PCI Differential Ultra SCSI Adapter Installation and User's Guide

Third Edition (April 1997)

Contents

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 the Adapter

Attention: Static electricity can damage this adapter and your system unit. To avoid damage, keep your adapter in its static protective bag until you are ready to install. 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 adapter carefully; hold it by its edges.

- Do not touch any exposed printed circuitry.

- Prevent others from touching the components or the adapter card.

- During installation, touch the static-protective package containing the adapter to a metal expansion-slot screw or other unpainted metal surface on the computer for at least 2 seconds. (This drains static electricity from the package and from your body.)

- When possible, remove the adapter and install it directly into the computer without setting it down. Otherwise, place the adapter (component side up) on the static-protective bag on a flat surface until the adapter card is installed.

- Do not place the adapter on the computer cover or on a metal table.

About This Book

Use this book with your system unit documentation to install the PCI Differential 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.
- PowerPC is a trademark of International Business Machines Corporation.

Chapter 1. Overview

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

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

SCSI differential terminators are provided in sockets.
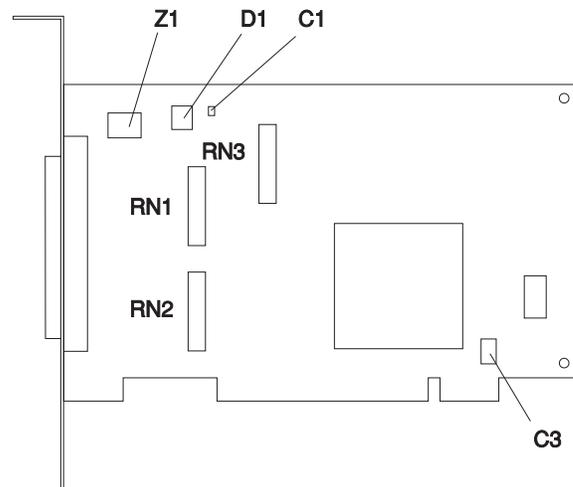
Figure   1-1. SCSI Connectors

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

Software Requirements

The PCI Differential 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 Differential 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).

Inventory

To install the PCI Differential Ultra SCSI Adapter, you need:

- The adapter.
- This document, *PCI Ultra Differential 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:

- External cables.
- A Differential 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.
- To attach an 8-bit device use 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 total cable length to 25 meters (approximately 80 feet). Total SCSI chain cable length includes internal and external cabling.

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 the Adapter" on page vii.

Attention: Do not remove the PCI Differential 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 external devices.

Connecting External Devices

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 Differential 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 Differential Ultra SCSI Adapter is in `Available` mode. The adapter text 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 Differential 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:

   `lslpp -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.

Appendix A. Multi-Adapter Configurations

Multi-adapter configurations use more than one SCSI adapter on any single SCSI bus. In some of these cases you may need to physically remove the SCSI differential terminators from their sockets.

These configurations also require that you change the default SCSI ID of additional adapters to something other than 7. All devices and adapters which share a SCSI bus must have a unique SCSI ID. The default SCSI ID 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

Since the adapter only supports external devices, the typical multi-adapter configuration consists of two or more computer systems sharing the same external devices.
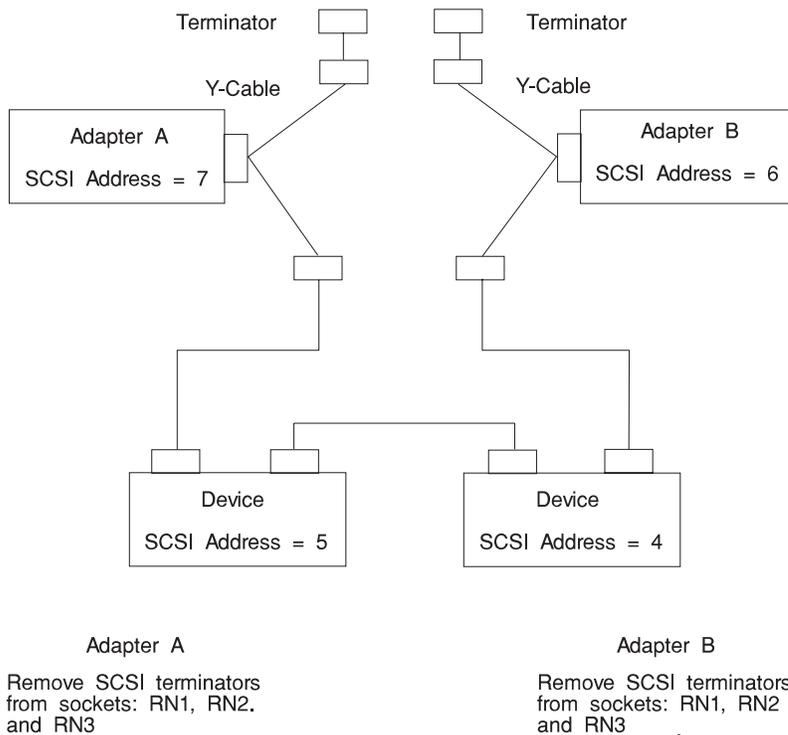
Two adapters sharing the same external devices


```
        Terminator   ▭           ▭   Terminator
                     ▭           ▭
            Y-Cable                     Y-Cable
    ┌──────────────────┐        ┌──────────────────┐
    │    Adapter  A    │        │    Adapter  B    │
    │ SCSI Address = 7 │        │ SCSI Address = 6 │
    └──────────────────┘        └──────────────────┘


          ▭                             ▭


    ┌──────────────────┐        ┌──────────────────┐
    │     Device       │        │     Device       │
    │ SCSI Address = 5 │        │ SCSI Address = 4 │
    └──────────────────┘        └──────────────────┘
```

Adapter A

Remove SCSI terminators
from sockets: RN1, RN2.
and RN3

Adapter B

Remove SCSI terminators
from sockets: RN1, RN2
and RN3   .

Figure   A-1. Sharing external devices with Y-cables.

If a Y-Cable is removed from one adapter, the other adapter can still use the SCSI
bus since the bus remains properly terminated because the Y-cable is still attached
to the SCSI bus and has a terminator attached. The adapter which had the Y-cable
removed is no longer terminated and may fail diagnostics. In order to run
diagnostics, replace RN1, RN2 and RN3 or simply attach a wide differential SCSI
terminator to the adapter's external connector from which the Y-cable was removed.

Two adapters sharing the same external devices, simplified: In this case
leave the differential SCSI terminators in their sockets. However, if the adapter to
device cables are removed, the SCSI bus is no longer terminated and the SCSI bus
does not function properly.
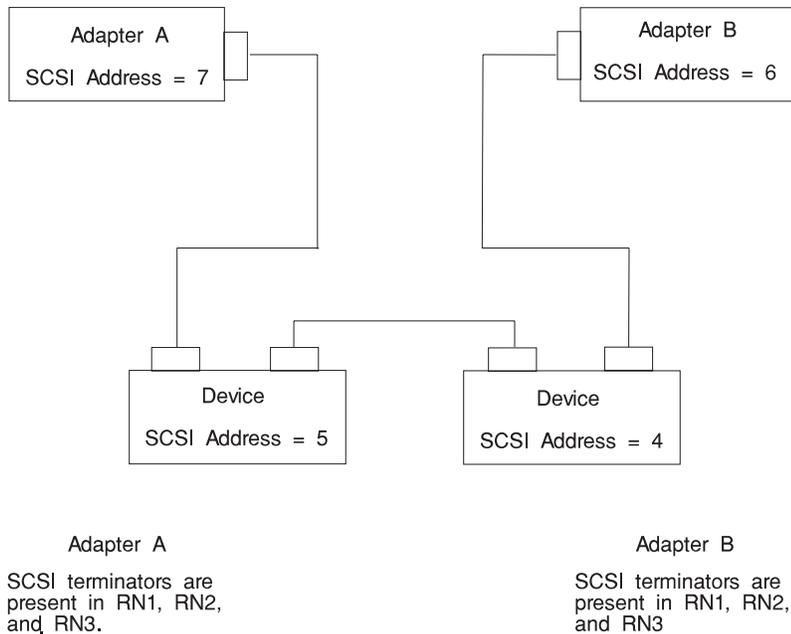
Figure   A-2.   *Sharing external devices without Y-cables*

Three adapters sharing the same external devices: In the above example if any adapter to device cable is removed from an adapter, the SCSI bus does not function properly unless it is re-terminated. Do not attempt to operate or run diagnostics on the SCSI bus with any dangling or unconnected cables in the chain.

However, diagnostics may be run on any adapter which has its cable disconnected from its external connector without the need to place a terminator on the adapter's external port.

Three adapters sharing the same external devices

Figure   A-3.   Three adapters sharing external devices with Y-cables

In this example, any Y-cable may be removed from any adapter and the SCSI bus remains properly terminated and functional for the remaining adapters. Since all terminators have been removed from their sockets, the adapter removed from the SCSI bus must have the terminators replaced or a terminator placed on its external connector before running diagnostics.
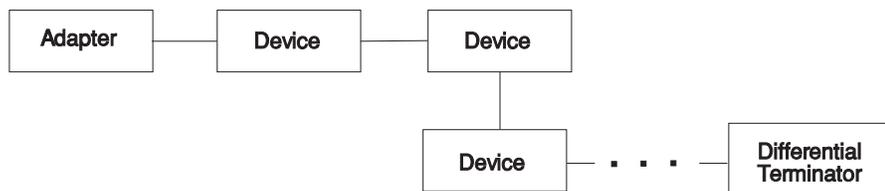
Appendix B. Planning your SCSI Device Layout

SCSI devices are attached to a SCSI adapter in a chain. If you are connecting more than one SCSI device, it is important that you plan the layout of your SCSI chain.

External Devices Only

Setting SCSI Addresses

Each SCSI device requires a unique SCSI address; a number from 0 to 7 for narrow devices or from 0 to 15 for wide 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 may set to address 6 through 0 and 15 through 8.

Determining Current SCSI Addresses

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 its manual 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 include a table to record the settings you choose).

Important: Before you set the SCSI addresses, you must first determine which addresses are available; that is, not already in use by other SCSI devices and adapers 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-s,b* string 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 B-1. This helps you select non-conflicting addresses for any new devices you add.

Planning SCSI Addresses

Make sure no two SCSI devices have the same address, and that no device uses the SCSI address 7, which is reserved for the adapter.

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

Table B-1. Data Access Priorities for SCSI Adresses		
Priority	**SCSI ID**	**Actual SCSI Device Name**
Highest	7	PCI Differential 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 in the documentation 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 must 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.

The basic rules of terminating SCSI buses are:

- Terminate the ends of the chain
- Do not terminate devices in the middle of the chain
- Terminating this adapter requires manual intervention.

  Note: User must either leave in or remove terminators from sockets RN1, RN2, or RN3.

Appendix C. PCI Differential Ultra SCSI Adapter Bus Connectors

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

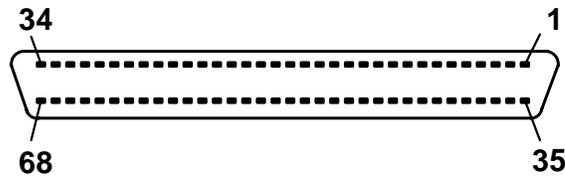The following table shows the pinout for the external 68-pin SCSI connectors.

Figure   C-1. External 68-Pin Connector

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

Signal Name	Pin	Pin	Signal Name
RST	25	59	-RST
MSG	26	60	-MSG
SEL	27	61	-SEL
C/D	28	62	-C/D
REQ	29	63	-REQ
I/O	30	64	-I/O
DB(8)	31	65	-DB(8)
DB(0)	32	66	-DB(0)
DB(10)	33	67	-DB(10)
DB(11)	34	68	-DB(11)

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 Differential 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 Réglement 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，第二種情報装置（住宅地域又はその隣接した地域において使用されるべき情報装置）で住宅地域での電波障害防止を目的とした情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）基準に適合しております。

しかし，本装置をラジオ，テレビジョン受信機に近接してご使用になると，受信障害の原因となることがあります。

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 equipment is in the Class 2 category (information equipment to be used in a residential area or an adjacent area thereto) and conforms to the standards set by the Voluntary Control Council For Interference by Data Processing Equipment and Electronic Office Machines aimed at preventing radio interference in such residential area.

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: 93H5626

93H5626