

POWER GXT4000P and POWER GXT6000P Graphics
Adapter

Installation and Using 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.

First Edition (September 2000)

Before using this information and the product it supports, read the information in "Safety Information" on page v and "Appendix B. Notices" on page 25.

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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 anti-static protective bag until you are ready to install it. To reduce the possibility of electrostatic discharge, follow the precautions listed below:

- 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 POWER GXT4000P or the POWER GXT6000P graphics adapter with its associated device driver software.

ISO 9000

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

Related Publications

The following publications contain related information:

- System unit documentation for information specific to your hardware configuration
- Operating system documentation for information specific to your software configuration

This documentation is located on the AIX V4.3 documentation CD. The documentation information is made accessible by loading the documentation CD onto the hard disk or by mounting the CD in the CD-ROM drive.

- *PCI Adapter Placement Reference Guide* (for the latest version, you may need to contact your marketing representative)
- *Adapters, Devices, and Cable Information for Multiple Bus Systems* (for the latest version, you may need to contact your marketing representative)

Trademarks

The following terms are trademarks of International Business Machines Corporation in the United States, other countries, or both:

- AIX
- POWER GXT4000P
- POWER GXT6000P

Other company, product, and service names may be trademarks or service marks of others.

Chapter 1. Overview

The POWER GXT4000P and POWER GXT6000P graphics adapters are single card adapters that attach to your system unit in a PCI bus slot. The PCI bus interface provides 64 bit, 66MHz (50MHz systems) and bus master support and requires 3.3 volt power. These adapters provide 3D graphics acceleration. Connection to the video monitor is made through a DVI (Digital Video Interface) connector.

Refer to the *PCI Adapter Placement Reference* for supported system units and supported slot locations.

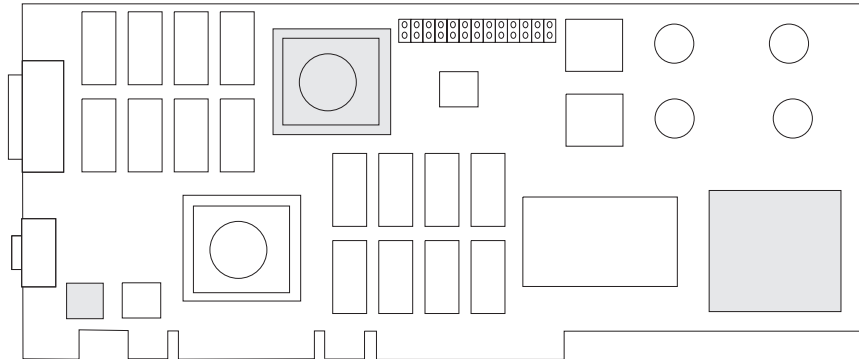


Figure 1. POWER GXT6000P Top View; (POWER GXT4000P does not include shaded technology)

Note: Be sure to retain your proof of purchase as it might be required to receive warranty service.

The POWER GXT4000P Adapter supports the following:

- 24 bit double-buffered up to 1920x1200
- 8 bit double-buffered alpha
- 4/8 bit overlay double-buffered
- 8 bits of window IDs
- 24 bit Z-buffer
- 8 bit stencil/clip planes
- OpenGL 1.2, graPHIGS, GLX 1.3, X 11R6
- 3D Acceleration:
 - Depth Buffering
 - Antialiasing
 - Gouraud shading
 - Fog and atmospheric effects
 - Stencil test
 - Alpha test

- Blending
- Dithering
- Texture mapping:
 - 108MB Texture Memory (1280x1024)
 - Dual Textures
 - 3D Texture
- Display resolution:
 - 640x480x24@85Hz
 - 1024x768x24@85Hz
 - 1280x1024x24@85Hz
 - 1600x1200x24@85Hz
 - 1920x1200x24@76Hz
 - 1280x1024x24@120Hz (quad BFR stereo)
 - 2048x1536x24@60Hz (Analog only)
 - (including monitors that comply with ISO 9241, Part 3 Std.)
- Stereo viewing

The POWER GXT6000P Adapter supports the following:

- 24 bit double-buffered up to 1920x1200
- 8 bit double-buffered alpha
- 4/8 bit overlay double-buffered
- 8 bits of window IDs
- 24 bit Z-buffer
- 8 bit stencil/clip planes
- OpenGL 1.2, graPHIGS, GLX 1.3, X 11R6
- 3D Acceleration:
 - Depth Buffering
 - Antialiasing
 - Gouraud shading
 - Fog and atmospheric effects
 - Stencil test
 - Alpha test
 - Blending
 - Dithering
- Texture mapping:
 - 108MB Texture Memory (1280x1024)
 - Dual Textures
 - 3D Texture
 - Texture Color Table
- Display resolution:

- 640x480x24@85Hz
 - 1024x768x24@85Hz
 - 1280x1024x24@85Hz
 - 1600x1200x24@85Hz
 - 1920x1200x24@76Hz
 - 1280x1024x24@120Hz (quad BFR stereo)
 - 2048x1536x24@60Hz(Digital and Analog)
(includes monitors that comply with ISO 9241, Part 3 Std.)
- Stereo viewing
 - Hardware Geometry Acceleration and Lighting

Software Requirements

The POWER GXT4000P and the POWER GXT6000P are supported on AIX Version 4.3.3 with AIX 4.3.3.0-05 Recommended Maintenance package. If support is required on an AIX release other than AIX 4.3.3, ensure that this adapter is supported on that release of AIX prior to installation. Contact your support representative for assistance.

OpenGL requires the OpenGL 1.2. for AIX, Version 4.3.3 Licensed Program Product (5696-939). If support is required on an AIX release other than AIX 4.3.3, ensure that this adapter is supported on that release of AIX prior to installation. Contact your support representative for assistance.

graPHIGS requires the graPHIGS for AIX, Version 4.3.3 Licensed Program Product (5696-907). If support is required on an AIX release other than AIX 4.3.3, ensure that this adapter is supported on that release of AIX prior to installation. Contact your support representative for assistance.

Chapter 2. Preparing for Installation

This chapter helps you prepare to install the POWER GXT4000P or the POWER GXT6000P graphics adapter.

Note: If AIX is not installed on your system unit, install your graphics adapter before you install the operating system. (See “Chapter 4. Installing the POWER GXT4000P and POWER GXT6000P Graphics Adapter” on page 9.) When you install AIX, your device driver software automatically installs.

If AIX is operating on your system, install your device driver software before you install your graphics adapter. (See “Chapter 3. Installing Device Driver Software” on page 7.)

Checking Prerequisites

To install the POWER GXT4000P or the POWER GXT6000P graphics adapter, make sure you have the following on hand:

- The adapter
- This document, *POWER GXT4000P and POWER GXT6000P Graphics Adapter Installation and Using Guide*
- The user's guide for the system unit
- The operating system documentation
- *PCI Adapter Placement Reference*
- A flat-blade screwdriver or a 5mm nut driver
- Media containing the device driver software

Chapter 3. Installing Device Driver Software

This chapter explains how to install the device driver software.

Be sure you have read “Chapter 2. Preparing for Installation” on page 5 to determine:

- If you should install your device driver software first, go to step 1 and continue with this section.
- If you should install your graphics adapter hardware first, go to “Chapter 4. Installing the POWER GXT4000P and POWER GXT6000P Graphics Adapter” on page 9. When you install AIX, your graphics adapter device driver automatically installs.

To install the device driver software on an AIX system, do the following:

1. Turn on the system unit power.
2. Log in as **root** user.
3. Insert the media containing the device driver software (example: CD-ROM) into the appropriate media device.
4. Type the following System Management Interface Tool (SMIT) fast path:
`smitty devinst`
5. Press Enter. The Install Additional Device Software screen highlights the **INPUT device/directory for software** option.
6. 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. The Install Additional Device Software window highlights the **SOFTWARE to install** option.
7. Press **F4** to display the SOFTWARE to install window.
8. Type the following to display the Find window:
`/`
9. Type the following for POWER GXT4000P:
`devices.pci.14106E01`

OR
10. Type the following for POWER GXT6000P:
`devices.pci.14107001`

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

Example:

```
devices.pci.14107001
```

11. Press **PF7** to select the highlighted device driver software and press Enter.

12. The Install Additional Device Software screen displays. Entry data fields are automatically updated. Press Enter to accept the data.
13. The ARE YOU SURE window displays. Press Enter to accept the data.
14. 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 will appear in the Result column of the summary at the bottom of the page.
15. Remove the installation media from the drive.
16. Press **F10** to exit SMIT.
17. Go to graphics adapter install procedure, “Chapter 4. Installing the POWER GXT4000P and POWER GXT6000P Graphics Adapter” on page 9.

Chapter 4. Installing the POWER GXT4000P and POWER GXT6000P Graphics Adapter

This chapter explains how to install the graphics adapter. Before you begin, be sure you have read “Handling Static-Sensitive Devices” on page vii.

Attention: Do not remove the POWER GXT4000P or POWER GXT6000P 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 5 to determine:
 - If you should install your graphics 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 7. Return here to install your hardware.
 - If you should install your POWER GXT4000P or POWER GXT6000P Graphics adapter as a second graphics adapter and you have only one display, leave the display attached to the original adapter when you first turn on the system power. This enables you to redirect the console to the new graphics adapter during the power on sequence.
2. Refer to the User’s Guide that shipped with your system unit to perform the following:
 - Shut down your system unit
 - Install the graphics adapter in your system unit

Refer to the *PCI Adapter Placement Reference* to identify supported installation slots for a POWER GXT4000P or POWER GXT6000P adapter. Return here to complete the process.

Attention: Failure to install your graphics adapter in the correct slot can cause your adapter or system unit to function incorrectly.
3. After you have completed the basic installation, connect your keyboard and mouse to the system unit and connect your video cable to the graphics adapter.

If only one display is available during installation and you are installing the POWER GXT4000P or POWER GXT6000P as the second graphics adapter, the display must be connected to the original graphics adapter so that you can redirect the console to the new graphics adapter.

Attention: If you are attaching a display which has a 15-pin D-shell connector, the Digital Video Interface (DVI) to 15-pin D-shell converter supplied with the adapter must be used.
4. Turn on both your system unit and your display. Follow any instructions on the screen.

5. A **select display** (console) icon appears on your screen. Press the number key (for example, 1 or 2) on your keyboard of the monitor you want to be your default display.

Note: If you are planning to run applications such as OpenGL 1.2, GLX 1.3, graPHIGS, or X 11R6, be sure to install the appropriate level of the licensed program after you install the POWER GXT4000P or POWER GXT6000P Adapter.

Troubleshooting

You can often resolve initial installation problems by following a few basic troubleshooting steps in the order below:

- Checking Cables
- Checking Installed Software (lspp)
- Checking Console (possibly redirect)
- Checking Installed Hardware (lsdev)

Checking Cables

1. Ensure your cables are connected to the correct adapter.
 - If you have more than one display adapter, be sure that each adapter is connected to a display.
 - Verify the cable connection to your video monitor is made through a DVI connector. (For detailed connector information, go to *Adapters, Devices, and Cable Information for Multiple Bus Systems* if you received this book with your system unit.)
2. If no login prompt appears, restart your system unit.
3. If the system responds with a login prompt, continue with the troubleshooting verifications.

Verifying AIX Software Installation

1. Verify the device driver for the POWER GXT4000P or POWER GXT6000P is installed as follows:
 - Log in as **root** user.
 - Type the following:

```
lspp -l all | grep GXT4000P
```
 - Press Enter.
2. If the POWER GXT4000P device driver is installed, the following is an example of the data that displays if you are running AIX Version 4.3.3:

```
devices.pci..X11 4.3.3.0 COMMITTED AIXwindows GXT4000P
devices.pci..diag 4.3.3.0 COMMITTED GXT4000P Graphics
devices.pci..rte 4.3.3.0 COMMITTED GXT4000P Graphics
```
3. If the POWER GXT4000P or POWER GXT6000P device driver did not install, return to “Chapter 3. Installing Device Driver Software” on page 7.

Checking Console

1. If you continue to experience problems, it may be necessary to redirect the device console to the new adapter using the *chdisp* command. Refer to your operating system documentation for instructions.
2. If you have checked your cables, tried the **chdisp** command and continue to experience problems, run diagnostics. Refer to your operating system documentation for instructions.

Verifying AIX Hardware Installation

1. To verify that your system unit recognizes the POWER GXT4000P or POWER GXT6000P adapter, type the following:

```
lsdev -Cs pci
```

Press Enter.

2. If the POWER GXT4000P or POWER GXT6000P adapter did install, the following is an example of the data that displays on your screen if installing the POWER GXT4000P adapter:

```
Available 04-02 GXT4000P Graphics Adapter
```

3. If the message on your screen indicates your adapter is Defined instead of Available, shut down your machine. Check the POWER GXT4000P or POWER GXT6000P adapter to ensure that it is installed correctly.
4. If the POWER GXT4000P or POWER GXT6000P adapter did not install, return to "Chapter 4. Installing the POWER GXT4000P and POWER GXT6000P Graphics Adapter" on page 9.

If you continue to experience problems, it may be necessary to call your system support organization. Refer to your operating system documentation for instructions.

Chapter 5. Display Information

The POWER GXT4000P and POWER GXT6000P graphics adapters support Video Electronics Standards Association (VESA), Display Power Management Signalling (DPMS).

Changing Resolution and Refresh Rates

To change the resolution and refresh rates for X or CDE sessions, complete the following steps:

1. Turn on your system unit power.
2. Log in as **root** user.
3. Type the following:
smit

Press Enter.
4. From the System Management screen, select **Devices** and press Enter.
5. Select **Graphic Displays** and press Enter.
6. Select **Select the Display Type**.
7. Select the **POWER GXT4000P or POWER GXT6000P Graphics Adapter** and press Enter.
8. Press **PF4** for a list of Display Types supported.
9. Select the desired type and press Enter.

Note: If POWER GXT4000P or POWER GXT6000P detects a Data Display Channel (DDC) monitor, default is your only SMIT screen option.

For DDC monitor users, pressing PF4 here results in an information message that states the popup is not available for this entry field. Press **PF3** to return to the Graphics Display screen. Select **Display Resolution and Refresh Rate**. Resume process of non-DCC monitor user at step #12 below.

10. In Select the Display Type screen, notice the Select Display Type field data has been updated. Press Enter.
11. Press **PF3** twice to return to the Graphics Display screen.
12. Select **Select the Display Resolution and Refresh Rate** and press Enter.
13. From the Graphics Adapter screen, select the **GXT4000P or GXT6000P Graphics Adapter** and press Enter.
14. Press **PF4** for a list of Resolution and Refresh Rates that are supported.
15. Select the desired rate and press Enter.

Note: Your X session or CDE session will run at the rate that you specified the next time that you start one of these sessions.

16. Press **F10** to exit SMIT.

Chapter 6. Software Application Considerations

This chapter discusses operating system tasks related to the POWER GXT4000P or POWER GXT6000P graphics adapters.

Starting the Server in Overlay and Color Planes

The X server can create windows in a separate set of frame buffer planes called *overlays*. The X server supports this task by defining distinct visuals for the overlay and color planes.

The **-layer n** parameter for **xinit** gives the system the ability to select the hardware frame buffer planes in which to run the X server. A value of:

- 0 indicates the color plane.
- 1 indicates the overlay plane (default).

These are the only valid choices. All other choices default to layer 1.

Start the X server in the color planes by selecting one of the three examples:

- `xinit -- -layer 0<other flags>`
- `xinit -- -layer 1<other flags>`
or
- `xinit --<other flags>`

Starting the X Server for the 3D APIs

Following are **xinit** options that take advantage of 3D hardware capabilities. These options are required to run the 3D application programming interfaces (APIs).

API for GLX 1.3

Starting the X server for the GLX API requires an additional parameter `-x GLX.LI`. For example:

```
xinit -- -x dbe -x abx -x GLX<other flags>
```

API for OpenGL 1.2

Starting the X server for the OpenGL 1.2 API requires no additional parameters. For example:

```
xinit -- -x abx -x dbe <other flags>
```

API for graPHIGS

Using the visual associated with the window, graPHIGS supports creating gP windows as 8-bit Indexed, 24-bit TrueColor, or 24-bit DirectColor. Additionally, the gP window **must** be created in the color planes and for the best performance, it is recommended

that the X window (root window when the X server is started) be created in the overlay planes. In support of echoes, graPHIGS creates a child window in the overlay planes on behalf of the application.

The gP window can be created in either of two ways::

- By the application. The application passes the window ID to graPHIGS through the **XWINDID** procopt.

OR

- By graPHIGS when the workstation is created.

At its creation, the visual associated with the gP window is selected as follows:

- A visual can be specifically selected by the application from the supported visuals for the color planes by the **XGetVisualInfo** function and passed to the **XCreateWindow** function to create the gP window in the color planes.

In this case, start the X server in the overlay planes as follows:

```
xinit -- -x dbe -x abx
```

Within your application, select the desired visual and pass it to the **XCreateWindow** function.

This creation method is designed for optimum performance. The X server starts in the overlay planes while the gP runs in the color planes. Windows in different planes do not cause expose events to each other, forcing redraws.

If your application is not written to select a visual, you must alter your application.

A sample program, **windsamp**, and a **README** file are available to show how an application selects the desired visual and creates a gP window. Locate this information in the **/usr/lpp/graPHIGS/samples/windsamp** directory.

- Your application may default to using the visual associated with the root window (the window created when the X server was started) by not passing a selected visual to the **XCreateWindow** function.

Start the X server in the color planes and select one of the three graPHIGS supported visuals for the root window:

- Select the 8-bit visual:

```
xinit -- -x dbe -x abx -layer 0
```

- Select the 24-bit DirectColor visual:

```
xinit -- -x dbe -x abx -layer 0 -d 24 -cc DirectColor
```

- Select the 24-bit TrueColor visual:

```
xinit -- -x dbe -x abx -layer 0 -d 24 -cc TrueColor
```

This method requires no change to your application, but is not designed to produce the best performance. Because the X server and graPHIGS are both running in the color planes, graPHIGS must handle exposure events from manipulating the X windows, forcing more graPHIGS redraws.

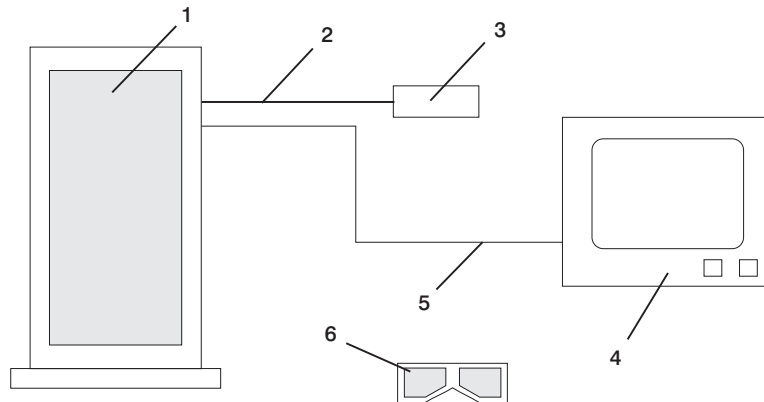
If the application chooses to create its own window and it is not the top-level window, a Window Manager Install property must be added when creating the window. This property allows a color map to be installed for the graPHIGS child window in the overlays and is created to support echoes.

Chapter 7. Stereo-Ready System Unit, Sync and Power-Supplied

The POWER GXT4000P and POWER GXT6000P graphics adapter are stereo-ready (sync- and power-supplied) and require attachment of a stereo device such as StereoGraphics CrystalEyes Stereoscopic System. This system comes complete with eyewear (model CE-PC) and emitter (ENT REV B or higher).

Note: Use only an emitter that has a permanently attached cable and no connectors or switches on the rear. This emitter is manufactured to work with the POWER GXT4000P or POWER GXT6000P graphics adapter.

Emitter models that have only a DB-9 connector cannot be used with the POWER GXT4000P or POWER GXT6000P.



- 1 Graphics System Unit
- 2 Emitter Cable
- 3 Emitter
- 4 Monitor
- 5 Video Display Cable
- 6 Eyewear

In this configuration, both sync signal and power are supplied by the adapter to the emitter.

1. Connect the end of the emitter cable to the 3-pin mini-jack on the POWER GXT4000P or POWER GXT6000P adapter.
2. Connect the video display cable from the adapter to the monitor.
3. Attach your stereo cable to your graphics adapter prior to powering on your system unit.

Note: Omission of this step trips the fuse. To reset a tripped fuse, power off the system unit and wait approximately 15 minutes for the fuse to return to its base value.

The following table lists only the stereo options supported by POWER GXT4000P and POWER GXT6000P.

Option	Default Setting	Related Interface Function
Set Stereo Mode	Non-applicable	VidMode
Query Stereo Mode	Non-applicable	VidQueryMode

Using the X_STEREO Environment Variable

The **-stereo** flag can only be used in AIX Version 4.3.3 or later. Nonsupported screens ignore the **X_STEREO** environment variable. If the environment variable is set to TRUE or the **-stereo** flag is set in AIX 4.3.3, double-buffer stereo will be enabled.

Supported screens will configure the adapter to provide the best available support for stereo. This can decrease other resources, such as texture memory. The actual amount of memory affected is device-dependent, and can be influenced by other factors, such as screen resolution or default pixel depth.

The **X_STEREO** environment variable should be exported in the **/usr/lpp/X11/defaults/xserverrc** file. The example is similar to the following:

```
export X_STEREO=TRUE
-STEREO[:display name or display number]
```

Configure the graphics adapter for optimum stereo support for the screen that is specified by **:display**.

The **:display** parameter is optional but useful when using the multihead option. The **:display** parameter is the name of the display as shown in the **lsdisp** command. If no display number or name is supplied, the **-stereo** flag pertains to all supported screens.

Non-supported screens ignore the **-stereo** flag.

Appendix A. 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 POWER GXT4000P and POWER GXT6000P have 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



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 conforme 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

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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.

Appendix B. Notices

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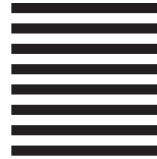
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