s
Maximum Scatter/Gathers	26 elements
Maximum Size of I/O Requests	6.4 Mbytes in 64 Kbyte stripes
Maximum Queue Tags per Drive	As many as the drive can accept
Stripe Sizes	2, 4, 8, 16, 32, 64, or 128 Kbyte
Maximum Number of Concurrent Commands	255

3.3.3 Fault Tolerance

Table 3-5 shows the SRCZCRX controller fault tolerance features:

Table 3-5   Fault Tolerance Features

Specification	Intel Raid Controller SRCZCRX
Support for SMART [1]	Yes
Optional Battery Backup for Cache Memory	Yes. Up to 48 hours of data retention for 128 Mbyte of cache memory.
Drive Failure Detection	Automatic
Drive Rebuild Using Hot Spares	Automatic
Parity Generation and Checking	Yes

1. The Self Monitoring Analysis and Reporting Technology (SMART) detects up to 70 percent of all predictable disk drive failures. SMART also monitors the internal performance of all motors, heads, and drive electronics.

3.3.4 Electrical Characteristics

This section provides the power requirements for the Intel RAID Controller SRCZCRX. Table 3-6 lists the maximum power requirements, which include SCSI TERMPWR, under normal operation.

Table 3-6   Maximum Power Requirements

Storage Adapter	PCI / PCI-X 5.0 V	PCI / PCI-X 3.3 V	PCI / PCI-X 12V	PCI / PCI-X -12V	Power	Over Operating Range
Intel RAID Controller SRCZCRX	2.0 A	0.0 V	0.3 A with battery connected and charging	10 mA	14 W	0° C to 55° C

3.3.5   Thermal and Atmospheric Characteristics

The Intel RAID Controller SRCZCRX has the following thermal, and atmospheric characteristics.

- Temperature range: 0°C to 55°C (dry bulb)
- Relative humidity range: 5% to 80% noncondensing
- Maximum dew point temperature: 32°C
- Airflow must be sufficient to keep the heat sink temperature below 80°C

The following parameters define the storage and transit environment for the Intel RAID Controller SRCZCRX:

- Temperature range: − 40°C to + 115°C (dry bulb)
- Relative humidity range: 20% to 80% noncondensing

3.3.6   Safety Characteristics

The Intel RAID Controller SRCZCRX meets or exceeds the requirements of UL flammability rating 94 V0. Each bare board is also marked with the supplier's name or trademark, type, and UL flammability rating. Since these boards are installed in a PCI bus slot, all voltages are below the SELV 42.4 V limit.

Chapter A
Glossary of Terms and Abbreviations

Active Termination   The electrical connection required at each end of the SCSI bus, composed of active voltage regulation and a set of termination resistors. Ultra SCSI, Ultra2 SCSI, Ultra160 SCSI, and Ultra320 SCSI require active termination.

BIOS   Basic Input/Output System. Software that provides basic read/write capability. Usually kept as firmware (ROM based). The system BIOS on the mainboard of a computer is used to boot and control the system. The SCSI BIOS on your host adapter acts as an extension of the system BIOS.

Configuration   Refers to the way a computer is setup; the combined hardware components (computer, monitor, keyboard, and peripheral devices) that make up a computer system; or the software settings that allow the hardware components to communicate with each other.

Device Driver   A program that allows a microprocessor (through the operating system) to direct the operation of a peripheral device.

Differential SCSI   A hardware configuration for connecting SCSI devices. It uses a pair of lines for each signal transfer (as opposed to Single-Ended SCSI which references each SCSI signal to a common ground).

Domain Validation   Domain Validation is a software procedure in which a host queries a device to determine its ability to communicate at the negotiated Ultra320 data rate.

EEPROM   Electronically Erasable Programmable Read Only Memory.

External SCSI Device   A SCSI device installed outside the computer cabinet. These devices are connected together using specific types of shielded cables.

Fusion-MPT Architecture   Fusion-MPT (Message Passing Technology) architecture consists of several main elements: Fusion-MPT firmware, the Fibre Channel and SCSI hardware, and the operating system level drivers that support these architectures. Fusion-MPT architecture offers a single binary, operating system driver that supports both Fibre Channel and SCSI devices now.

Host   The computer system in which a storage adapter is installed. It uses the storage adapter to transfer information to and from devices attached to the SCSI bus.

Host Adapter Board (HAB)   A circuit board or integrated circuit that provides a device connection to the computer system.

Internal SCSI Device   A SCSI device installed inside the computer cabinet. These devices are connected together using an unshielded ribbon cable.

Main Memory   The part of a computer's memory which is directly accessible by the CPU (usually synonymous with RAM).

NVRAM   NonVolatile Random Access Memory.

PCI and PCI-X	Peripheral Component Interconnect. A high performance local bus specification that allows connection of devices directly to computer memory. The PCI Local Bus allows transparent upgrades from 32-bit data path at 33 MHz to 64-bit data path at 33 MHz, and from 32-bit data path at 66 MHz to 64-bit data path at 66 MHz.
Peripheral Devices	A piece of hardware (such as a video monitor, disk drive, printer, or CD-ROM) used with a computer and under the computer's control. SCSI peripherals are controlled through a SCSI SRCU42X controller (host adapter).
SCSI Bus	A storage adapter (host adapter) and one or more SCSI peripherals connected by cables in a linear configuration. The adapter may exist anywhere on the bus, allowing connection of both internal and external SCSI devices. A system may have more than one SCSI bus by using a multi-channel adapter or by using multiple adapters.
SCSI Device	Any device that conforms to the SCSI standard and is attached to the SCSI bus by a SCSI cable. This includes SCSI storage adapters (host adapters) and SCSI peripherals.
SCSI ID	A way to uniquely identify each SCSI device on the SCSI bus. Each SCSI bus has eight available SCSI IDs numbered 0 through 7 (or 0 through 15 for Wide SCSI). The storage adapter (host adapter) usually gets the highest ID (7 or 15) giving it priority to control the bus.
Single-Ended SCSI	A hardware specification for connecting SCSI devices. It references each SCSI signal to a common ground. This is the most common method (as opposed to differential SCSI, which uses a separate ground for each signal).
TolerANT	A technology developed and used by Intel to improve data integrity, data transfer rates, and noise immunity through the use of active negation and input signal filtering.
Ultra SCSI	A standard for SCSI data transfers. It allows a transfer rate of up to 20 Mbytes/s over an 8-bit SCSI bus and up to 40 Mbytes/s over a 16-bit SCSI bus.
Ultra2 SCSI	A standard for SCSI data transfers. It allows a transfer rate of up to 40 Mbytes/s over an 8-bit SCSI bus, and up to 80 Mbytes/s over a 16-bit SCSI bus.
Ultra160 SCSI	A standard for SCSI data transfers. It allows a transfer rate of up to 160 Mbytes/s over a 16-bit SCSI bus.
Ultra320 SCSI	A standard for SCSI data transfers. It allows a transfer rate of up to 320 Mbytes/s over a 16-bit SCSI bus.
VHDCI	Very High-Density Cable Interconnect. This cable is used to connect external connectors to your storage adapter.