



N2225 and N2226 SAS/SATA HBAs for IBM System x

User's Guide

IBM P/N: 00FH247

First Edition (April 2014)

© **Copyright IBM Corporation 2014.**

US Government Users Restricted Rights -- Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.

Table of Contents

Safety	2
N2225 and N2226 SAS/SATA HBAs for IBM System x Hardware User's Guide	6
1 Overview	6
2 HBA Features	6
2.1 N2225 HBA Features	6
2.2 N2226 HBA Features	6
3 Functional Descriptions	7
3.1 PCI Express Interface	7
3.2 SAS Interface	7
4 Operating System Support	7
5 HBA Characteristics	7
5.1 Flash	7
5.2 LED	7
5.3 Connectors	8
5.4 Physical Characteristics	8
5.5 Electrical Characteristics	9
5.6 Thermal and Atmospheric Limits	9
6 HBAs Certifications and Safety Characteristics	10
7 Hardware Installation Instructions	11
8 Replaceable HBA Components	13
Appendix A: Getting Help and Technical Assistance	14
A.1 Before You Call	14
A.2 Using the Documentation	14
A.3 Getting Help and Information from the World Wide Web	15
A.4 Software Service and Support	15
A.5 Hardware Service and Support	15
A.6 IBM Taiwan Product Service	15
Appendix B: Notices	16
B.1 Trademarks	17
B.2 Important Notes	17
B.3 Documentation Format	18
B.4 Electronic Emission Notices	18

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安裝本產品之前，請仔細閱讀 **Safety Information (安全信息)**。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας (safety information).

.תפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

Youq mwngz yungh canjbinj neix gaxgong, itdingh aeu doeg aen
canjbinj soengq cungj vahgangj ancien siusik.

مەزكۆر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

ཐོན་རྐྱེན་འདི་བདེ་སྤྱོད་མ་བྱས་གོང་། རྫོང་གྱི་ཡིད་གཟབ་བྱ་འདྲ་མིན་ཡིད་བའི་འོད་ལྗན་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

●
●
●
●
●
●
●
●
●
●

Important:

Each caution and danger statement in this document is labeled with a number. This number is used to cross reference an English-language caution or danger statement with translated versions of the caution or danger statement in the *Safety Information* document.

For example, if a caution statement is labeled "Statement 1," translations for that caution statement are in the *Safety Information* document under "Statement 1."

Be sure to read all caution and danger statements in this document before you perform the procedures. Read any additional safety information that comes with the server or optional device before you install the device.

This device is intended for use with UL Listed IBM devices.

Statement 1:



DANGER

Electrical current from power, telephone, and communication cables is hazardous.

To avoid a shock hazard:

- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- Connect all power cords to a properly wired and grounded electrical outlet.
- Connect to properly wired outlets any equipment that will be attached to this product.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.

To Connect:

1. Turn everything OFF.
2. First, attach all cables to devices.
3. Attach signal cables to connectors.
4. Attach power cords to outlet.
5. Turn device ON.

To Disconnect:

1. Turn everything OFF.
2. First, remove power cords from outlet.
3. Remove signal cables from connectors.
4. Remove all cables from devices.

Statement 3:



CAUTION:

When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:



DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.



Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

Statement 8:



CAUTION:

Never remove the cover on a power supply or any part that has the following label attached.



Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Statement 28:



CAUTION:

The battery is a lithium ion battery. To avoid possible explosion, do not burn the battery. Exchange it only with the approved part. Recycle or discard the battery as instructed by local regulations.

N2225 and N2226 SAS/SATA HBAs for IBM System x Hardware User's Guide

1 Overview

The N2225 and N2226 SAS/SATA HBAs for IBM® System x® are Serial Attached SCSI (SAS) host bus adapters (HBAs) that provide high-performance external storage connectivity for servers and workstations. The N2225 HBA provides eight lanes of 12Gb/s SAS connectivity and is matched with eight lanes of PCIe 3.0 8Gb/s performance. The N2226 HBA provides sixteen lanes of 12Gb/s SAS connectivity and is matched with eight lanes of PCIe 3.0 8Gb/s performance. These HBAs are based on the Fusion-MPT™-architected LSI SAS 3008 controller that integrates the latest enhancements in PCIe 3.0 technology and 12Gb/s SAS technology.

The HBAs have onboard Flash memory for the firmware.

2 HBA Features

The following sections list the HBAs features.

2.1 N2225 HBA Features

- Implements one LSI SAS 3008 eight-port 12Gb/s SAS to PCIe 3.0 controller
- Supports eight-lane, full-duplex PCIe 3.0 performance
- Supports eight external 12Gb/s SATA+SAS ports
- Supports SATA link rates of 3Gb/s and 6Gb/s
- Supports SAS link rates of 3Gb/s, 6Gb/s, and 12Gb/s
- Provides two x4 external mini-SAS HD connectors (SFF-8644)
- Supports passive copper cables
- Supports up to 1024 SATA or SAS end devices
- Offered with a full-height bracket and a low-profile vented bracket
- Provides one heartbeat LED

2.2 N2226 HBA Features

- Implements two LSI SAS 3008 eight-port 12Gb/s SAS to PCIe 3.0 controllers
- Supports eight-lane, full-duplex PCIe 3.0 performance
- Supports sixteen external 12Gb/s SATA+SAS ports
- Supports SATA link rates of 3Gb/s and 6Gb/s
- Supports SAS link rates of 3Gb/s, 6Gb/s, and 12Gb/s
- Provides four x4 external mini-SAS HD connectors (SFF-8644)
- Supports passive copper cables
- Supports up to 1024 SATA or SAS end devices
- Offered with a full-height bracket
- Provides two heartbeat LEDs

3 Functional Descriptions

3.1 PCI Express Interface

PCIe is a high-speed standard local bus for point-to-point interfacing of I/O components to the processor and the memory subsystems in high-end computers and servers. The N2225 HBA uses one LSI SAS 3008 controller chip and one PCI Express switch to provide high-bandwidth interconnection ability. The N2226 HBA uses two LSI SAS 3008 controller chips and one PCI Express switch to provide high-bandwidth interconnection ability.

Both the HBAs supports eight-lane PCIe performance up to 64Gb/s single direction and 128Gb/s dual direction.

3.2 SAS Interface

The LSI SAS 3008 controller chip contains the SATA+SAS functionality for the HBAs. The following table shows the LSI SAS 12Gb/s SAS performance.

Half Duplex	Full Duplex
Narrow port (one lane), 1200 MB/s	Narrow port (one lane), 2400 MB/s
Wide port (four lanes), 4800 MB/s	Wide port (four lanes), 9600 MB/s

4 Operating System Support

To check for the latest list of supported operating systems and to download the device drivers for those operating systems, see <http://www.ibm.com/systems/support/>.

5 HBA Characteristics

5.1 Flash

The N2225 HBA provides one 4-M × 16-bit Flash ROMs to store the firmware and the BIOS. The N2226 HBA provides two 4-M × 16-bit Flash ROMs to store the firmware and the BIOS.

5.2 LED

The N2225 HBA Heartbeat LED, CR1, blinks green to indicate the HBA is capable of general activity. The N2226 HBA Heartbeat LEDs, CR3 and CR4, blink green to indicate the HBA is capable of general activity.

5.3 Connectors

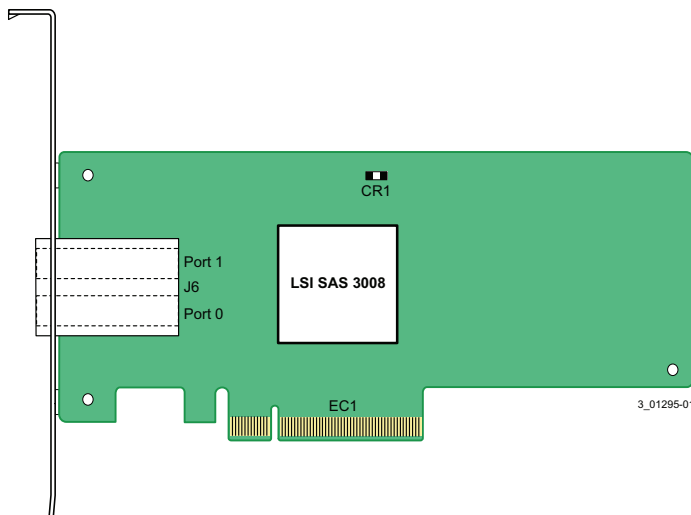
- **PCIe Connector (EC1).** The N2226 and N2225 HBAs support a x8 interface. The PCIe host interface connection is through the edge connector, EC1, which provides connections on both the top (EC1 B) and bottom (EC1 A) of the board. The signal definitions and pin numbers conform to the PCIe specification.
- **SATA+SAS Connectors**
 - **N2225 SATA+SAS (J6)**– The N2225 HBA supports SATA and SAS connectors through connectors that are SFF-8644 mini-SAS HD, external connectors. See [Figure 1](#) for the connector locations.
 - **N2226 SATA+SAS (J6, J7)** – The N2226 HBA supports SATA and SAS connectors through connectors that are SFF-8644 mini-SAS HD, external connectors. See [Figure 2](#) for the connector locations.
- **Auxiliary Power Connector (J5).** The N2226 HBA provides a 6-pin PCIe power connector.

5.4 Physical Characteristics

5.4.1 N2225 HBA Physical Characteristics

The N2225 SAS HBA is a 6.6-in. × 2.7-in., low-profile board. The component height on the top and bottom of the HBA is in accordance with the PCIe specification. The following figure shows the HBA board layout.

Figure 1 N2225 SAS/SATA HBA Board Layout

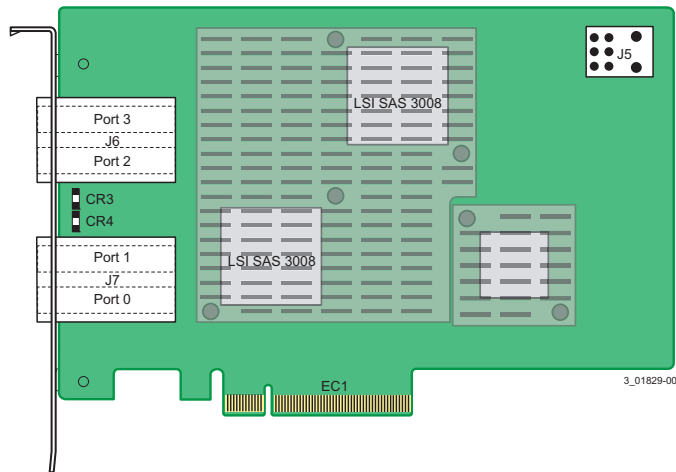


- **EC1** – PCIe x8 board edge connector
- **CR1** – Heartbeat LED
- **J6** – SFF-8644 mini-SAS HD, external, right-angle connectors

5.4.2 N2226 HBA Physical Characteristics

The N2226 SAS HBA is a 6.6-in. × 4.4-in board. The component height on the top and bottom of the HBA is in accordance with the PCIe specification. The following figure shows the HBA board layout.

Figure 2 N2226 SAS/SATA HBA Board Layout



- **EC1** – PCIe x8 board edge connector
- **CR3, CR4** – Heartbeat LEDs
- **J5** – Auxiliary power connector
- **J6, J7** – SFF-8644 mini-SAS HD, external, right-angle connectors

5.5 Electrical Characteristics

5.5.1 N2225 HBA Electrical Characteristics

The power requirements for the N2225 HBA under normal operation are as follows:

- PCIe 12.0 V = 1.07 A
- Power values:
 - Nominal = 14.5 W
 - Worst case = 22.5 W

5.5.2 N2226 HBA Electrical Characteristics

The power requirements for the N2226 HBA under normal operation are as follows:

- PCIe 12.0 V = 2.35 A
- PCIe 3.3 V = 0.13 A
- Power values:
 - Nominal = 28.6 W
 - Worst case = 35.4 W

5.6 Thermal and Atmospheric Limits

The atmospheric limits for the HBAs are as follows:

- Temperature range: 0 °C to 55 °C (32 °F to 131 °F) (dry bulb)
- Relative humidity range: 5% to 90% noncondensing
- Maximum dew point temperature: 32 °C (89.6 °F)
- Minimum airflow
 - **N2225 HBA:**

- 200 linear feet per minute
- **N2226 HBA:**
 - 220 LFPM at 35 °C inlet temperature
 - 270 LFPM at 45 °C inlet temperature
 - 350 LFPM at 55 °C inlet temperature

The following limits define the storage and transit environment for the HBAs:

- Temperature range: –45 °C to +105 °C (–49 °F to +221 °F) (dry bulb)
- Relative humidity range: 5% to 90% noncondensing

6 HBAs Certifications and Safety Characteristics

The HBAs meet or exceed the requirements of UL flammability rating 94V-0. Each bare board is marked with the supplier's name or trademark, type, and UL flammability rating. Because these boards are installed in a PCIe bus slot, all voltages are less than the SELV 42.4-V limit.

The design and implementation of the HBAs minimize electromagnetic emissions, susceptibility to radio frequency energy, and the effects of electrostatic discharge.

The HBAs meet the following integrated electromagnetic interference (EMI) compliance labels:

- CE mark
- CISPR Class B
- C-Tick mark
- Canadian Compliance Statement
- FCC Class B, marked with the FCC Self-Certification logo
- Japan VCCI
- Korean KCC
- Taiwan BSMI

The HBAs meet the following environmental directives:

- RoHS
- WEEE

7 Hardware Installation Instructions

Statement 1:



DANGER

Electrical current from power, telephone, and communication cables is hazardous.

To avoid a shock hazard:

- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- Connect all power cords to a properly wired and grounded electrical outlet.
- Connect to properly wired outlets any equipment that will be attached to this product.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.

To Connect:

1. Turn everything OFF.
2. First, attach all cables to devices.
3. Attach signal cables to connectors.
4. Attach power cords to outlet.
5. Turn device ON.

To Disconnect:

1. Turn everything OFF.
2. First, remove power cords from outlet.
3. Remove signal cables from connectors.
4. Remove all cables from devices.

To install the HBAs, follow these steps:

1. **Unpack the HBA and inspect if for damage.** If it appears damaged, or if any of the following items are missing, contact your place of purchase. The HBA is shipped with the following items:
 - A CD containing an electronic version of this User's Guide and other related documentation.
 - *IBM Warranty Information*



ATTENTION Make a backup of your data before changing your system configuration to avoid the risk of data loss.

2. **Prepare the computer.** Turn off the computer, and disconnect the power cord from the rear of the power supply.



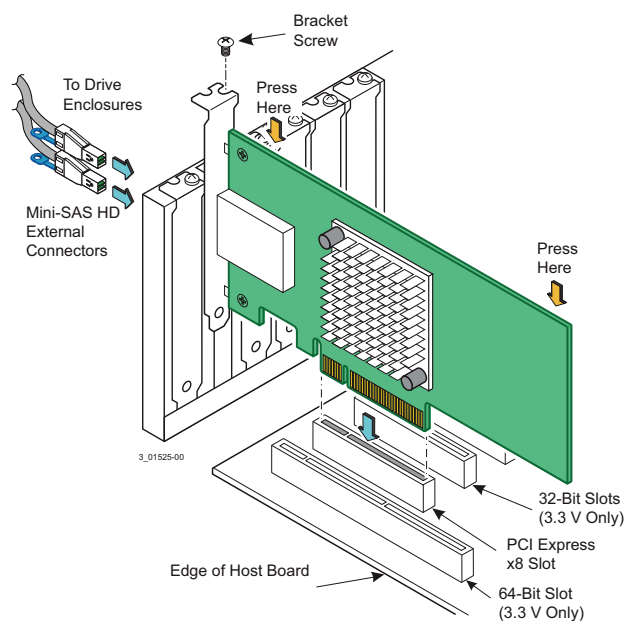
CAUTION Disconnect the computer from the power supply and from any networks to which you will install the HBA, or you risk damaging the system or experiencing electrical shock.

3. **Remove the cover from the chassis.**
4. **Check the mounting bracket on the HBA (system-dependent).** If required for your system, replace the full-height mounting bracket that ships on the HBA with the low-profile bracket supplied.
5. **Insert the HBA into an available PCIe slot.**
 - a. **For N2225 ONLY.** Locate an empty x8 PCIe slot. Remove the blank bracket panel on the rear of the computer that aligns with the empty PCIe slot. Save this bracket screw, if applicable. Align the HBA to a PCIe slot. Press down gently, but firmly, to seat the HBA correctly in the slot. The following figures show how to insert the HBA into a PCIe slot.



NOTE The shape, size, and locations of the components on your HBAs and its bracket might vary from this illustration. The HBAs require a x8 PCIe slot.

Figure 3 Install an N2225 HBA in a PCIe Slot

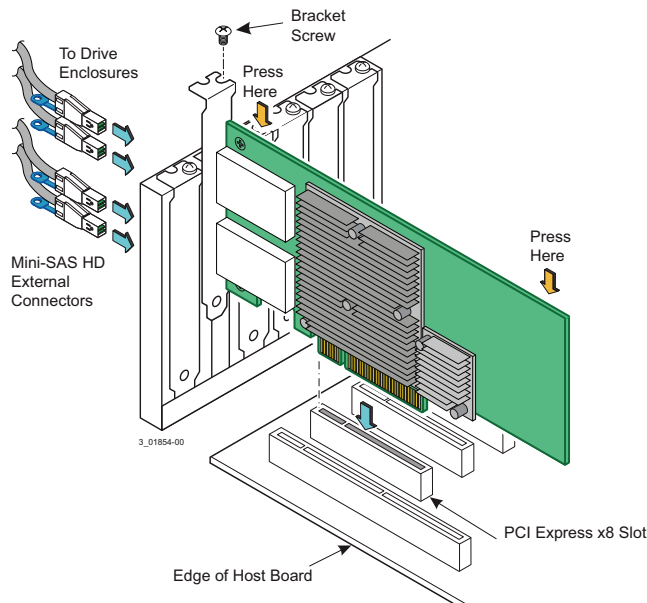


- a. **For N2226 ONLY.** Locate an empty x8 PCIe slot. The N2226 is a high power HBA and must be installed in a 75W slot, or an external power connector cable must be installed from the N2226 to the server. Remove the blank bracket panel on the rear of the computer that aligns with the empty PCIe slot. Save this bracket screw, if applicable. Align the HBA to a PCIe slot. Press down gently, but firmly, to seat the HBA correctly in the slot. The following figures show how to insert the HBA into a PCIe slot.



NOTE The shape, size, and locations of the components on your HBAs and its bracket might vary from this illustration. The HBAs require a x8 PCIe slot.

Figure 4 Install an N2226 HBA in a PCIe Slot



6. **Secure the HBA bracket to the system's chassis.** Install the bracket screw, if applicable, or engage the system retention mechanism to secure the HBA to the system's chassis.
7. **Replace the cover of the chassis.**
8. **Connect SAS cables between the HBA and the SAS enclosure that contains SATA or SAS devices.** The N2225 HBA has two, SFF-8644, external x4 mini-SAS HD connectors. The N2226 HBA has four SFF-8644, external x4 mini-SAS HD connectors. Use a cable with an external mini-SAS HD connector (SFF-8644) on one end (to connect to the HBA) and the appropriate connector to attach to the enclosure that contains SAS or SATA devices on the other end.
9. **Replace the cover and any power cords, and power up the system.** Replace the chassis's cover, reconnect any power cords, and reconnect any network cables. Turn on the power.

The hardware installation of your SAS HBAs is complete.

8 Replaceable HBA Components

The IBM field replaceable unit (FRU) part number for the N2225 HBA is 00AE914.

The IBM field replaceable unit (FRU) part number for the N2226 HBA is 00AE918.

Appendix A: Getting Help and Technical Assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This section contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your system, and whom to call for service, if it is necessary.

A.1 Before You Call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system.
- Go to the IBM support website at <http://www.ibm.com/supportportal/> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the documentation that is provided with your IBM product. The documentation that comes with IBM systems also describes the diagnostic tests that you can perform. Most systems, operating systems, and programs come with documentation that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

A.2 Using the Documentation

Information about your IBM system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, readme files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to <http://www.ibm.com/supportportal/> and follow the instructions.

A.3 Getting Help and Information from the World Wide Web

On the World Wide Web, the IBM website has up-to-date information about IBM systems, optional devices, services, and support. You can find service information for IBM systems and optional devices at <http://www.ibm.com/supportportal/>.

A.4 Software Service and Support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems. For information about which products are supported by Support Line in your country or region, see <http://www.ibm.com/services/supline/products/>.

For more information about Support Line and other IBM services, see <http://www.ibm.com/services/>, or see <http://www.ibm.com/planetwide/> for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

A.5 Hardware Service and Support

You can receive hardware service through your IBM reseller or IBM Services. To locate a reseller authorized by IBM to provide warranty service, go to <http://www.ibm.com/partnerworld/> and click **Find Business Partners** on the right side of the page. For IBM support telephone numbers, see <http://www.ibm.com/planetwide/>. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

A.6 IBM Taiwan Product Service

台灣 IBM 產品服務聯絡方式：
台灣國際商業機器股份有限公司
台北市松仁路7號3樓
電話：0800-016-888

IBM Taiwan product service contact information:

IBM Taiwan Corporation
3F, No 7, Song Ren Rd.
Taipei, Taiwan
Telephone: 0800-016-888

Appendix B: Notices

This information was developed for products and services offered in the U.S.A.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

*IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785
U.S.A.*

INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM websites are provided for convenience only and do not in any manner serve as an endorsement of those websites. The materials at those websites are not part of the materials for this IBM product, and use of those websites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

B.1 Trademarks

IBM, the IBM logo, and [ibm.com](http://www.ibm.com) are trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the web at "Copyright and trademark information" at <http://www.ibm.com/legal/copytrade.shtml>

Adobe and PostScript are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States and/or other countries.

Cell Broadband Engine is a trademark of Sony Computer Entertainment, Inc., in the United States, other countries, or both and is used under license therefrom.

Intel, Intel Xeon, Itanium, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

Java and all Java-based trademarks and logos are trademarks or registered trademarks of Oracle and/or its affiliates.

Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Microsoft, Windows, and Windows NT are trademarks of Microsoft Corporation in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.

B.2 Important Notes

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

IBM makes no representation or warranties regarding non-IBM products and services that are ServerProven[®], including but not limited to the implied warranties of merchantability and fitness for a particular purpose. These products are offered and warranted solely by third parties.

IBM makes no representations or warranties with respect to non-IBM products. Support (if any) for the non-IBM products is provided by the third party, not IBM.

Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

This product is not intended to be connected directly or indirectly by any means whatsoever to interfaces of public telecommunications networks, nor is it intended to be used in a public services network.

B.3 Documentation Format

The publications for this product are in Adobe Portable Document Format (PDF) and should be compliant with accessibility standards. If you experience difficulties when you use the PDF files and want to request a web-based format or accessible PDF document for a publication, direct your mail to the following address:

*Information Development
IBM Corporation
205/A015
3039 E. Cornwallis Road
P.O. Box 12195
Research Triangle Park, North Carolina 27709-2195
U.S.A.*

In the request, be sure to include the publication part number and title.

When you send information to IBM, you grant IBM a nonexclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

B.4 Electronic Emission Notices

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not 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.

Industry Canada Class A emission compliance statement

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

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Australia and New Zealand Class A statement

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards.

Attention: This is an EN 55022 Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Responsible manufacturer:

International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
914-499-1900

European Community contact:

IBM Deutschland GmbH
IBM Technical Regulations, Department M372
IBM-Allee 1,71139 Ehningen, Germany
Telephone: +49 7032 15 2941
Email: lugi@de.ibm.com

Germany Class A statement

Deutschsprachiger EU Hinweis:

Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der IBM empfohlene Kabel angeschlossen werden. IBM übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der IBM verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der IBM gesteckt/eingebaut werden.

EN 55022 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden: "Warnung: Dieses ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funk-Störungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen zu ergreifen und dafür aufzukommen."

Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)". Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC EG Richtlinie 2004/108/EG) für Geräte der Klasse A

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:

International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:

IBM Deutschland GmbH
Technical Regulations, Abteilung M372
IBM-Allee 1, 71139 Ehningen, Germany
Telephone: +49 7032 15-2941
E-mail: lugi@de.ibm.com

Generelle Informationen:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.

Japan VCCI Class A statement

<p>この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。</p> <p>VCCI-A</p>

This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI). If this equipment is used in a domestic environment, radio interference may occur, in which case the user may be required to take corrective actions.

Korea Communications Commission (KCC) statement

이 기기는 업무용(A급)으로 전자파적합기기로
서 판매자 또는 사용자는 이 점을 주의하시기
바라며, 가정외의 지역에서 사용하는 것을 목
적으로 합니다.

This is electromagnetic wave compatibility equipment
for business (Type A). Sellers and users need to pay
attention to it. This is for any areas other than home.

Russia Electromagnetic Interference (EMI) Class A statement

ВНИМАНИЕ! Настоящее изделие относится к классу А.
В жилых помещениях оно может создавать радиопомехи, для
снижения которых необходимы дополнительные меры

People's Republic of China Class A electronic emission statement

中华人民共和国“A类”警告声明

声明

此为A级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，
可能需要用户对其干扰采取切实可行的措施。

Taiwan Class A compliance statement

警告使用者：
這是甲類的資訊產品，在
居住的環境中使用時，可
能會造成射頻干擾，在這
種情況下，使用者會被要
求採取某些適當的對策。