



SCSI-2 F/W PCI RAID Adapter Installation and User's Guide

Note

Before using this information and the product it supports, be sure to read the general information under "Product Warranties and Notices" included with your system unit.

Third Edition (March 1999)

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Safety Information

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

Before installing or removing signal cables, ensure that the power cables for the system unit and all attached devices are unplugged.

When adding or removing any additional devices to or from the system, ensure that the power cables for those devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.

Use one hand, when possible, to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.

During an electrical storm, do not connect cables for display stations, printers, telephones, or station protectors for communication lines.

About This Book

This book provides information about installing the SCSI-2 F/W PCI RAID Adapter, planning your installation and cabling requirements, and installing the device driver support software. Use this book in conjunction with your specific system unit and operating system documentation.

ISO 9000

ISO 9000 registered quality systems were used in the development and manufacturing of this product.

Related Publications

Refer to your system unit and operating system documentation for information specific to your hardware and software configuration while installing the SCSI-2 F/W PCI RAID Adapter.

Refer to your operating system documentation for information about updating your system configuration or running diagnostics after you install the SCSI-2 F/W PCI RAID Adapter. If your operating system is AIX, refer to the *SCSI-2 F/W PCI RAID Adapter Reference Guide, SC23-1889*.

Trademarks and Acknowledgements

The following trademarks and acknowledgements apply to this information:

AIX is a registered trademark of International Business Machines Corp.

Chapter 1. Overview

The SCSI-2 F/W PCI RAID Adapter allows you to connect SCSI hard disk drives in a RAID configuration to system units with a Peripheral Component Interconnect (PCI) bus¹. RAID (Redundant Array of Inexpensive Disks) provides a way to spread stored data among two or more hard disk drives inside or attached to a host system. A PCI bus provides high-speed data transfer.

You can create, control, and manage a RAID configuration in combination with supporting host software. The SCSI-2 F/W PCI RAID Adapter supports fast and wide SCSI synchronous data rates up to 10 MB per second (8-bit) or 20 MB per second (16-bit) on three independent SCSI-2 channels.

Note: This guide uses the term *channel* rather than *bus*. PCI transfer rates of up to 100 MB per second are also supported. You can install up to two SCSI-2 F/W PCI RAID Adapters in a host system.

The SCSI-2 F/W PCI RAID Adapter conforms to the American National Standards Institute (ANSI) SCSI-2 standard and the PCI local specification, revision 2.1.

Software Requirements

AIX Release 4.1.5 or greater is required for use of this adapter.

Handling the Adapter

Attention: Static electricity may damage your equipment. Leave the adapter in the static-protective bag until you are ready to install it.

¹ Other SCSI devices cannot be connected to the SCSI-2 F/W PCI RAID Adapter.

SCSI Connectors

The SCSI-2 F/W PCI RAID Adapter has four connectors, as shown in Figure 1-1.

You cannot attach a cable to the external connector for channel 0 and the internal connector for channel 0 at the same time.

The SCSI-2 F/W PCI RAID Adapter provides built-in SCSI terminators that are always enabled.

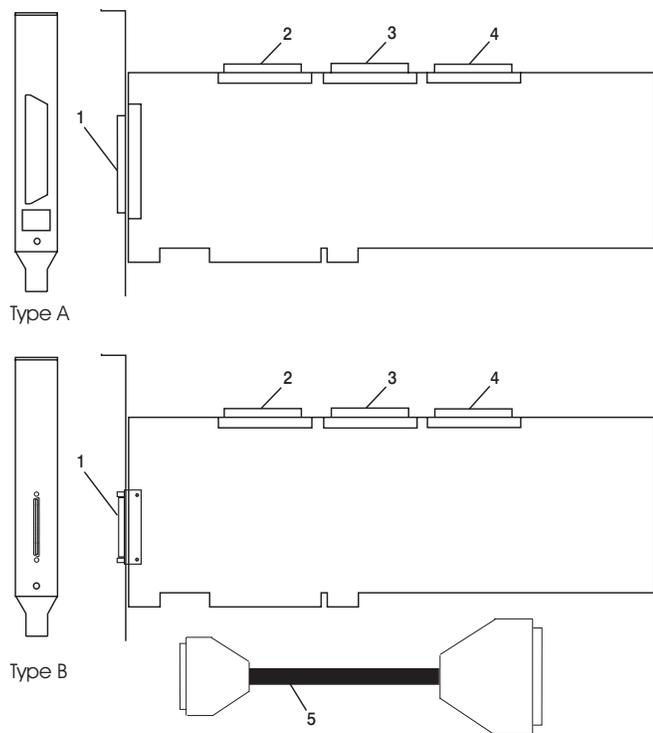


Figure 1-1. SCSI Connectors

- | | | | |
|---|--|---|---|
| 1 | Channel 0. 68-pin SCSI standard external connector. | 2 | Channel 0. 68-pin SCSI standard internal connector. |
| 3 | Channel 1. 68-pin SCSI standard internal connector. | 4 | Channel 2. 68-pin SCSI standard internal connector. |
| 5 | Channel 0. 68-pin SCSI Very High Density Interface external connector. | 6 | Interposer cable required for Type B adapter only. |

Note: You can attach an internal cable to the internal channel 0 or an external cable to the external channel 0, but *not* both at the same time.

Chapter 2. Preparing for Installation

Installing the SCSI-2 F/W PCI RAID Adapter consists of the following steps:

1. Taking an inventory of all pieces necessary for installation
2. Determining your cable requirements
3. Installing device drivers
4. Installing the adapter

Note: If AIX is not installed on your system unit, install your adapter before you install the operating system. (See Chapter 4, “Installing the SCSI-2 F/W PCI RAID Adapter” on page 4-1.) When you install AIX, your device driver software automatically installs.

If AIX is operating on your system, install your device driver software prior to installing your adapter. (See Chapter 3, “Installing the Device Driver Software” on page 3-1.)

5. Connecting cables and drives

Note: For best performance, distribute the hard disk drives equally across the available channels, 0, 1, and 2.

Inventory

To install the SCSI-2 F/W PCI RAID Adapter, you need:

- A flat-blade screwdriver.
- The device driver software media (Included diskette or CD-ROM)
- Your system unit documentation

To connect SCSI hard disk drives to the SCSI-2 F/W PCI RAID Adapter, you need:

- External cables (for attaching external hard disk drives)
- Internal cables (for attaching internal hard disk drives)
- A 16 bit to 8 bit interposer, if attaching 8-bit drives
- Your SCSI hard disk drive documentation
- An internal to external extender cable (FC3131), if attaching external hard disk drives to the internal channels.
- An interposer cable if you have the type B adapter.

Determining Your Cable Requirements

You must use the correct SCSI cables to properly attach SCSI hard disk drives. Narrow (8-bit) hard disk drives require a cable with a 50-pin connector at the hard

disk drive end and a 68-pin connector at the adapter end. Wide (16-bit) hard disk drives require a cable with a 68-pin connector at both ends.

SCSI specifications limit total cable length to 6 meters (approximately 20 feet). Total cable length of the SCSI chain includes both internal and external cabling.

If you install a fast synchronous hard disk drive, such as a narrow SCSI hard disk that can transfer data at up to 10 MB per second or a wide SCSI hard disk drive that can transfer data at up to 20 MB per second, the maximum cable length is limited to 3 meters (approximately 10 feet).

For more information on connecting SCSI hard disk drives to the SCSI-2 F/W PCI RAID Adapter, see Appendix A, "Connecting SCSI Hard Disk Drives to the Adapter" on page A-1.

Internal Cabling

If you plan to install internal SCSI hard disk drives, you must obtain the necessary cables for your system unit. Refer to your SCSI hard disk drive documentation for information about determining cable requirements. Refer to your system unit documentation for information about installing internal SCSI hard disk drives and cables.

Internal hard disk drives typically attach to a cable with one or more connectors, allowing you to attach other SCSI devices to the cable. You can use wide or narrow SCSI internal cables. The wide cables attach to the 68-pin internal connectors for Channels 2, 1, or 0 (see Figure 1-1 on page 1-2). Narrow cables require an interposer.

There must be a SCSI terminator at the end of the internal cable. Some terminators are plugged into the last position of the cable. Some terminators are built into the cable and cannot be removed. Other terminators are built into the SCSI device or onto a backplane within the computer.

Important: You can attach an internal cable to the internal channel 0 or an external cable to the external channel 0, but *not* both at the same time.

External Cabling

External SCSI devices have a variety of connectors. Ensure that you have cables with the correct connectors for each external device in your planned SCSI chain.

With the correct cables, you can externally attach narrow or wide hard disk drives to the SCSI-2 F/W PCI RAID Adapter. In both cases, the cable end that attaches to the adapter requires a 68-pin connector.

Chapter 3. Installing the Device Driver Software

The instructions in this chapter are for AIX. AIX automatically configures your system when you restart your system after you install the device driver and diagnostics software. If you have another operating system installed, refer to your operating system documentation for information about installing the device driver and diagnostics software and configuring your system.

Installing the Software

To install the device driver and diagnostics software:

1. Turn the power on to your system unit.
2. At the system prompt, log in as **root**.
3. Insert the device driver and diagnostics software media (diskette or CD-ROM) into the appropriate media device.
4. To start SMIT, type:

```
smitty devinst
```

at the prompt, then press Enter. The Install Additional Device Software panel displays. The **INPUT device/directory for software** option is highlighted.

5. Press F4 to display a list of input devices that you can select. The cursor is already positioned on the entry field where you select the input device.
6. Select the appropriate device and press Enter.

The Install Additional Device Software panel displays the device you selected in the **INPUT device/directory for software** field. The **SOFTWARE to install** option is highlighted.

7. Press F4 to display a list of the device driver and diagnostics you can install.
8. To display a Find dialog box, type:

```
/
```

and press Enter. Then type:

```
devices.pci.14102e00
```

The following is then highlighted:

```
devices.pci.14102e00
```

```
ALL
```

Press F7 to select the highlighted software, then press Enter. The Install Additional Device Software panel displays the completed required fields.

9. Press Enter. The **ARE YOU SURE** list displays.

10. Press Enter. The COMMAND STATUS panel displays. The term RUNNING is highlighted, indicating that the software is being installed and configured.
11. When RUNNING changes to OK, scroll down to the bottom of the page and locate the Installation Summary. If the installation was successful, SUCCESS appears at the bottom of the panel in the Result column of the Installation Summary.
12. Remove the installation media from the hard disk drive.
13. Press F10 to exit SMIT.
14. To shutdown your system, type:
 shutdown -F
 then press Enter.
15. Go to Chapter 4, "Installing the SCSI-2 F/W PCI RAID Adapter" on page 4-1.

Chapter 4. Installing the SCSI-2 F/W PCI RAID Adapter

This chapter provides instructions for installing the SCSI-2 F/W PCI RAID Adapter and connecting your SCSI hard disk drives to it. Be sure to save this guide for future reference and use.

Refer to your system unit documentation for information about shutting down your system unit and removing its cover.

Installing Internal SCSI Drives

Set up and install your SCSI hard disk drives as described in the documentation provided with each hard disk drive. Most internal hard disk drives require you to secure the hard disk drive inside the system unit and connect a power cable. Make sure that no two hard disk drives on the same SCSI channel have the same SCSI address.

Connecting Internal Hard Disk Drives and Installing the Adapter

Refer to your system unit documentation for information about opening your system unit and installing an internal SCSI hard disk drive.

To connect internal hard disk drives and install the SCSI-2 F/W PCI RAID Adapter:

1. Attach the correct narrow (8-bit) or wide (16-bit) cable to the hard disk drive, then install the hard disk drive according to the instructions in your hard disk drive and system unit documentation.
2. If the last SCSI hard disk drive on the internal chain does not supply a terminator, attach a SCSI terminator to the end of the cable. The SCSI-2 F/W PCI RAID Adapter provides built-in terminators, so one is not required at the adapter end of the cable. If the internal SCSI hard disk drive supplies a terminator, the drive must be placed on the internal cable location farthest from the adapter. Some terminators are built into the backplane that the hard disk drive connects to.
3. Install the SCSI-2 F/W PCI RAID Adapter into any available PCI slot. For best performance, install the adapter in the primary PCI slot. The primary PCI slot is usually a lower numbered card slot.
4. Connect the adapter end of the internal cable to the correct internal connector on the SCSI-2 F/W PCI RAID Adapter, usually channel 1 or 2. You can use the internal channel 0 connector, however, that connector is generally reserved for

external hard disk drives. All the connectors are built so that there is only one way you can plug them in.

5. If you are installing the optional internal-to-external extender cable, attach the metal bracket side of the cable into an unused card slot and connect the other end to the connector for either channel 1 or 2 on the adapter. You should not connect to the internal connector for channel 0 with the internal-to-external extender cable because the internal channel 0 connector shares a channel connection to the external connector for channel 0.

Important

After you connect the card, internal cables, and hard disk drive, be sure to record which set of hard disk drives or extender cables are connected to channels 2, 1, and 0. The management software identifies the physical hard disk drives by channel and SCSI ID. In order to properly remove or add physical hard disk drives, it is necessary to identify the location of the removed or added hard disk drive to the system.

After you install all the internal SCSI hard disk drives and the SCSI-2 F/W PCI RAID Adapter, reinstall the cover to your system unit according to the instructions in your system unit documentation.

Connecting External SCSI Hard Disk Drives

After you install the SCSI-2 F/W PCI RAID Adapter and reinstall the cover of your system unit, you can connect the external hard disk drives.

To connect external hard disk drives:

1. Connect the 68-pin connector to the external port for channel 0, or to the additional external connectors if you installed the optional internal-to-external extender cable. Use the fastening screws on the cable connector to securely attach the connector to the adapter.
2. Connect the other end of the cable to your SCSI hard disk drive enclosure.
3. When all hard disk drives are connected, ensure that a SCSI terminator is attached to the last hard disk drive or is contained in the enclosure.

Notes:

1. The SCSI channels 0, 1, and 2 should never be interconnected. Each channel must operate independently.
2. Only hard disk drives can be connected to the SCSI channels.
3. When you operate with more than one adapter in a system, you cannot share hard disk drives between the adapters.

Verifying the Installation

To verify your newly installed SCSI-2 F/W PCI RAID Adapter is available for use:

1. At the system prompt, log in as **root**.
2. Type:

```
lsdev -Cs pci
```

at the system prompt and press Enter. A list of PCI devices displays. **Available** indicates the SCSI-2 F/W PCI RAID Adapter is installed. If any errors are flagged, refer to the problem determination section of the *SCSI-2 F/W PCI RAID Adapter Reference Guide, SC23-1889*.

Problem Determination

If you encounter any problems with the adapter after you install it, refer to your system unit documentation for information about running diagnostics or other problem determination procedures. AIX users should refer to the *SCSI-2 F/W PCI RAID Adapter Reference Guide, SC23-1889*.

Configuring Your System

If you must update your system configuration after you install the SCSI-2 F/W PCI RAID Adapter, refer to your operating system documentation for the correct procedure to follow. AIX users should refer to the *SCSI-2 F/W PCI RAID Adapter Reference Guide, SC23-1889*.

Appendix A. Connecting SCSI Hard Disk Drives to the Adapter

Planning Your SCSI Hard Disk Drive Layout

The RAID adapter connects to a hard disk drive through one of three possible SCSI-2 channels. The connected hard disk drives can be inside the host system unit, outside the system unit in a hard disk drive enclosure, or both. Each hard disk drive on a SCSI channel must have a unique SCSI ID of 0 through 6, 8, 9, A, B, C, D, E, or F.

The addressing scheme is in hex notation. Address 7 is reserved for the adapter and should never be used for another SCSI device. Each of the SCSI channels (2, 1, and 0) is assigned a channel ID. The channel ID and SCSI ID are used to fully identify a hard disk drive connected to the adapter. For example, a hard disk drive with SCSI ID 8 connected to channel 2 on the adapter is identified as hard disk drive 28 (Channel ID 2)(SCSI ID 8) by the management software.

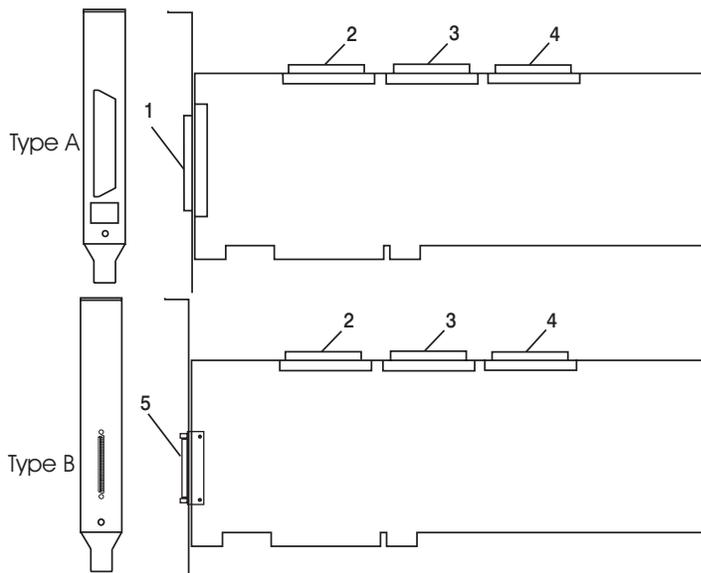


Figure A-1. SCSI Channels

1, 5	Channel 0	2	Channel 0
3	Channel 1	4	Channel 2

For best overall performance and data protection, you should evenly distribute hard disk drives across the three available channels. See Figure A-2 on page A-2 for a sample RAID configuration.

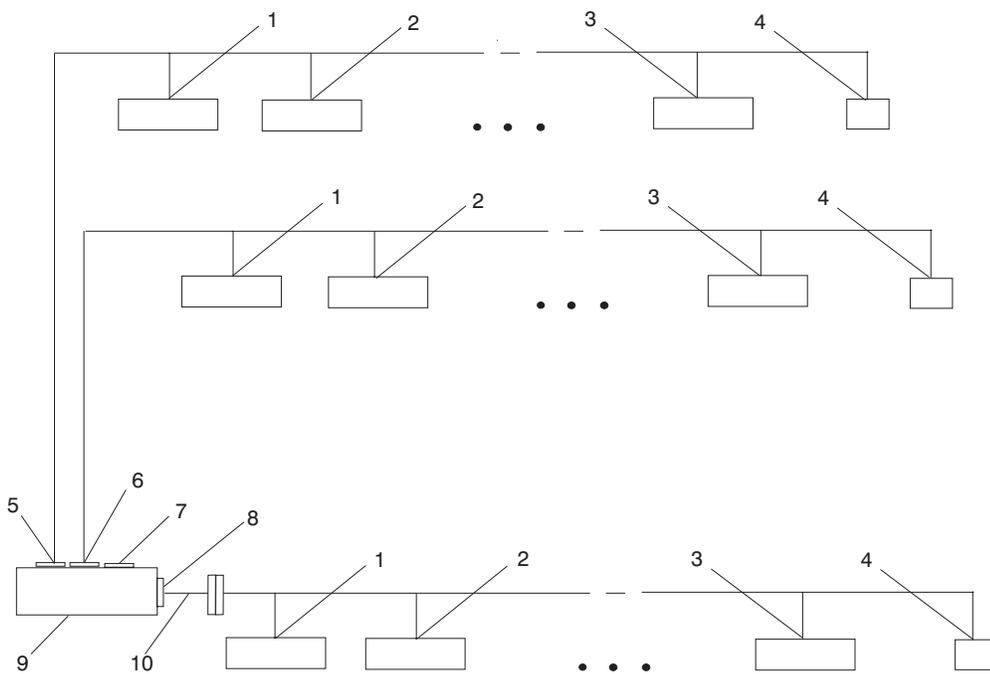


Figure A-2. Adapter and Hard Disk Drive Configuration

- 1 Hard Disk Drive ID 0
- 2 Hard Disk Drive ID 1
- 3 Hard Disk Drive ID 15 (D)
- 4 Terminator
- 5 Channel 2, 68-pin SCSI standard internal connector
- 6 Channel 1, 68-pin SCSI standard internal connector
- 7 Channel 0, 68-pin SCSI standard internal connector
- 8 Channel 0, 68-pin SCSI standard external connector (Type A)
- 8 Channel 0, 68-pin SCSI Very High Density Interface external connector (Type B)
- 9 SCSI-2 F/W PCI RAID Adapter
- 10 Interposer cable (required for Type B adapter only)

Determining Current SCSI Hard Disk Drive Addresses

Manufacturers use different methods to set SCSI addresses, such as jumpers, dual inline package (DIP) switches, push buttons, and dials. If your SCSI hard disk drive is new, refer to the installation instructions that came with it to see whether it specifies a default SCSI address. Sometimes the hard disk drive enclosure or backplane to which a hard disk drive is connected automatically sets the SCSI address for you. Check the hard disk drive itself to verify that the current SCSI addresses are set properly. Be sure to keep a list of all the SCSI addresses you use and the channels to which they are connected for future reference.

Important: Before you set any SCSI address, you must first determine which addresses are already in use by other SCSI devices attached to the same SCSI channel. *Remember:* You can repeat SCSI addresses only when the devices are attached to different channels. To determine the SCSI addresses of any installed devices, start the RAID manager program and list the attached physical drives. For an AIX system, see SCSI-2 F/W PCI RAID Adapter Reference Guide, SC23-1889. If you have another operating system installed, refer to your operating system documentation for the correct procedures to follow.

Planning SCSI Hard Disk Drive Addresses

Ensure that no two SCSI hard disk drives on a chain use the same address and that no device uses SCSI address 7, which is reserved for the adapter.

Notes:

1. The priority of SCSI addresses for the SCSI-2 F/W PCI RAID Adapter is not in sequential order. The order of priority is 7 through 0 and 15 through 8. Addresses 15 through 8 (F, E, D, C, B, A, 9, 8) are for 16-bit configurations only.
2. Address 7 is reserved for the adapter.

Changing SCSI Hard Disk Drive Addresses

To change a SCSI address, refer to the documentation that came with your SCSI hard disk drive.

Terminating the SCSI Hard Disk Drives and Adapter

Some SCSI hard disk drives have built-in terminators controlled by a DIP switch, jumper, or push button. Other devices attach terminators to the SCSI cable or require that a terminator be plugged into the device on a connector. When you install your SCSI hard disk drives, be sure to correctly terminate each device. Refer to the documentation for each device to see how it should be terminated. When you plan your SCSI hard disk drive layout, determine whether it is necessary to purchase terminators for your devices and cables.

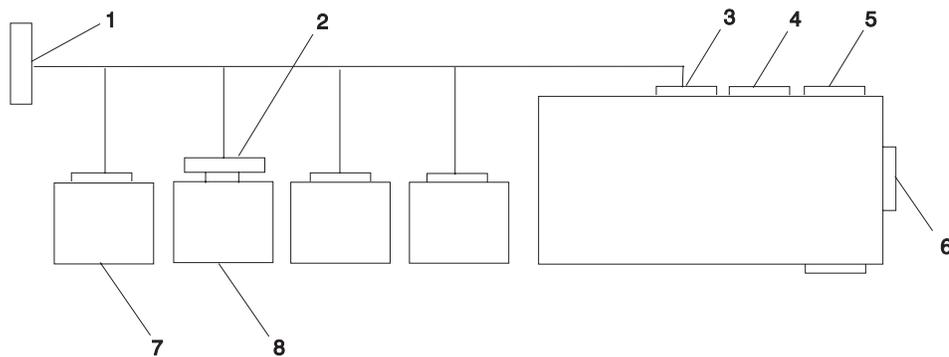
Remember the basic rules for terminating SCSI hard disk drives:

- Terminate each end of the chain
- Do not terminate devices in the middle of the chain

Appendix B. Connection Examples

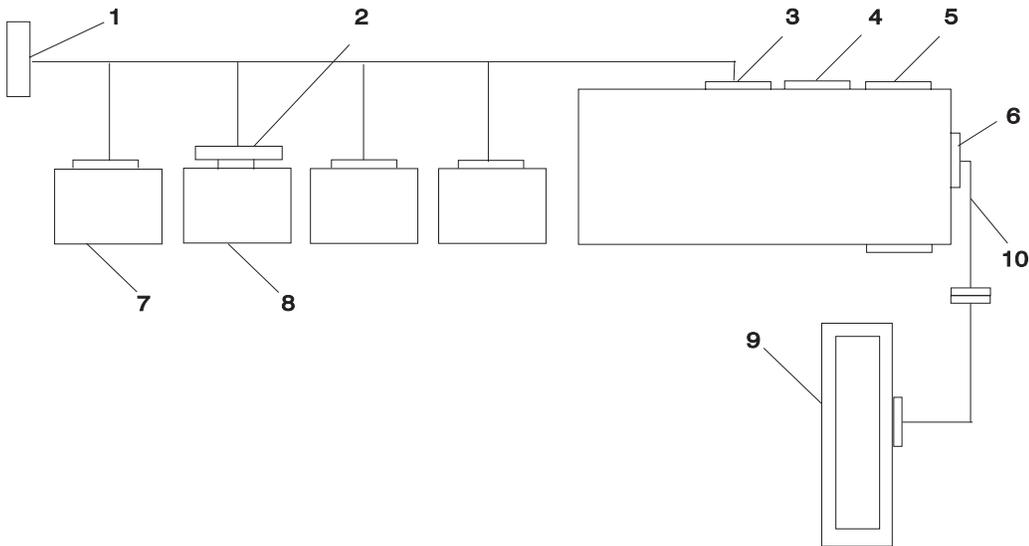
This section provides examples showing the different ways you can connect SCSI hard disk drives to the SCSI-2 F/W PCI RAID Adapter.

Internal Hard Disk Drive Connection

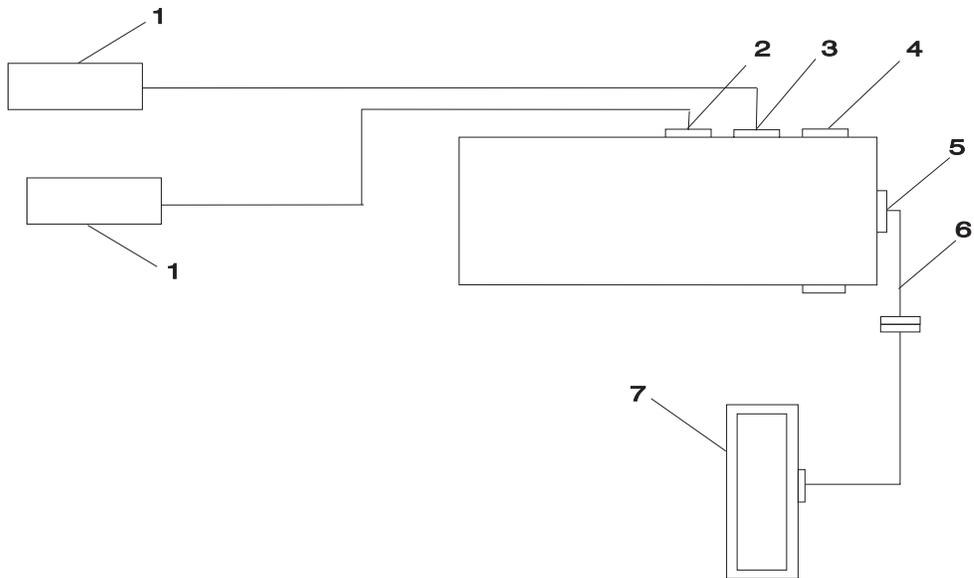


- 1 System specific terminator
- 2 Interposer (16 bit to 8 bit)
- 3 Channel 2, 68-pin SCSI standard internal connector
- 4 Channel 1, 68-pin SCSI standard internal connector
- 5 Channel 0, 68-pin SCSI standard internal connector
- 6 Channel 0, 68-pin SCSI standard external connector (Type A Adapter)
- 6 Channel 0, 68-pin SCSI Very High Density Connector Interface external connector (Type B Adapter)
- 7 16-bit hard disk drive
- 8 8-bit hard disk drive

Internal and External Hard Disk Drive Connections

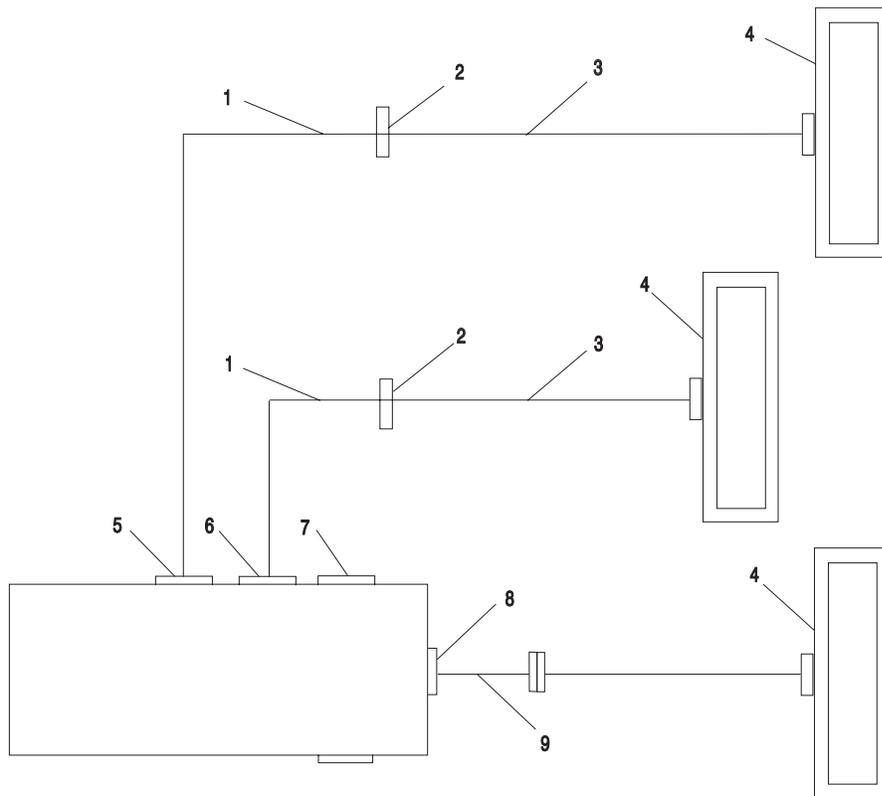


- 1 Terminator
- 2 Interposer (16 bit to 8 bit)
- 3 Channel 2, 68-pin SCSI standard internal connector
- 4 Channel 1, 68-pin SCSI standard internal connector
- 5 Channel 0, 68-pin SCSI standard internal connector
- 6 Channel 0, 68-pin SCSI standard external connector (Type A adapter)
- 6 Channel 0, 68-pin SCSI Very High Density Connector Interface external connector (Type B adapter)
- 7 16-bit hard disk drive
- 8 8-bit hard disk drive
- 9 External enclosure
- 10 Interposer cable (required for Type B adapter only)



- 1 SCSI hot plug backplane
- 2 Channel 2, 68-pin SCSI standard internal connector
- 3 Channel 1, 68-pin SCSI standard internal connector
- 4 Channel 0, 68-pin SCSI standard internal connector
- 5 Channel 0, 68-pin SCSI standard external connector (Type A adapter)
- 5 Channel 0, 68-pin SCSI Very High Density Connector Interface external connector (Type B adapter)
- 6 Interposer cable (required for Type B adapter)
- 7 External enclosure

External Connections



- 1 Internal to external extender cable (F/C 3131)
- 2 Card slot position (for each internal to external extender cable)
- 3 External cable
- 4 External enclosure
- 5 Channel 2, 68-pin SCSI standard internal connector
- 6 Channel 1, 68-pin SCSI standard internal connector
- 7 Channel 0, 68-pin SCSI standard internal connector
- 8 Channel 0, 68-pin SCSI standard external connector (Type A adapter)
- 8 Channel 0, 68-pin SCSI Very High Density Connector Interface external connector (Type B adapter)
- 9 Interposer cable (required for Type B adapter)

Appendix C. Communications Statements

The following statement applies to this product. The statement for other products intended for use with this product appears in their accompanying documentation.

Federal Communications Commission (FCC) Statement

Note: The SCSI-2 F/W PCI RAID Adapter 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 receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an authorized dealer or service representative for help.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from authorized dealers. Neither the provider nor the manufacturer are responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

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.

Responsible Party:

International Business Machines Corporation
New Orchard Road
Armonk, New York 10504
Telephone: (919) 543-2193



Tested to Comply
With FCC Standards

FOR HOME OR OFFICE USE

European Union (EU) Statement

This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. The manufacturer cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of option cards supplied by third parties. Consult with your dealer or sales representative for details on your specific hardware.

This product has been tested and found to comply with the limits for Class B Information Technology Equipment according to CISPR 22 / European Standard EN 55022. The limits for Class B equipment were derived for typical residential environments to provide reasonable protection against interference with licensed communication devices.

International Electrotechnical Commission (IEC) Statement

This product has been designed and built to comply with IEC Standard 950.

United Kingdom Telecommunications Safety Requirements

This equipment is manufactured to the International Safety Standard EN60950 and as such is approved in the UK under the General Approval Number NS/G/1234/J/100003 for indirect connection to the public telecommunication network.

The network adapter interfaces housed within this equipment are approved separately, each one having its own independent approval number. These interface adapters, supplied by the manufacturer, do not use or contain excessive voltages. An excessive voltage is one which exceeds 70.7 V peak ac or 120 V dc. They interface with this equipment using Safe Extra Low Voltages only. In order to

maintain the separate (independent) approval of the manufacturer's adapters, it is essential that other optional cards, not supplied by the manufacturer, do not use main voltages or any other excessive voltages. Seek advice from a competent engineer before installing other adapters not supplied by the manufacturer.

Avis de conformité aux normes du ministère des Communications du Canada

Cet appareil numérique de la classe B est conform à la norme NMB-003 du Canada.

Canadian Department of Communications Compliance Statement

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

VCCI Statement

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づきクラス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。

The following is a summary of the VCCI Japanese statement in the box above.

This product is a Class B Information Technology Equipment and conforms to the standards set by the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). This product is aimed to be used in a domestic environment. When used near a radio or TV receiver, it may become the cause of radio interference. Read the instructions for correct handling.

Radio Protection for Germany

Dieses Gerät ist berechtigt in Übereinstimmung mit dem deutschen EMVG vom 9.Nov.92 das EG-Konformitätszeichen zu führen.

Der Aussteller der Konformitätserklärung ist die IBM Germany.

Dieses Gerät erfüllt die Bedingungen der EN 55022 Klasse B.

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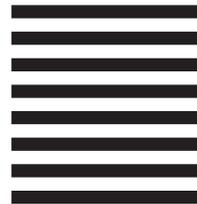
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