

**PCI Single-Ended Ultra SCSI 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 (April 1997)

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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.

Handling Static Sensitive Devices

Attention: Static electricity can damage this device and your system unit. To avoid damage, keep this device in its static protective bag until you are ready to install it. To reduce the possibility of electrostatic discharge, follow the precautions listed below.

Electrostatic Discharge Protection

To prevent electrostatic discharge:

- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed printed circuitry.
- Do not leave the device where others can handle and possibly damage the device.
- While the device is still in its anti-static package, touch it to an unpainted metal part of the system unit for at least two seconds. (This drains static electricity from the package and from your body.)
- Remove the device from its package and install it directly into your system unit without setting it down. If it is necessary to set the device down, place it on its static-protective package. (If your device is an adapter, place it component side up.) Do not place the device on your system unit cover or on a metal table.
- Take additional care when handling devices during cold weather as heating reduces indoor humidity and increases static electricity.

About This Book

Use this book with your system unit documentation to install the PCI Single-Ended Ultra SCSI Adapter. Included are device driver install, configure, and verify instructions.

ISO 9000

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

Related Publications

This book refers to the documentation that came with your system unit.

Trademarks

- AIX is a registered trademark of International Business Machines Corporation.
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Chapter 1. Overview

This guide describes how to install the PCI Single-Ended Ultra SCSI Adapter in a system unit with a PCI (peripheral compatible interface) bus. The PCI Single-Ended Ultra SCSI Adapter enables you to use internal and external SCSI (small computer system interface) 8 or 16 bit devices. The adapter conforms to the ANSI (American National Standards Institute) SCSI standard and to the PCI local specification, Revision 2.1.

The PCI Single-Ended Ultra SCSI Adapter supports ultra SCSI synchronous data rates up to 20 MHz. A 16-bit SCSI device supports a maximum transfer rate of 40 megabytes (40,000,000 bytes) per second. An 8-bit SCSI device supports a maximum transfer rate of 20 megabytes (20,000,000 bytes) per second.

Attention: When the SCSI adapter detects any externally attached device, the SCSI bus negotiates for a maximum 10MHz Fast SCSI for both internal and external devices. To optimize internal Ultra (20MHz) SCSI bus speeds, the manufacturer recommends you do not use internally and externally attached devices at the same time. (In AIX, the automatic negotiation for 10MHz can be overridden using SMIT to reconfigure the adapter. Refer to “Configuring the Ultra SCSI adapter” on page 4-6.)

SCSI Connectors

The adapter has three SCSI connectors and a jumper block:

- External connector:
 - J2 68-pin SCSI standard connector
- Internal Connectors:
 - J3 68-pin high-density SCSI standard connector for 16-bit attachment
 - J4 50-pin (2 by 25) SCSI standard connector for 8-bit attachment
- Jumper:
 - J7 Jumper block

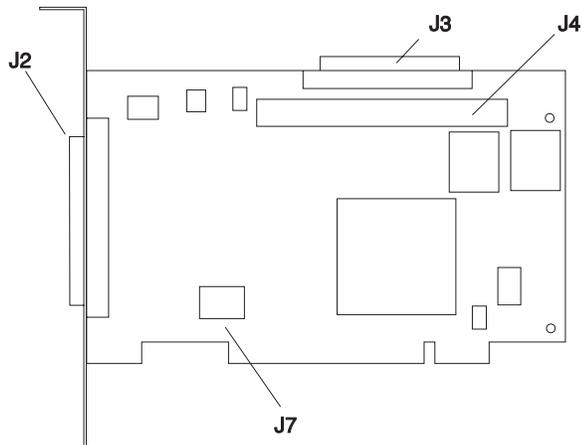


Figure 1-1. SCSI Connectors

The adapter has built-in SCSI terminators that are automatically enabled or disabled depending on the cables that are attached.

Software Requirements

The PCI Single-Ended Ultra SCSI Adapter is supported on AIX Version 4.2.1. If support is required on an AIX release other than AIX 4.2.1, please insure this adapter is supported on that release of AIX prior to install. Contact your support representative for assistance.

Chapter 2. Preparing for Installation

This section outlines the installation process for the PCI Single-Ended Ultra SCSI Adapter.

The process includes:

- Taking an inventory of installation materials.
- Determining your cable needs.
- Installing your device driver software.
- Installing your adapter.

Note: If AIX is not installed on your system unit, install your adapter before you install the operating system (refer to Chapter 4, “Installing Hardware” 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 (refer to Chapter 3, “Installing Device Driver Software” on page 3-1).

Additional device drivers may be required for the SCSI devices attached to your adapter. Refer to the documentation that came with your devices for installation instructions.

Inventory

To install the PCI Single-Ended Ultra SCSI Adapter, you need:

- The adapter.
- This document, *PCI Single-Ended Ultra SCSI Adapter Installation and User's Guide*.
- The system unit User's Guide.
- A flat-blade screwdriver.

To connect the SCSI devices to the adapter, you may also need:

- The documentation that came with your SCSI devices.
- External cables.
- Internal cables.
- A Single-Ended SCSI terminator.
- Media containing device driver software.

Determining Cable Needs

External Cable Connectors: External SCSI devices are manufactured with a variety of connectors. Ensure you have cables with the appropriate connectors for each external 8 or 16-bit device in your planned SCSI chain.

For either external 8 or 16-bit device, the cable end that attaches to the adapter is a 68-pin connector. The device end varies with the type of device you are attaching.

External Cabling: Attach either an 8-bit or 16-bit SCSI device to the external 68-pin connector.

Review the following list of SCSI cable connections to correctly attach your device.

- An 8-bit device uses a cable with a 50-pin connector on the device end and a 68-pin connector on the adapter end.
- A 16-bit device uses a cable with a 68-pin connector on both ends.

SCSI specifications limit the total cable length attached as a function of SCSI bus speed:

- To use a fast, 10MHz, synchronous device (such as a 8-bit SCSI disk that can transfer up to 10 megabytes per second of data or a 16-bit SCSI disk that can transfer up to 20 megabytes per second of data) the maximum cable length is limited to 3 meters (approximately 10 feet).
- To use Ultra SCSI speeds of 20MHz, possible total cable lengths are:

Total Devices	Length of Bus
4 or less	3.0 meters
5 to 8	1.5 meters

For information about connecting SCSI devices to your adapter, see Appendix A, "Connecting SCSI Devices to the Adapter" on page A-1.

Internal Cable Connectors: Internal SCSI devices attach to a cable with one or more connectors that allow you to attach 8 or 16-bit devices to the cable.

The 16-bit cable attaches to the 68-pin internal connector, J3. The 8-bit cable attaches to the 50-pin connector, J4 (see Figure 1-1 on page 1-2).

Internal Cabling: Understand your internal installation, in detail, to determine specific attachment locations for your internal SCSI terminator.

To use internal SCSI devices in your system, obtain the necessary cables for your system unit. Install the cables using information found in your system unit User's Guide.

Terminator locations can vary. Terminators can be:

- Plugged into the last position of the internal cable.
- Built on the cable and cannot be removed.
- Built into the SCSI device.
- Built on a backplane within the system unit.

Important: Use either an 8-bit connector or a 16-bit connector, but do not use both. It is possible, however, to hook up an 8-bit device to your 16-bit cable (connected via your J3 internal connection) using an 8 to 16-bit interposer.

Chapter 3. Installing Device Driver Software

This section explains how to install device driver software.

Note: Additional device drivers may also be required for the SCSI devices attached to the adapter. Refer to the documentation that came with your devices for installation instructions.

AIX Device Driver Software Installation

1. Be sure you have read Chapter 2, "Preparing for Installation" on page 2-1.
 - Determine if you should install your device driver software first.
 - Determine if you should install your adapter hardware first.
 - If you should install your device driver software first, go to step 2 and continue with this section.
 - If you should install your hardware first, go to Chapter 4, "Installing Hardware" on page 4-1. When you install AIX, your adapter device driver automatically installs.
2. Turn the system unit power on.
3. Log in as **root**.
4. Insert the media containing the device driver software (example: CD-ROM) into the appropriate media device.
5. Type the following

```
smit devinst
```

and press Enter.
6. The Install Additional Device Software screen highlights the "**INPUT device/directory for software**" option.
7. Select or type *your input device*:
 - Press **F4** to display the input device list. Select the *name of the device* (example: CD-ROM) that you are using and press Enter.
-- or --
 - In the Entry Field, type the *name of the input device* you are using and press Enter.
8. The Install Additional Device Software window highlights the **SOFTWARE to install** option.
9. Press **F4** to display the SOFTWARE to install window.

10. Type the following to display the Find window:

/

11. Type the following

`devices.pci.00100f00`

and press Enter. (The system finds and highlights this device driver software.)

12. Press **PF7** to select the highlighted device driver software.

Screen appears. Example:

4.2.1.0 `devices.pci.00100f00` ALL

13. Press Enter.

14. The Install Additional Device Software screen displays. Entry data fields are automatically updated. Press Enter to accept the data.

15. The ARE YOU SURE window displays. Press Enter to accept the data.

16. The **COMMAND STATUS** screen appears.

- The term **RUNNING** is highlighted to indicate that the install and configure command is in progress.
- When **RUNNING** changes to **OK**, scroll down to the bottom of the page and locate the Installation Summary.
- After a successful installation, **SUCCESS** appears in the Result column of the summary at the bottom of the page.

17. Remove the installation media from the drive.

18. Press **F10** to exit SMIT.

19. Refer to your system unit documentation to shutdown your system unit.

20. Go to adapter install procedure, Chapter 4, "Installing Hardware" on page 4-1.

Chapter 4. Installing Hardware

This section provides the guidance necessary to install a PCI adapter. Before you begin, be sure you have read “Handling Static Sensitive Devices” on page vii.

To determine your adapter jumper settings, refer to Appendix B, “Jumper Settings and Multi-Adapter Configurations” on page B-1.

If you need to set the J7 jumpers on the adapter as described in Appendix B, “Jumper Settings and Multi-Adapter Configurations” on page B-1, make the change at this time.

Attention: Do not remove the PCI Single-Ended Ultra SCSI Adapter from its anti-static package at this time.

Installing the Adapter

1. Be sure you have read Chapter 2, “Preparing for Installation” on page 2-1.
 - Determine if you should install your adapter hardware first.
 - Determine if you should install your device driver software first.
 - If you should install your adapter hardware first, go to 2 and continue with this section.
 - If you should install your device driver software first, go back to Chapter 3, “Installing Device Driver Software” on page 3-1. Return here to install your hardware.
2. Refer to the User's Guide that shipped with your system unit to perform the following:
 - Shutdown your system unit.
 - Install the adapter in your system unit.
3. Go to your system unit User's guide for PCI adapter installation instructions.
4. Return here to connect your internal and/or external devices.

Connecting Internal/External Devices

While your system is shut down, perform the following to connect internal devices:

- Attach any 8-bit or 16-bit cable to the device.
- Ensure that there is a SCSI terminator on the end of the cable or that a terminator is supplied by the last SCSI device on the internal chain. If the terminator is supplied by the internal SCSI device, the internal SCSI device must be placed on the internal cable location farthest from the adapter.
- Connect the adapter end of the internal cable to the correct internal connector on the PCI Single-Ended Ultra SCSI Adapter. Use either the 50-pin internal connector, J4, or the internal 68-pin connector, J3.

Note: All the connectors are built so they can only be plugged in one way.

- Turn on both your system unit and your display. Follow any instructions on the screen.

To connect external devices:

- Connect the 68-pin connector to the external port (J2). Use the fastening screws on the cable connector to securely attach the connector to the adapter.
- Connect the other end of the cable to your SCSI device.
- If necessary, connect additional cables to additional SCSI devices.
- When all devices are connected, ensure that a SCSI terminator is attached to the last device.
- Turn on both your system unit and your display. Follow any instructions on the screen.

Verifying Adapter Available for Use

To verify that your newly installed PCI Single-Ended Ultra SCSI Adapter is available for use, follow the steps below:

1. If necessary, turn your system unit power on.
2. Log in as **root**.
3. At the prompt, type

```
lsdev -Cs adapter | grep 00100f00
```

and press Enter.
4. A list of SCSI adapters displays. Verify that the PCI Single-Ended Ultra SCSI Adapter is in Available mode. The adapter text description reads "Wide Fast-20 I/O Controller."

Note: If adapter is not available for use, go to Chapter 3, "Installing Device Driver Software" on page 3-1.

Troubleshooting

To verify that your newly installed PCI Single-Ended Ultra SCSI Adapter is available for use, go to "Verifying Adapter Available for Use."

Verify AIX 4.1 Software Installation

1. Login as **root**.
2. For 4.1 systems, type:

```
lspp -h devices.pci.00100*
```

and press Enter.
Example output follows:

Fileset	Level	Action	Status	Date	Time

Path: /usr/lib/objrepos					
devices.pci.00100100.rte					
	4.1.5.0	COMMIT	COMPLETE	02/03/97	09:42:
	4.1.5.2	COMMIT	COMPLETE	02/03/97	09:42:
devices.pci.00100f00.rte					
	4.1.5.0	COMMIT	COMPLETE	02/03/97	09:40:
	4.1.5.2	COMMIT	COMPLETE	02/03/97	09:42:

You should verify that the filesets 'devices.pci.00100100.rte' and 'devices.pci.00100f00.rte' are installed at the 4.1.5.2 level or higher.

3. Type:

```
lslpp -h devices.mca.8d77.com
```

and verify this fileset is at 4.1.5.1 or higher.

Verify AIX 4.2 Software Installation

1. Login as **root**.
2. For 4.2 systems, type:
`lslpp -h devices.pci.00100*`
and press Enter.

Example output follows:

Fileset	Level	Action	Status	Date	Time

Path: /usr/lib/objrepos					
devices.pci.00100100.com	4.2.1.0	COMMIT	COMPLETE	01/31/97	12:48:
devices.pci.00100f00.rte	4.2.1.0	COMMIT	COMPLETE	01/31/97	12:48:

3. Verify that the filesets `devices.pci.00100100.com` and `devices.pci.00100f00.rte` are at the 4.2.1.0 level or higher.
4. Type
`lslpp -h devices.common.IBM.scsi.rte`
and verify this fileset is at 4.2.1.0 or higher.
5. If the filesets are not at the correct level, you can install the software by following the *AIX Device Driver Installation* instructions or by following the instructions supplied with the installation media.

Configuring the Ultra SCSI adapter

The Ultra adapter prevents use of Ultra speeds by an external device. Ultra speeds for external devices may be enabled through the SCSI SMIT panel (below).

Enable Ultra Speed (on external devices)

1. At the command prompt, type:

```
smit scsia
```

and press Enter.

2. Select **Change / Show Characteristics of a SCSI Adapter**.

3. Select *your Ultra SCSI adapter* from the list.

Example: (This screen varies based on the adapter you select.)

```
Change / Show Characteristics of a SCSI Adapter
```

```
Type or select values in entry fields.
```

```
Enter AFTER making all desired changes.
```

```
Apply change to DATABASE only      |Entry Fields|
Description                          no
Status                               Wide/Fast-20 SCSI I/O Controller
Location                             Available
Controller type                       04-07
Adapter card SCSI ID                 53C875
BATTERY backed adapter               |7|
Negotiate after SCSI check condition  no
Wide bus enabled                     yes
SCSI bus transceiver alternative     single_Ended
Number of DMA bursts per PCI bus ownership 16
Maximum synchronous data transfer rate (mHz) 20
Enable Ultra speed on SE bus w/external cable disable
Apply change to DATABASE only        no
```

4. Select **Enable Ultra speed on SE bus with external cable**.

5. Press **F4**.

6. Select **enable**, and press Enter.

7. Press Enter.

8. If the change was successful, press **F10** to exit SMIT.

If you were not successful using “Enable Ultra Speed (on external devices)” on page 4-6, try the following:

1. Select **Apply change to DATABASE only**.
2. Press **F4** and select **yes**.
3. Press Enter.
4. Press **F10** to exit SMIT.
5. At this point, adapter and child devices must be reconfigured. At the command prompt, type
shutdown -Fr
to reboot your system.

Speeds for all devices can be controlled via the SMIT panel. Maximum speeds are 5M, 10M, or 20M data cycles per second.

Limit Adapter Speed

1. At the command prompt, type:
smit scsia
and press Enter.
2. Select **Change / Show Characteristics of a SCSI Adapter**.
3. Select *your Ultra SCSI adapter* from the list.
Note: For example, see 2 on page 4-6.
4. Select **Maximum synchronous data transfer rate (MHz)**.
5. Press **F4**.
6. Select the desired speed: **5**, or **10**, or **20** million data cycles per second, and press Enter.
7. Press Enter.
8. If the change was successful, press **F10** to exit SMIT.

If you were not successful using “Limit Adapter Speed” on page 4-7, try the following:

1. Select **Apply change to DATABASE only**.
2. Press **F4** and select **yes**.
3. Press Enter.
4. Press **F10** to exit SMIT.
5. At this point, adapter and child devices must be reconfigured. At the command prompt, type
shutdown -Fr
to reboot your system.

Appendix A. Connecting SCSI Devices to the Adapter

Planning Your SCSI Device Layout

SCSI devices are attached to a SCSI adapter in a chain. Devices in the chain can be internal (inside your system unit) or external (connected outside your system unit).

If you are connecting more than one SCSI device, it is important that you plan the layout of your SCSI chain.

Note: At each end of the SCSI chain, a terminator is required.

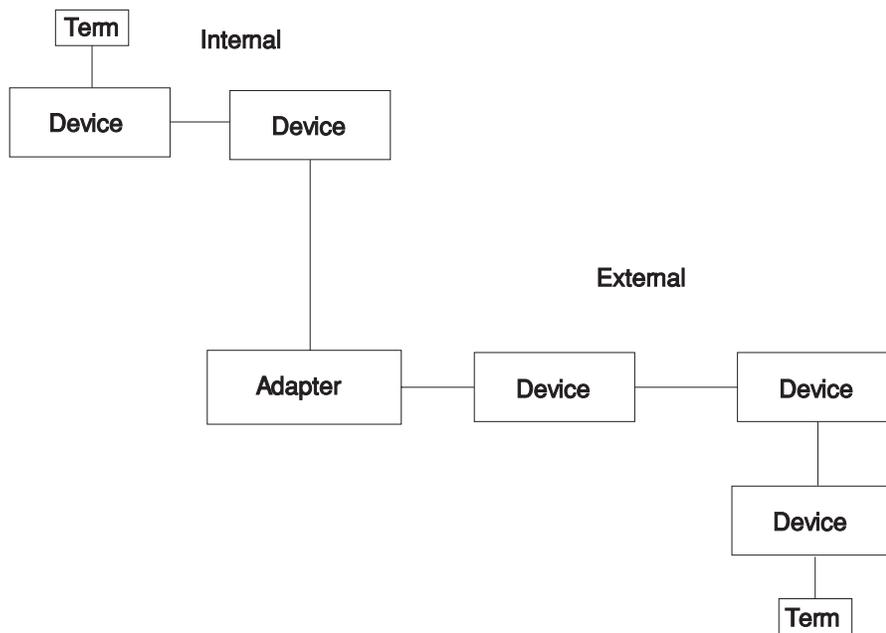


Figure A-1. SCSI Chain with Internal and External Devices

Term is the SCSI terminator on the last device or the end of the cable.

Setting SCSI Addresses

Each SCSI device requires a unique SCSI address. The address is a number from 6 through 0 for 8-bit devices or from 6 through 0 and 15 through 8 for 16-bit devices. If two SCSI devices have the same address, your system unit does not function properly. SCSI address 7 is reserved for the adapter, so additional SCSI devices can be set to addresses 6 through 0 and 15 through 8.

Determining Current SCSI Addresses

This section provides directions for installing the PCI Single-Ended Ultra SCSI Adapter.

Manufacturers use many different methods to set SCSI addresses, including jumpers, dual inline package (DIP) switches, push buttons, or dials. If your SCSI device is new, check the manual that shipped with the device to see if it specifies a default SCSI address. If one is not specified, check how SCSI addresses are set, then check the device itself for the current SCSI address. Be sure to maintain a list of all your SCSI addresses for future reference (your system unit documentation may provide a table where you can record them).

Important: Before you set the SCSI address, you must first determine which addresses are available; that is, not already in use by other SCSI devices and adapters installed in your system. Each SCSI device or adapter must have a unique address. To determine the SCSI addresses of the devices/adapters already installed, enter the following command:

```
lsdev -Cs scsi
```

This command returns the following information:

Column 1: device name (for example, scsi0)
Column 2: device status (for example, Available)
Column 3: SCSI information (the format is: *nn-nn-nn-s,b*)
Column 4: device type (for example, CD-ROM drive, 2.3GB tape drive, etc.)

The *s* in the *nn-nn-nn* returned in Column 3 is the SCSI address of the associated device. The *b* is the SCSI bus number for that device.

Record the names and SCSI addresses of your installed SCSI devices in Table A-1 on page A-3. This helps you select non-conflicting addresses for any new devices you add.

Planning SCSI Addresses

No two SCSI devices should have the same address, and no device should use the SCSI address 7. Address 7 is reserved for the adapter.

Note: SCSI addresses are not in sequential order from highest to lowest priority. Refer to Table A-1 for the priority associated with each SCSI address.

Priority	SCSI ID	Actual SCSI Device Name
Highest	7	PCI Single-Ended Ultra SCSI Adapter
	6	
	5	
	4	
	3	
	2	
	1	
	0	
	15	
	14	
	13	
	12	
	11	
	10	
V	9	
Lowest	8	

Changing SCSI Addresses

If you need to change SCSI addresses, follow the instructions supplied with each device.

Terminating the SCSI Devices and Adapter

Some SCSI devices have built-in terminators controlled by a DIP switch, jumper, or push button. Other devices use terminators on the cable. Some devices require a terminator be plugged into the device on a connector. After planning your installation, you need to supply the correct terminator to the SCSI device at each end of the chain. Refer to the device instructions to find out how it is terminated. If necessary, you should purchase terminators when you buy devices and cables.

Active terminators are required for all installations for reliable SCSI operation.

The basic rules of terminating SCSI buses are:

- Terminate the ends of the chain
- Do not terminate devices in the middle of the chain
- The adapter enables or disables its built-in terminator as required (see “Jumper Block J7” on page B-1).

Appendix B. Jumper Settings and Multi-Adapter Configurations

Jumper Settings and Multi-Adapter Configurations

The PCI Single-Ended Ultra SCSI Adapter contains built-in SCSI terminators. The adapter determines if it is in the middle of the SCSI chain or at the end of the chain. It also enables or disables the built-in terminators as required. This is accomplished by determining which cables, if any, are attached to the adapter.

Jumper Block J7: The default configuration for the adapter places all the jumper settings to OUT and is how the adapter is shipped. This configuration is for a single adapter on a SCSI chain allowing the adapter to sense where it is in the chain, in the middle or on the end. The adapter enables or disables its built-in SCSI terminator as required.

Typical installations use only one adapter with some internal or external SCSI devices. In these cases, the jumpers are left in the factory position.

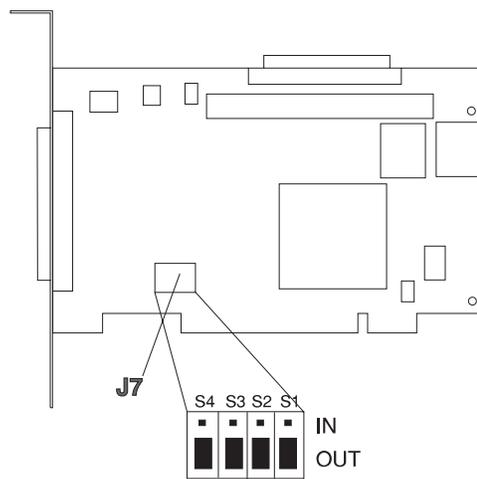
Multi-Adapter Configurations: Using more than one SCSI adapter on any single SCSI bus may require the automatic termination sensing logic to be overridden by setting the individual jumpers on jumper block J7.

The automatic sensing logic that controls the enablement and disablement of the built-in terminators detects external and internal terminators on the external and internal SCSI bus. This control logic cannot sense other built-in terminators of another adapter on the SCSI bus. For those instances, you must tell the adapters that the external cabling is in use by moving the jumpers on jumper block J7.

Switch Setting Definitions: The various switch settings and cable attachments can be combined in many different ways. The following switch setting definitions explain how the terminators are affected:

- S1** When placed in the OUT position, the termination control logic automatically determines the attachment or non-attachment of an 8-bit narrow cable and terminator.
- When placed in the IN position, the termination control logic indicates that an internal 8-bit cable and terminator is attached.
- S2** When placed in the OUT position, the termination control logic automatically determines the attachment or non-attachment of an internal 16-bit SCSI cable and terminator.
- When placed in the IN position, the termination control logic indicates that an internal 16-bit device is attached.
- S3** When placed in the OUT position, the termination control logic automatically senses an 8-bit or 16-bit SCSI cable and terminator on the external bus.
- When placed in the IN position, the termination control logic indicates that an external 8-bit SCSI cable and terminator is attached.
- This is useful in cases where an 8-bit device is incorrectly identified as a 16-bit device. This is necessary if the SCSI cable improperly grounds all unused pins, which indicates to the logic that a 16-bit cable and terminator is attached.
- S4** When placed in the OUT position, the termination control logic automatically determines that a cable and terminator are attached to the external bus. This is used in conjunction with S3 to determine whether a cable and terminator is attached and whether it is 8-bit or 16-bit.
- When placed in the IN position, the termination control logic indicates that an external device is attached. This works in conjunction with S3 to determine 8-bit or 16-bit device attachment.

When there are no cables attached, the jumpers are set to the default setting of OUT and the SCSI terminators are enabled for 16-bit SCSI. This ensures that an adapter with nothing attached has SCSI terminators enabled to pass diagnostics.



All jumpers shown in OUT position

Figure B-1. Jumper Locations and Default Settings

Setting the Device Termination

Some devices have built-in termination that are controlled by a DIP switch, jumper, or push button. Other devices use terminators on a cable or on a connector where a terminator is plugged. To determine if a device has built-in termination, refer to its documentation.

The following example shows the default configuration for jumper block J7 on the SCSI adapter. The adapter was shipped with the jumpers in this configuration. This configuration is for a single adapter on a SCSI chain. It allows the adapter to sense whether it is at the end of a SCSI chain or in the middle of a SCSI chain. The adapter then enables or disables its built-in SCSI terminators as required.

Typical installations use only one adapter and some number of internal or external SCSI devices. In these cases the jumpers are left in the factory-set default position.

Default Position of Jumper Block J7
For Automatic Termination selection

```
Jumper J7 settings  
-----  
s4  s3  s2  s1  
out out out out
```

If the adapter is on one end of the SCSI chain, you must provide a SCSI terminator at the other end of the chain after the last device. If the adapter is in the middle of the SCSI chain, you must provide a terminator at each end of the SCSI chain.

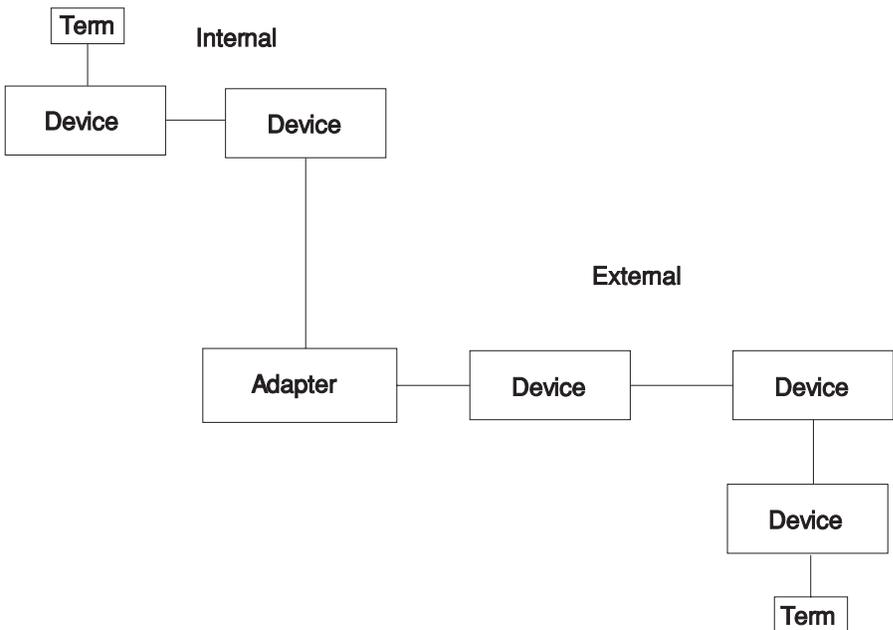


Figure B-2. SCSI Chain with Internal and External Devices

Term is the SCSI terminator on the last device or the end of the cable.

Multi-Adapter Configurations

There are configurations that use more than one SCSI adapter on any single SCSI bus. In these cases, the automatic termination sensing logic must be overridden by setting the individual jumpers S1, S2, S3 and S4 located on jumper block J7.

The automatic sensing logic, which controls the enablement or disablement of the built on terminators, works by detecting an external terminator on the external SCSI bus, or by detecting an internal terminator on the internal SCSI bus. This control logic cannot sense the built-in adapter terminators of another adapter on the SCSI bus. Therefore, in these cases, you must specify to the adapters that external cabling is in use by moving the jumpers on J7.

These configurations also require that you change the default SCSI address of additional adapters to something other than 7. All devices and adapters that share a SCSI bus must have a unique SCSI ID. The default SCSI address setting on the adapter is modified by software. Refer to the software documentation for the operating system and device driver you are using to determine how to do this.

Typical Multi-Adapter Configurations

Two system unit systems sharing internal devices located on only one of the system unit systems.

Examples and Jumper Settings

This example shows two adapters with one sharing the internal devices of the other.

In this case, adapter A has internal devices connected and adapter B has access to those devices. The internal and external cabling must be the same width.

If the internal cabling is 16-bit, the external cabling must be 16-bit. An 8-bit device can be placed on the internal bus if a 16-bit to an 8-bit interposer is used.

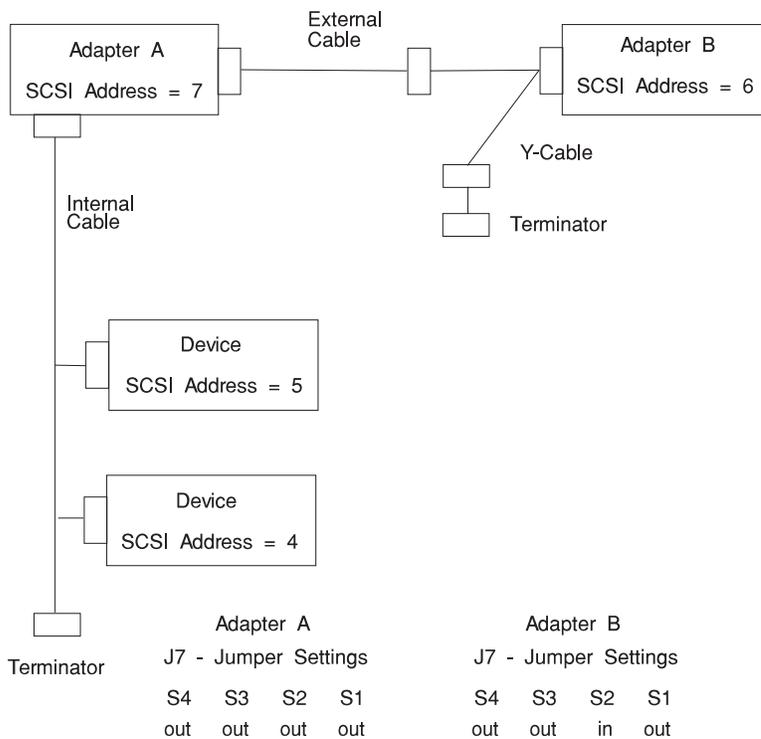


Figure B-3. Adapters Sharing Internal Devices

This example shows two adapters with one sharing the internal devices of the other, with simplified cabling.

The following shows a simplified cabling method for the previous example. This technique has a limitation: If any external cable is removed, Adapter A is not properly terminated and does not function properly. If the external cable is removed, then adapter A must have jumpers reconfigured to the factory default prior to use, or an external terminator must be placed on the external adapter A's external connector. Failure to do so may make the adapter fail intermittently and may cause adapter diagnostics to fail.

If the external cable is removed from adapter A and left attached to adapter B, adapter B may fail to function since the non-terminated cable distorts the electrical signals on the SCSI bus.

When troubleshooting or diagnosing problems with this configuration, keep in mind that when removing external cables you must first take action to properly re-terminate or move jumpers before running diagnostics.

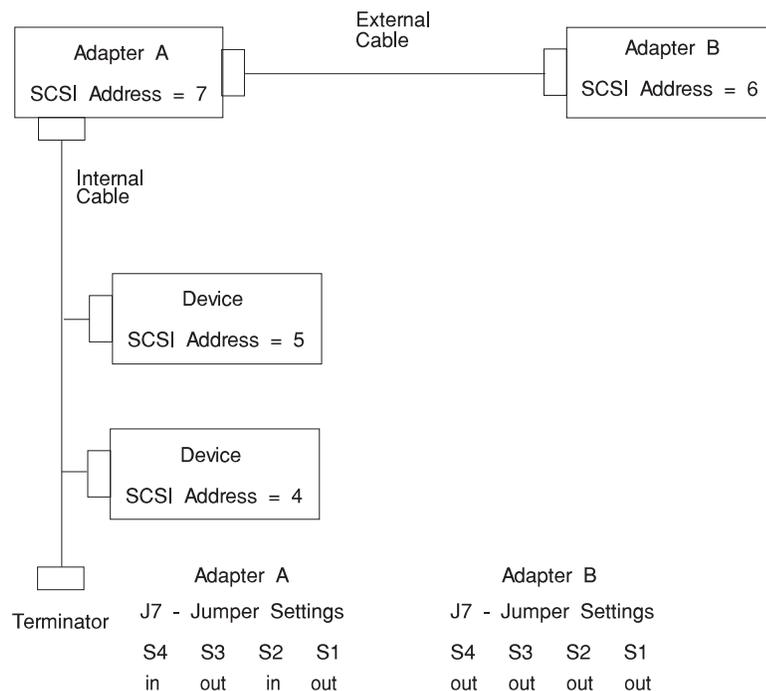


Figure B-4. Adapters Sharing Internal Devices with Simplified Cabling

Appendix C. PCI Single-Ended Ultra SCSI Adapter Bus Connectors

The PCI Single-Ended Ultra SCSI Adapter Bus Connectors supports two single-ended SCSI buses (internal and external).

There are two connectors provided for attaching to the internal SCSI bus. The 50-pin connector, shown below, is used for attaching an 8-bit SCSI cable. The 68-pin connector is used for attaching a 16-bit SCSI cable, shown on page C-3.

Note: Only one internal connector can have a cable attached at a time.

Internal 50-Position SCSI Bus Connector

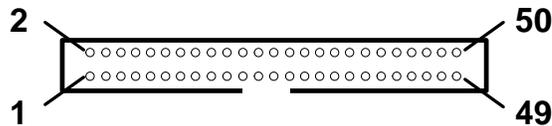


Figure C-1. Internal 50-Pin SCSI Bus Connector

Signal Name	Pin	Pin	Signal Name
Ground	1	2	-DB(0)
Ground	3	4	-DB(1)
Ground	5	6	-DB(2)
Ground	7	8	-DB(3)
Ground	9	10	-DB(4)
Ground	11	12	-DB(5)
Ground	13	14	-DB(6)
Ground	15	16	-DB(7)
Ground	17	18	-DB(P)
Ground	19	20	Ground
Ground	21	22	CPRSNT
Reserved	23	24	Reserved
Open	25	26	TERMPWR
Reserved	27	28	Reserved
Ground	29	30	Ground
Ground	31	32	-ATN
Ground	33	34	Ground
Ground	35	36	-BSY
Ground	37	28	-ACK
Ground	39	40	-RST

Signal Name	Pin	Pin	Signal Name
Ground	41	42	-MSG
Ground	43	44	-SEL
Ground	45	46	-C/D
Ground	47	48	-REQ -I/O
Ground	49	50	-SI_O

Internal, External 68-Position 16-Bit Single-Ended High-Density SCSI Bus Connector

The following table shows the pinout for the internal and external 68-pin SCSI connectors.

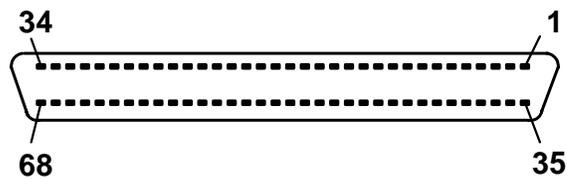


Figure C-2. Internal, External 68-Pin Connector

Signal Name	Pin	Pin	Signal Name
Ground	1	35	-DB(12)
Ground	2	36	-DB(13)
Ground	3	37	-DB(14)
Ground/CPRNST_16*	4	38	-DB(15)
Ground	5	39	-DB(P1)
Ground	6	40	-DB(0)
Ground	7	41	-DB(1)
Ground	8	42	-DB(2)
Ground	9	43	-DB(3)
Ground	10	44	-DB(4)
Ground	11	45	-DB(5)
Reserved*	12	46	-DB(6)
Ground	13	47	-DB(7)
Ground	14	48	-DB(P)
Ground	15	49	Ground
Ground	16	50	CPRNST
TERMPWR	17	51	TERMPWR
TERMPWR	18	52	TERMPWR
Reserved	19	53	Reserved
Ground	20	54	Ground
Ground	21	55	-ATN
Ground	22	56	Ground
Ground	23	57	-BSY
Ground	24	58	-ACK
Ground	25	59	-RST
Ground	26	60	-MSG
Ground	27	61	-SEL
Ground	28	62	-C/D

Signal Name	Pin	Pin	Signal Name
Ground	29	63	-REQ
Ground	30	64	-I/O
Ground	31	65	-DB(8)
Ground	32	66	-DB(0)
Ground	33	67	-DB(10)
Ground	34	68	-DB(11)

Note: * = External Connector Only

Appendix D. 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 PCI Single-Ended Ultra SCSI 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
Old Orchard Road
Armonk, New York 10504
Telephone: (919) 543-2193

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 respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Canadian Department of Communications Compliance Statement

This Class B digital apparatus meets the requirements of the Canadian Interference-Causing Equipment Regulations.

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。

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

This is a Class B product based on the standard of the Voluntary Control Council for Interference from Information Technology Equipment (VCCI). If this is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.

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.

Part Number: 93H5604

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