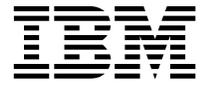


**ARTIC960Hx
PCI Adapter
Guide to Operations**



**ARTIC960Hx
PCI Adapter
Guide to Operations**

Important

Before using this information and the product it supports, be sure to read all the information in Appendix A, "Notices" on page A-1.

Before installing or removing an adapter, be sure to study the Connect/Disconnect sequence diagram for cables in "Safety Information" on page A-2.

First Edition (June 1998)

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Machine: ARTIC960Hx PCI Adapter

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 - c. Inform IBM or your reseller of changes in a Machine's location.

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Contents

About This Book	ix
Who Should Read This Book	ix
Related Information	ix
Chapter 1. Product Description	1-1
ARTIC960Hx PCI Adapter with Voltage Regulator	1-2
ARTIC960Hx PCI Adapter without Voltage Regulator	1-2
IBM Part Numbers	1-3
Features and Function	1-3
Specifications	1-5
Operating System Support Programs and Publications	1-6
Chapter 2. Installation Requirements and Instructions	2-1
Hardware Requirements	2-1
Handling Static-Sensitive Devices	2-2
Component Locations	2-3
Installation	2-3
Step 1. Installing a Memory Module	2-3
Step 2. Installing a PMC Card	2-5
Step 3: Installing the Base Adapter	2-7
Step 4. Downloading the Diagnostics and Operating System Support Programs	2-9
Chapter 3. Removing a PMC Card or a Memory Module	3-1
Removing a PMC Card	3-1
Removing a Memory Module	3-3
Chapter 4. Troubleshooting	4-1
Problem Determination Procedures	4-1
Appendix A. Notices	A-1
Trademarks and Service Marks	A-1
Safety Information	A-2
Required Electronic Emission and Connectivity Notices	A-3
Industry Canada Compliance Statement	A-3
European Union (EU) Electromagnetic Compatibility Directive	A-4
Germany	A-4

Japan	A-6
Index	X-1

About This Book

This book describes the ARTIC960Hx PCI Adapter and provides step-by-step installation instructions. After you have finished reading this book, you should be able to:

- Install or remove the adapter
- Install or remove a memory module
- Install or remove a PMC card
- Troubleshoot possible problems
- Download system support programs, publications, and utility programs that support the development of adapter applications

Terminology Note

Throughout this book, the IBM ARTIC960Hx PCI Adapter is referred to as the *base adapter*.

Who Should Read This Book

This book is written for an experienced computer user or a person who sets up, uses, or programs the ARTIC960Hx PCI Adapter.

Related Information

- Operating and installation documentation provided with any base adapter card you are using.
- Operating and installation documentation provided with your computer.
- Reference, service, and diagnostics documentation available for your computer.
- Other related publications can be obtained from the Web at:
<http://wwprodso1n.bocaratn.ibm.com/artic/pubs.html>

Chapter 1. Product Description

The ARTIC960Hx PCI Adapter is a full-length, 32-bit base adapter with a universal PCI interface. The base adapter provides high-function control of I/O operations and serves to off-load input/output tasks from the system microprocessor.

There are two versions of the ARTIC960Hx PCI Adapter: one with a voltage regulator and one without a voltage regulator. Both versions are keyed for a 3.3-volt and 5-volt PCI connector, and both use 5-volt signaling levels to the PCI-mezzanine-card (PMC) connector.

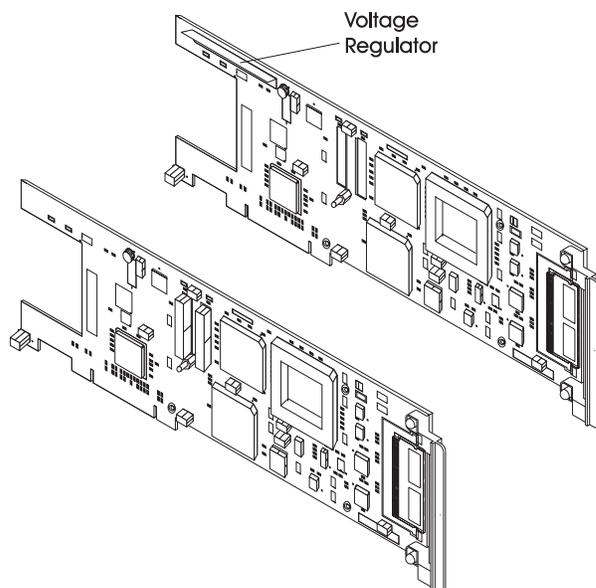


Figure 1-1. Base Adapter with Memory Module Installed

ARTIC960Hx PCI Adapter with Voltage Regulator

This adapter has a voltage regulator that converts some of the 5-volt input to a 3.3-volt level. The base adapter uses the 3.3 volts for internal signaling. It also provides this voltage to the PMC connector; however, only 5-volt signaling levels are used across the PMC connector.

The PMC connector on this adapter is keyed to accept only 5-volt-compatible PMC cards.

Note: You can install any 5-volt, single or single-extended PMC card on the adapter with a voltage regulator; however, the voltage regulator might interfere with a PMC card that does not meet these standard sizes.

ARTIC960Hx PCI Adapter without Voltage Regulator

The version of the adapter without the voltage regulator can operate only in computers that supply 3.3 volts to the PCI connector. The adapter routes the 5-volt and 3.3-volt input to the PMC connector.

You can install any 5-volt PMC card on this adapter.

IBM Part Numbers

The following table lists the part numbers for FRUs associated with the ARTIC960Hx PCI Adapter. The adapter is shipped without memory, which is ordered separately.

Description	Part Number
ARTIC960Hx PCI Adapter with voltage regulator	87H3427
ARTIC960Hx PCI Adapter without voltage regulator	87H3581
Plug-in memory modules	
4 MB	87H3616
8 MB	87H3621
16 MB	87H3626
32 MB	87H3631
Adapter Bracket Kit	87H3562

Features and Function

The base adapter has the following features:

32-bit (33/66 MHz) Intel 80960HD microprocessor

The Intel 80960HD microprocessor operates off a 33 MHz on-card oscillator and includes two on-board memory subsystems:

- Extended-data-output (EDO) dynamic random-access memory (DRAM), and
- Read-only memory (ROM)

4 MB to 32 MB of 50-ns or 60-ns EDO DRAM

The base adapter microprocessor uses this area for its instructions and data packets.

128 KB of 5-volt-only, sector-erasable ROM

The ROM subsystem consists of 128 KB of sector-erasable, read-only flash memory. It contains the power-on self-test (POST) and bootstrap-loader code for the on-board microprocessor.

PMC Connector

The PMC connector provides a 5-volt, 32-bit PCI interface for attaching a single, or single-extended, PCI-mezzanine card (PMC). A PMC card provides a high-function, application-specific interface that expands the capability of a base adapter like the ARTIC960Hx PCI Adapter. Attaching a PMC card provides support for high-speed communications, such as a T1 or broadband network. A PMC card has the protocol chips and electrical-interface drivers, receivers, terminators, and connectors that apply to that specific interface.

Bus Master Data Transfers

The base adapter supports adapter-to-system or adapter-to-adapter bus master data transfers.

Plug-in Memory

Plug-in memory modules are available in 4 MB, 8 MB, 16 MB, and 32 MB sizes. A plug-in module must be installed for the adapter to operate.

Specifications

The following describes the physical attributes, environmental conditions, and electrical requirements for the base adapter.

Size

Length: 309.8 millimeters (12.2 inches)

Width: 98.5 millimeters (3.8 inches)

Environment

- Air Temperature:

Operating: 0°C through 55°C (32°F through 131°F)

Non-Operating: -40°C through 70°C (-40°F through 158°F)

- Humidity:

Operating: 5% through 95%.

Wet Bulb Temperature: 29°C (84.2°F)

Electrical

- Power Requirements—Maximum current used by the adapter.

Voltage	With Regulator	Without Regulator
+3.3 V	0 A	570 mA
+5 V	1110 mA	730 mA
+12 V	0 A (see note)	0 A (see note)
-12 V	0 A (see note)	0 A (see note)

Note: The ARTIC960Hx PCI Adapter does not use +12 or -12 volts; however, it does route these voltages to the PMC connector.

Operating System Support Programs and Publications

To help programmers develop products for the ARTIC960Hx PCI Adapter, operating system packages containing the drivers and utilities to support a particular operating system are available on the World Wide Web (Web). To download these sample programs and utilities from the Web, see "Step 4. Downloading the Diagnostics and Operating System Support Programs" on page 2-9.

Other related publications can be obtained from the Web at:

<http://wwprodsoln.bocarbon.ibm.com/artic/pubs.html>

Obtaining Publications when Web Support Is Unavailable

If you do not have access to the Web, you can obtain these publications from the no-fee Developer's Assistance Program (DAP).

By telephone, call **1-800-426-3333** and ask for **ARTIC 160**.

By E-mail, send to **artic@us.ibm.com**.

Chapter 2. Installation Requirements and Instructions

Each ARTIC960Hx PCI Adapter package includes the following:

- The base adapter
- This book (with Warranty Statement)
- An adapter bracket kit containing the bracket and five screws

Note: The ARTIC960Hx PCI Adapter is a Class A device.

The Federal Communications Commission (FCC) classification for this product might differ from the FCC classification for your system unit. Use the classification that is highest. For example, if the FCC classification for your system unit is Class B and a card that you install is Class A, the classification of your computer would change to Class A. For more information, see "Required Electronic Emission and Connectivity Notices" on page A-3.

When Replacing an Adapter or Changing Memory

After reinstalling an ARTIC960Hx PCI Adapter, turn the computer on and allow the operating system to boot. Then shut down the system and turn the computer off. Restart the computer. This procedure prevents memory errors that can occur if the memory or location of the adapter is changed.

Hardware Requirements

The ARTIC960Hx PCI Adapter with voltage regulator can be installed in any PCI-compliant computer. However, the ARTIC960Hx PCI Adapter without a voltage regulator must be installed in a computer that provides 3.3 volts to the PCI connector.

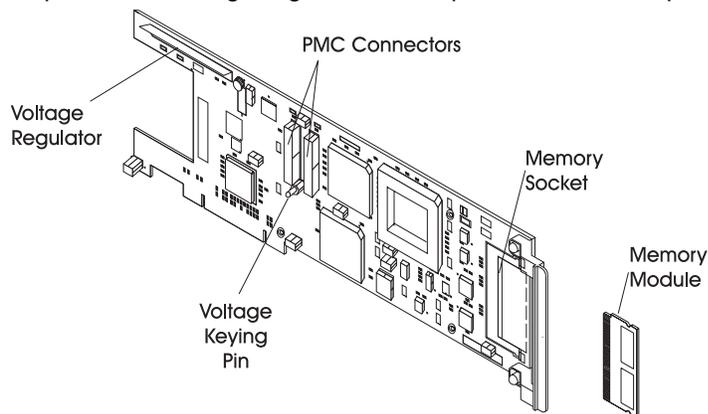
Handling Static-Sensitive Devices

Components for your adapter can be damaged by static discharges. To prevent this damage, your base adapter is wrapped in an anti-static bag. Observe the following precautions when handling the base adapter.

- Keep the adapter in its anti-static bag until you are ready to install it.
- Make the least possible movement of your body to minimize the electrostatic charges created by contact with clothing fibers, carpet, and furniture.
- If possible, keep one hand on the computer chassis when you are inserting or removing the adapter. Always turn the computer off before removing an adapter.
- *Do not touch the printed circuit.* Where possible, hold the adapter by its plastic end pieces or by its edges, but do not touch the metal edge connectors.
- Do not place the adapter on the machine cover or on a metal table. Machine covers and metal tables increase the risk of damage because they make a discharge path from your body through the adapter.

Component Locations

The following shows some important landmarks on the ARTIC960Hx PCI Adapter. The voltage regulator is not present on all adapters.



Installation

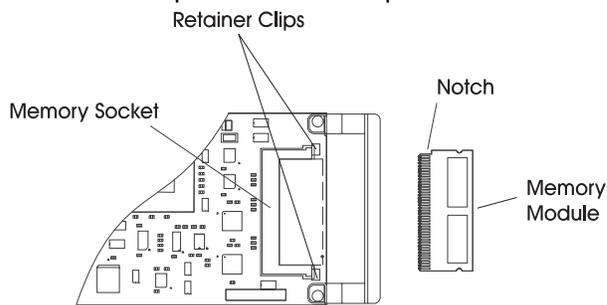
The following instructions assume that you have the base adapter out of the system unit and are ready to begin installation. Use these steps, as appropriate for your computer, to install a memory module, a PMC card, or the base adapter.

Note: For some system installations, the base adapter and the PMC card are pre-assembled.

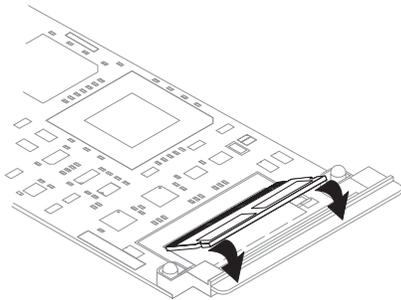
Step 1. Installing a Memory Module

1. Remove the base adapter and the memory module from their respective anti-static packages. Be sure to hold these items by the edges only. For the best result, place the base adapter on a flat surface, component side up, and the plastic guide rail to your right. The top edge of the adapter is now farthest from you.

2. Align the memory module with the base adapter. Make sure the notch is toward the top of the base adapter.



3. Insert the memory module into the memory socket. The module will initially plug into the socket at approximately a 25° angle.



4. Press on the top corners of the memory module and rotate it toward the base adapter until the memory module snaps into the retainer clips.

Step 2. Installing a PMC Card

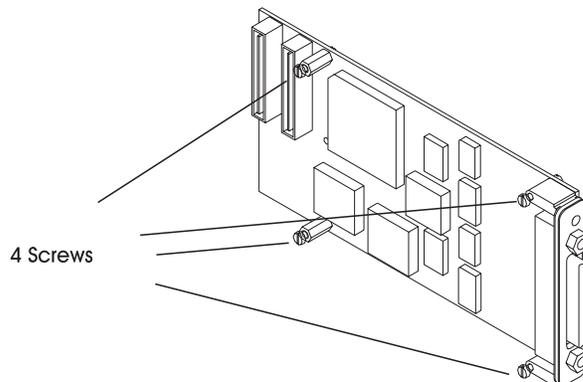
Before you begin

Verify that the voltage keying pin on the base adapter is located between the two PMC connectors. **Do not move the keying pin. It is intended to ensure the attachment of a 5-volt-compatible PMC card.**

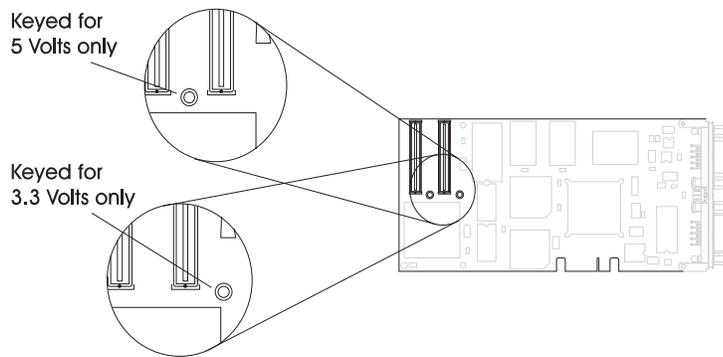
See “Component Locations” on page 2-3 for the location of the voltage keying pin and PMC connectors.

The following illustrations depict a typical PMC card. If your card differs from the illustrations, refer to the installation instructions that came with your PMC card.

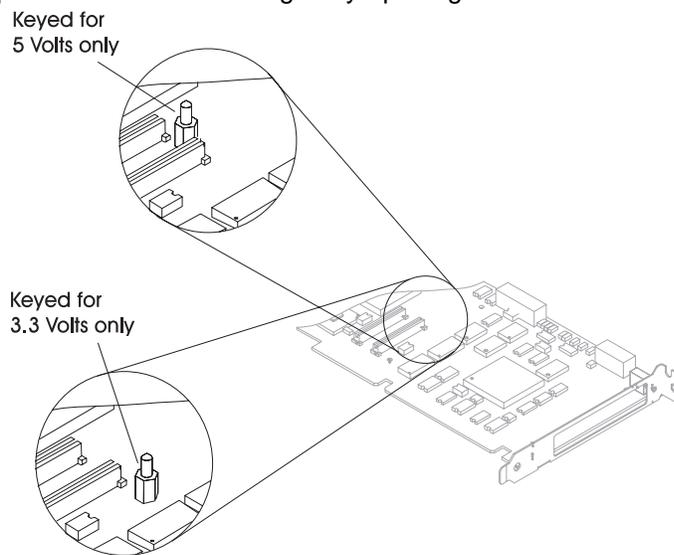
1. If they are in place, remove the screws. With some PMC cards, the screws are shipped in a separate package.



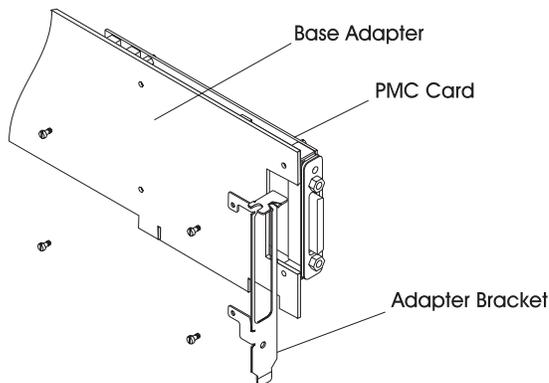
- The PMC card must have a voltage key opening between the two PMC connectors. This opening identifies the PMC card as a 5-volt-compatible card.



- Align the connector on the PMC card with the PMC connector on the base adapter. When the base adapter and the PMC card are properly aligned, the tip of the voltage keying pin on the base adapter will fit into the voltage key opening on the PMC card.



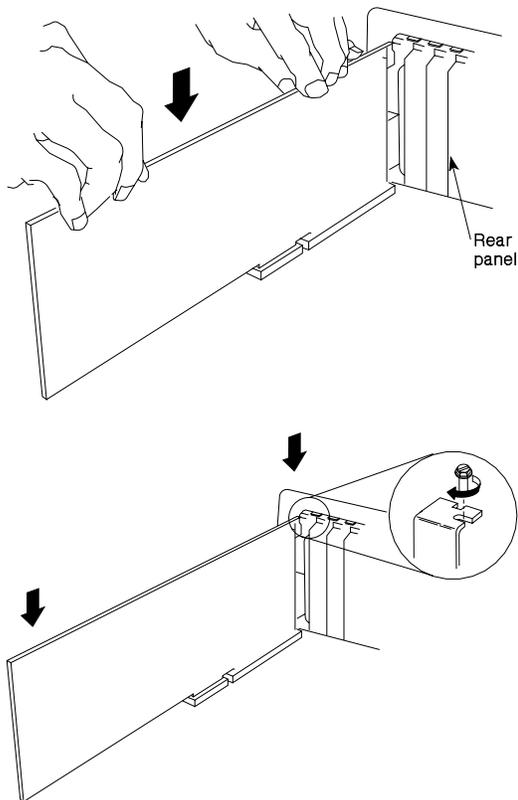
4. Firmly press the PMC card and the base adapter connectors together.
5. Attach the cards through the standoffs using two of the screws. If your PMC card has a rubber gasket around the connector on the back of the card, take care not to damage it. Attach the adapter bracket using the remaining two screws. If your PMC card differs from the illustration or uses different hardware, refer to the installation instructions that came with your card.



Step 3: Installing the Base Adapter

1. Turn the computer off.
2. Unplug the power cords from the electrical outlets.
3. Disconnect all cables from the rear of the system unit.
4. Remove the system unit cover.
5. Locate an available 32-bit PCI expansion slot in your system unit that supports the length of the base adapter.
6. Remove the expansion-slot screw, and then remove the expansion-slot cover.

7. Grasping the base adapter by the top edge, firmly press it into the connector at the rear panel of the system unit. Then secure the adapter bracket to the slot using the screw provided.



8. Before tightening the expansion-slot screw, make sure adjacent expansion-slot screws do not interfere with the adapter bracket. Then tighten the expansion-slot screw to lock the base adapter in place.
9. If you have other adapters (or options) to install, do so now. Refer to the installation instructions provided with your computer for more information.
10. Reinstall the system unit cover and reconnect all cables to their appropriate connectors (refer to the documentation that came with your computer).
11. Plug all power cords into electrical outlets.

Step 4. Downloading the Diagnostics and Operating System Support Programs

IBM provides adapter support for some operating system environments. The adapter diagnostic program and the support programs for your specific operating system can be obtained through the World Wide Web or a Bulletin Board System (BBS).

Downloading from the Web

Do the following.

1. Using a Web browser of your choice, type:
`http://wwprodso1n.bocaratn.ibm.com/artic/file_rep.html`
2. Select the operating-system support you want.
3. Download the **Program** file.
4. Download the **Installation/file creation instructions** file, and follow the steps for installing and configuring the product support.

Downloading from the BBS

Do the following.

1. Check that your modem settings are as follows:

Data Bit	8
Parity Bit	N
Stop Bit	1
2. Dial the U.S.A. number **561-443-0134**.
3. Select the operating system support you want.
4. Select a **Transfer Protocol** supported by your communications software.
5. View on-line or download the **Readme/Instruction** file.
6. Follow the instructions in the Readme file for downloading and installing the program support that comes with the diagnostics.

Obtaining Operating System Software when Web/BBS Support Is Unavailable

For those who are unable to retrieve the files from either the Web or BBS, support is provided by telephone or E-mail.

For telephone assistance (U.S.A. *only*), call:

1-800-426-3333 and ask for ARTIC 160.

For E-mail assistance, send to:

artic@us.ibm.com

Chapter 3. Removing a PMC Card or a Memory Module

This chapter provides step-by-step instructions for:

- Removing a PMC card from the base adapter and re-installing the base adapter in the system unit.
- Removing a memory module from the base adapter

When Replacing an Adapter or Changing Memory

After reinstalling an ARTIC960Hx PCI Adapter, turn the computer on and allow it to complete POST. Then shut down the system and turn the computer off. Restart the computer. This procedure prevents memory errors that can occur if the memory or location of the adapter is changed.

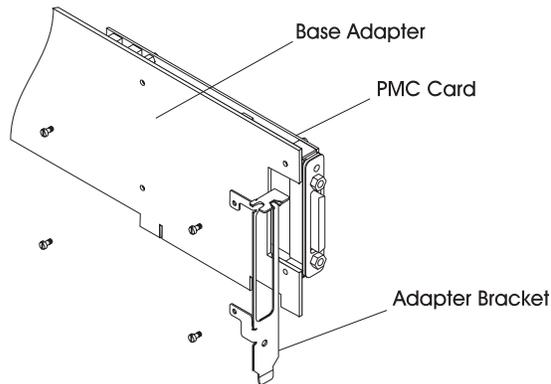
Removing a PMC Card

To remove a PMC card from the base adapter:

1. Turn the computer off.
2. Unplug the power cords from the electrical outlets.
3. Disconnect all cables from the rear of the system unit.
4. Remove the system unit cover.
5. Locate the assembled adapter containing the PMC card and record its slot number.
6. Remove the expansion-slot screw that locks the assembled adapter in place.
7. Remove the assembled adapter by grasping the top edge and pulling upward.

Note: Be sure to hold the assembled adapter by the edges only; do not touch the component pins or solder joints.

8. Remove the four screws on the assembled adapter, and remove the adapter bracket. If the PMC card has a rubber gasket around the connector on the back of the card, take care not to damage it. The two cards are still held together by the PMC connector.



Some PMC cards may have the adapter bracket as part of the card. Refer to the instructions that came with the card for information about whether the bracket should be removed.

9. Carefully separate the connector on the PMC card from the connector on the base adapter using a gentle rocking motion.
10. Reinstall just the base adapter into the same slot recorded in Step 5 of this procedure.
11. Reinstall the system unit cover.
12. Reconnect all cables previously removed from the system unit.
13. Plug all power cords into electrical outlets.
14. Turn the computer on.
15. Run diagnostics if necessary.

To test the base adapter, refer to the operating system support programs you downloaded from the Web or BBS in "Step 4. Downloading the Diagnostics and Operating System Support Programs" on page 2-9. If no problems are found, have the system unit serviced.

Removing a Memory Module

To remove a memory module from the base adapter:

1. If possible, locate a static-free package and have it handy.
2. Unplug the power cords from the electrical outlets.
3. Disconnect all cables from the rear of the system unit.
4. Remove the system unit cover.
5. Locate the base adapter containing the memory module and record its slot number.
6. Remove the expansion-slot screw that locks the base adapter in place.
7. Remove the base adapter by grasping the top edge of the card and pulling upward.

Note: Be sure to hold the base adapter by the edges only; do not touch the component pins or solder joints.

8. Release the memory module retaining clips by gently pressing them outward until the memory module snaps up.
9. Grasping the module by its edges, gently pull outward until it is free of the memory connector on the base adapter.
10. If possible, place the module in a static-free package.

If you plan to re-install the base adapter in the system unit, you must replace the memory module before you do so. The base adapter must have a memory module installed in order to function.

See "Step 1. Installing a Memory Module" on page 2-3 for installation instructions. Then return here and continue with Step 11.

11. Reinstall the base adapter, with a memory module installed, into the same slot recorded in Step 5 of this procedure.
12. Reinstall the system unit cover.
13. Reconnect all cables previously removed from the system unit.
14. Plug all power cords into electrical outlets.

15. Turn the computer on and allow it to complete POST; then restart the computer (see the note on page 3-1).

16. Run diagnostics if necessary.

To test the base adapter, refer to the operating system support programs you downloaded from the Web or BBS in “Step 4. Downloading the Diagnostics and Operating System Support Programs” on page 2-9. If no problems are found, have the system unit serviced.

Chapter 4. Troubleshooting

This chapter discusses how to troubleshoot possible problems with the ARTIC960Hx PCI Adapter.

Problem Determination Procedures

For system testing information, refer to the documentation that came with your computer.

If you performed the diagnostic tests because of a suspected communications problem and have successfully completed the tests without an error message, additional testing may be required on the following:

- Host computer or device with which you are trying to communicate (such as a printer)
- An attached communications device, such as a modem
- Communications cable

To test the base adapter, or a PMC card attached to the base adapter, refer to the operating system support programs you downloaded from the Web or BBS (see "Step 4. Downloading the Diagnostics and Operating System Support Programs" on page 2-9).

If you cannot isolate the problem, have the system unit serviced.

Appendix A. Notices

References in this publication to IBM products, programs, or services do not imply that IBM intends to make these available in all countries in which IBM operates. Any reference to an IBM licensed program or other IBM product in this publication is not intended to state or imply that only IBM's program or other product can be used. Any functionally equivalent product, program, or service that does not infringe on any of IBM's intellectual property rights or other legally protectible rights can be used instead of the IBM product, program, or service. Evaluation and verification of operation in conjunction with other products, programs, or services, except those expressly designated by IBM, are the user's responsibility.

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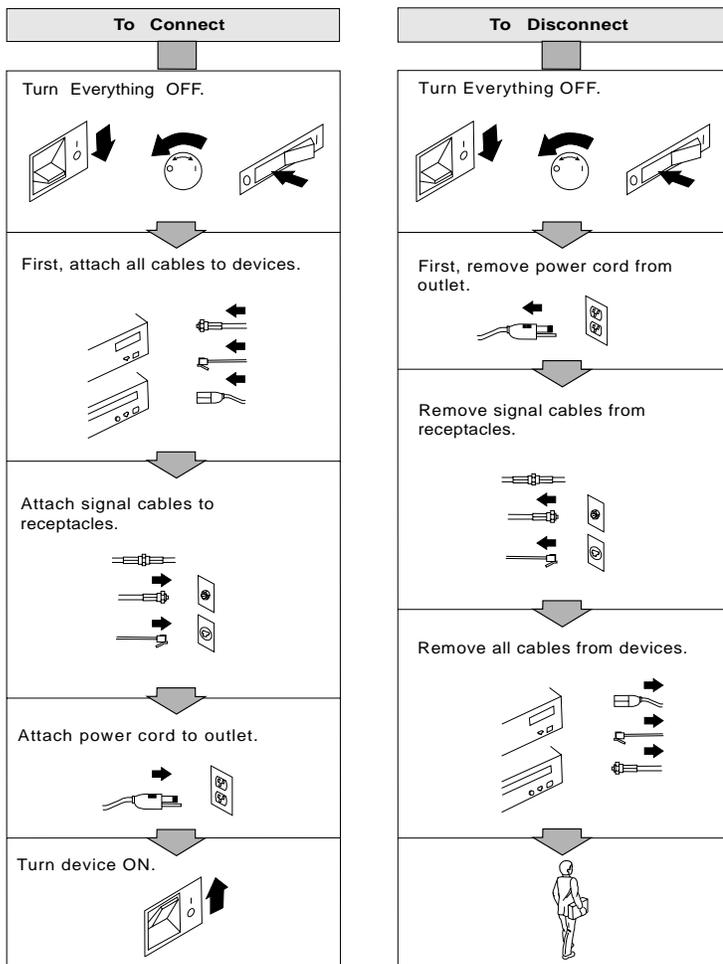
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Safety Information



DANGER: Electrical current from power, telephone, and communications cables is hazardous. To avoid shock hazard, connect and disconnect cables as shown below when installing, moving, or opening the covers of this product or attached devices.



Note: In the UK, by law, the telephone cable must be connected after the power cord.

Note: In the UK, by law, the power cord must be disconnected after the telephone line cable.

Required Electronic Emission and Connectivity 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 Compliance Statement

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

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Union (EU) Electromagnetic Compatibility Directive

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.

IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

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

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.

Germany

Zulassungsbescheinigung laut Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) vom 30. August 1995

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

Der Aussteller der Konformitätserklärung ist die:

International Business Machines
ARTIC Hardware Development
1798 N.W. 40th Street
Boca Raton FL 33431
U.S.A.

Informationen in Hinsicht EMVG Paragraph 3, Abs. 2:

Das Gerät erfüllt die Schutzanforderungen nach EN 50082-1 und EN 55022 Klasse A.
--

EN 55022 Klasse A Geräte bedürfen folgender Hinweise:

Nach dem EMVG:

"Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesministeriums für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind."

(Auszug aus dem EMVG, Paragraph 3, Abs. 4)

Dieses Genehmigungsverfahren ist nach Paragraph 9 EMVG in Verbindung mit der entsprechenden Kostenverordnung (Amtsblatt 14/93) kostenpflichtig.

Nach der EN 55022:

"Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen und dafür aufzukommen."

Anmerkung:

Um die Einhaltung des EMVG sicherzustellen, sind die Geräte wie in den Handbüchern angegeben zu installieren und zu betreiben.

Japan

Japanese Voluntary Control Council for Interference (VCCI) Statement

Attention: This product is a Class 1 Information Technology Equipment and conforms to the standards set by the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

Index

A

attaching a memory module 2-3

B

base adapter

component locations 2-3

description 1-1

documentation 1-6

features and function 1-3

hardware requirements 2-1

installing 2-7

installing a memory module 2-3

installing a PMC card 2-5

PMC connector 1-4

specifications 1-5

bracket, adapter 2-7

C

component locations, base

adapter 2-3

D

description, base adapter 1-1

Developer's Assistance Program
(DAP) 1-6

diagnostics

downloading from the BBS 2-9

downloading from the Web 2-9

E-mail assistance 2-10

system testing 4-1

telephone assistance 2-10

documentation, base adapter 1-6

downloading diagnostics 2-9

downloading operating system

support 2-9

E

E-mail assistance 1-6

EDO DRAM, base adapter 1-3

electrical safety A-2

F

features and function, base

adapter 1-3

FRU numbers 1-3

H

handling static-sensitive

devices 2-2

hardware requirements, base

adapter 2-1

I

IBM order (FRU) numbers 1-3

illustration, base adapter 2-3

installation

base adapter 2-7

base adapter, before you

begin 2-5

memory module 2-3

PMC card 2-5

M

memory module

installing 2-3

removing 3-3

microprocessor, base adapter 1-3

N

notices A-1

O

operating system support 1-6, 2-9

P

part numbers 1-3

PMC card

installing 2-5

removing 3-1

PMC connector, base adapter 1-4

problem determination

procedures 4-1

R

related information ix

removing a memory module 3-3

removing a PMC card 3-1

ROM, base adapter 1-3

S

safety, electrical A-2

specifications, base adapter 1-5

static-sensitive devices,

handling 2-2

T

telephone assistance 1-6

terminology ix

troubleshooting 4-1

V

voltage keying pin 2-5

W

Web address 1-6, 2-9

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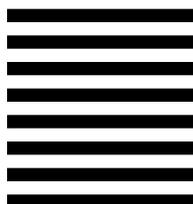
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