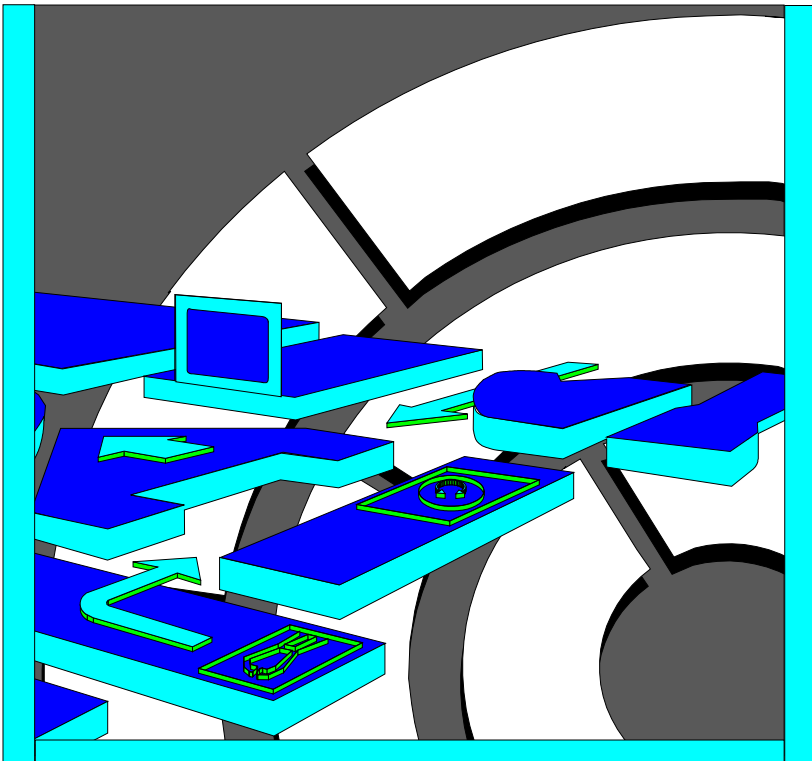


# IBM ARTIC960 PCI Co-Processor Platform

## Guide to Operations





# **IBM ARTIC960 PCI Co-Processor Platform**

## **Guide to Operations**



**Important**

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

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

**Second Edition (July, 1996)**

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## Statement of Limited Warranty (Machine)

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**Machine:** IBM ARTIC960 PCI Co-Processor Platform

**Warranty Period\*:** This Feature assumes the Warranty period of the IBM host in which it is installed. For all other conditions, the Warranty period is three years.

*\*Elements and accessories are warranted for three months. Contact your place of purchase for warranty service information.*

### Production Status

Each Machine is manufactured from new parts, or new and serviceable used parts (which perform like new parts). In some cases, the Machine may not be new and may have been previously installed. Regardless of the Machine's production status, IBM's warranty terms apply.

### The IBM Warranty

IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications. IBM calculates the expiration of the warranty period from the Machine's Date of Installation. The date on your receipt is the Date of Installation, unless IBM or your reseller informs you otherwise.

During the warranty period, IBM or your reseller will provide warranty service under the type of service designated for the Machine and will manage and install engineering changes that apply to the Machine. IBM or your reseller will specify the type of service.

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Replacement parts assume the remaining warranty of the parts they replace.

If a Machine does not function as warranted during the warranty period, IBM or your reseller will repair or replace it (with a Machine that is at least functionally equivalent) without charge. If IBM or your reseller is unable to do so, you may return it to your place of purchase and your money will be refunded.

If you transfer a Machine to another user, warranty service is available to that user for the remainder of the warranty period. You should give your proof of purchase and this Statement to that user.

## Warranty Service

To obtain warranty service for the Machine, you should contact your reseller or call IBM. In the United States, call IBM at **1-800-IBM-SERV (426-7378)**. In Canada, call IBM at **1-800-465-6666**. You may be required to present proof of purchase.

Depending on the Machine, the service may be 1) a "Repair" service at your location (called "On-site") or at one of IBM's or a reseller's service locations (called "Carry-in") or 2) an "Exchange" service, either On-site or Carry-in.

When a type of service involves the exchange of a Machine or part, the item IBM or your reseller replaces becomes its property and the replacement becomes yours. The replacement may not be new, but will be in good working order and at least functionally equivalent to the item replaced.

It is your responsibility to:

1. obtain authorization from the owner (for example, your lessor) to have IBM or your reseller service a Machine that you do not own;
2. where applicable, before service is provided —
  - a. follow the problem determination, problem analysis, and service request procedures that IBM or your reseller provide,
  - b. secure all programs, data, and funds contained in a Machine,
  - c. inform IBM or your reseller of changes in a Machine's location, and
  - d. for a Machine with exchange service, remove all features, parts, options, alterations, and attachments not under warranty service. Also, the Machine must be free of any legal obligations or restrictions that prevent its exchange; and
3. be responsible for loss of, or damage to, a Machine in transit when you are responsible for the transportation charges.

## **Extent of Warranty**

IBM does not warrant uninterrupted or error-free operation of a Machine.

Misuse, accident, modification, unsuitable physical or operating environment, improper maintenance by you, or failure caused by a product for which IBM is not responsible may void the warranties.

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Some jurisdictions do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

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Under no circumstances is IBM liable for any of the following:

1. third-party claims against you for losses or damages (other than those under the first item listed above);
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## About This Book

This manual contains the following:

- IBM ARTIC960 PCI Co-Processor Platform description
- Hardware installation instructions
- Program download instructions
- Service information

This book is written for an experienced computer operator or a person who sets up, uses, or programs the IBM ARTIC960 PCI Co-Processor Platform with a PCI (peripheral component interconnect) computer.

### Terminology Note

Throughout this book, the IBM ARTIC960 PCI Co-Processor Platform also is referred to as the *co-processor platform* or the *co-processor adapter*, interchangeably.

---

## Related Publications

- Operating and Installation documentation provided with your computer system.
- Reference, service, and diagnostics documentation available for your computer system.
- *Application Interface Board Supplement to the Guide to Operations for IBM ARTIC960 Co-Processor Platform and IBM ARTIC960 PCI Co-Processor Platform*. Each Supplement contains a description of an IBM-developed AIB, instructions for installing the AIB, interface connector information, and interface cable details.



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## Chapter 1. Product Description

The IBM ARTIC960 PCI Co-Processor Platform is a programmable adapter that can be used with any full-size 32-bit, 5 volt, PCI/ISA or PCI/Micro Channel-compliant computer. This co-processor adapter supports the off-loading of real-time tasks from the system processor and provides bus-mastering capabilities for peer-to-peer transfers across the PCI bus.

The IBM ARTIC960 PCI Co-Processor Platform is shipped with a minimum of 1MB of instruction memory and without packet memory. At least 1MB of packet memory must be installed for the adapter to function. Plug-in packet memory modules are available in options of 1, 4, 8, and 16MB increments.

The co-processor adapter has the following standard features:

- 32-bit (25 MHz) microprocessor, Intel 80960C-Series
- Dynamic random-access memory (DRAM) error checking and correction for improved data accuracy
- Adapter-to-system or adapter-to-adapter bus master transfers
- Generic AIB interface for multipurpose applications
- Operating system driver included with the adapter.

The co-processor adapter is designed to permit application interface boards (AIBs) developed by either IBM or third parties to interface with the co-processor adapter without requiring any modification to the adapter. The AIB attaches to the co-processor adapter through a 140-pin connector. Interface signals exit the AIB through a multipin connector at the rear of this board. The co-processor adapter and the attached AIB occupy just one 32-bit expansion slot.

A set of operating system packages is available electronically; each contains ARTIC960 drivers and utilities to support a runtime environment for a particular operating system such as OS/2 or AIX.

Another electronically available software package is the **Developer's Kit**. The Developer's Kit is a set of publications and programs designed to help ARTIC960 AIB software developers develop for the ARTIC960 platform. The following items make up the Developer's Kit:

- *IBM ARTIC960 Co-Processor Platform Hardware Technical Reference* presents technical details of the adapter's system, options, and hardware interfaces. It provides descriptions and data related to the card configuration, functions, hardware interfaces, and programming considerations.
- *IBM ARTIC960 Co-Processor Platforms Programmer's Guide and Reference* provides an overview of both the adapter kernel support and the operating system support. It also describes the associated processes and utilities, as well as each of the services provided by the system unit support and the adapter kernel support.
- *IBM ARTIC960 Co-Processor Platform Application Interface Board Developer's Guide* provides the hardware and the software developer with AIB design requirements, and a collection of productivity tools to aid in the development of an AIB.
- A set of operating system packages, each containing sample programs and utilities to support the development of system unit and adapter applications. These packages are to be used with the *IBM ARTIC960 Co-Processor Platforms Programmer's Guide* and the *IBM ARTIC960 Co-Processor Platform Application Interface Board Developer's Guide*.

You can obtain these publications from the World Wide Web (WWW) at:

<http://wwprodso1n.bocaron.ibm.com/artic/>

If you do not have access to the WWW, you can obtain these publications from the no-fee Developer's Assistant Program (DAP), which also provides technical question-and-answer (Q&A) services supported by telephone and E-mail.

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

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

---

## **Specifications**

### **Size**

Length: 312 mm (12.2 inches)  
Depth: 106 mm (4.2 inches)

### **Environment**

- Air Temperature:
  - Operating: 10°C through 32°C (50°F through 95°F)
  - Non-Operating: 10°C through 43°C (50°F through 110°F)
- Humidity:
  - Operating: 8% through 80%.
  - Wet Bulb Temperature: 29.4°C (85°F)

### **Electrical**

- Power Requirements
  - +5 Vdc, 2.5 A (nominal)
  - +12 Vdc, 0 mA
  - 12 Vdc, 0 mA
- Power Dissipation
  - (Typically) 6.5 Watts





---

## Chapter 2. Installation

This chapter lists the contents of the IBM ARTIC960 PCI Co-Processor Platform package, and provides the hardware installation requirements and information for setting up and installing the co-processor adapter. Each IBM ARTIC960 PCI Co-Processor Platform package includes the following:

- IBM ARTIC960 PCI Co-Processor Platform, containing 1MB of instruction memory and no packet memory. (At least 1MB of packet memory must be installed on the co-processor adapter.)
- *Guide to Operations* book (with Warranty Statement).

### Options

Packet memory modules, application interface boards (AIBs), interface cables for the AIBs, and wrap plugs are available as options. Refer to the *4-Port Multi-Interface Application Interface Board Supplement to the Guide to Operations for the IBM ARTIC960 Co-Processor Platform/IBM ARTIC960 PCI Co-Processor Platform* for a description of the IBM-developed AIBs and associated cabling accessories.

---

## Installation Requirements

The FCC statement in Appendix B, "Notices" may be different than the FCC statement in the manual that came with your system. Use the FCC statement in this manual for the system unit that will contain the IBM ARTIC960 PCI Co-Processor Platform.

### Hardware Requirements for IBM Computers

The IBM ARTIC960 PCI Co-Processor Platform requires a full-length, 5-volt, 32-bit slot. It can be installed into any PCI/ISA or PCI/Micro Channel-compliant computer.

## Handling Static-Sensitive Devices

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

- Keep the adapter in its anti-static bag until you are ready to install it.
- Make the least possible movement with 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 switch off power before removing an adapter from the system unit.
- *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.

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## Installation Instructions

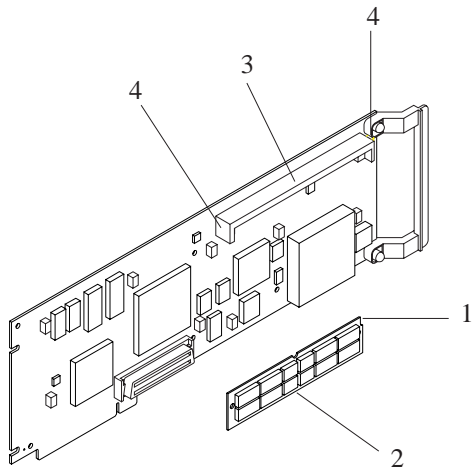
**Note:** Before performing any hardware installation, read “Handling Static-Sensitive Devices.”

Use the steps that follow to perform the hardware installation tasks appropriate for your computer system.

**Note:** For some RISC System/6000 system installations, the Packet Memory Module, the Co-Processor Platform, and the AIB are supplied already assembled as one unit.

## Step 1: Install the Optional Packet Memory Module onto the Co-Processor Platform

1. Hold the co-processor adapter (still wrapped in the anti-static bag) in one hand and touch a metal part of your system unit with the other hand. This places your body and the co-processor adapter at the same ground potential, thereby preventing an accidental static discharge.
2. Carefully remove the co-processor adapter and the packet memory module from their respective anti-static packages. Be sure to grasp these items by the edges only; do not touch the component pins or solder joints.
3. Hold the packet memory module **2** (as shown) with the notch **1** on the right, facing towards the handle of the co-processor adapter.
4. Insert the packet memory module at an angle (approximately 45°) into the connector **3**.
5. Place your thumbs on the top corners of the packet memory module; press it towards the co-processor adapter until the memory module snaps into the retainer clips **4**.



## Step 2: Configure AIB Bracket and Stiffener

The bracket and stiffener attached to your AIB should look like those in Figure 2-1.

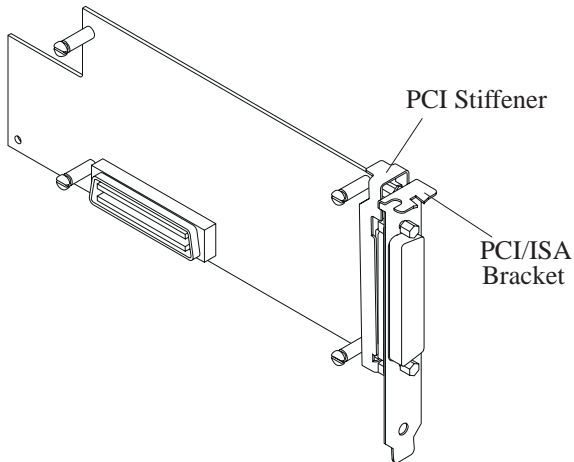


Figure 2-1. PCI/ISA Bracket and Stiffener

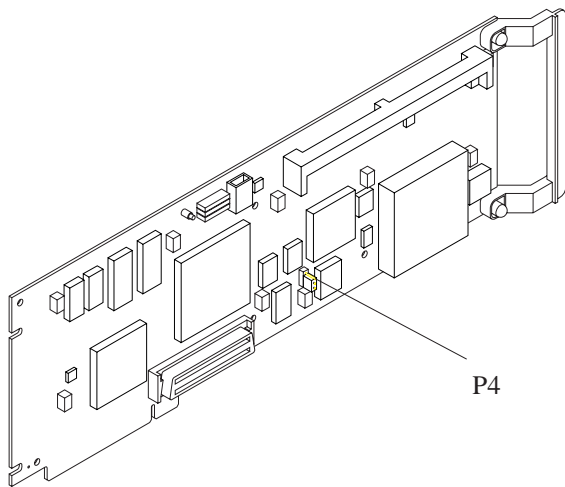
If they do not look like this illustration, do the following.

1. Carefully remove the AIB from its anti-static bag. Remember to grasp the circuit board by the edges only; do not touch the components or the solder joints.
2. Remove the L-shaped PCI/ISA bracket and PCI stiffener from the plastic bag.
3. Using a 3/16-inch hex nut driver, remove the bracket and stiffener currently attached to the AIB, and store them in a safe place.
4. Using the 3/16-inch hex nut driver and the hex screws and washers you removed in the previous step, attach the PCI/ISA bracket and stiffener so it looks like Figure 2-1.

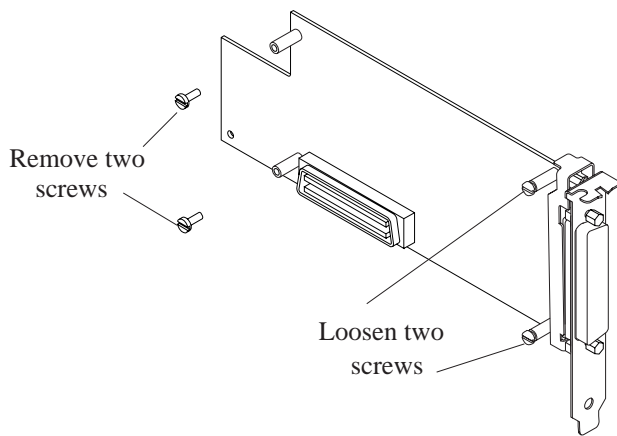
For information concerning the functional pin assignments and technical details of the 140-pin connector (AIB interface) on the co-processor adapter, refer to the *IBM ARTIC960 Co-Processor Platform Hardware Technical Reference* manual.

### Step 3: Install the AIB onto the Co-Processor Platform

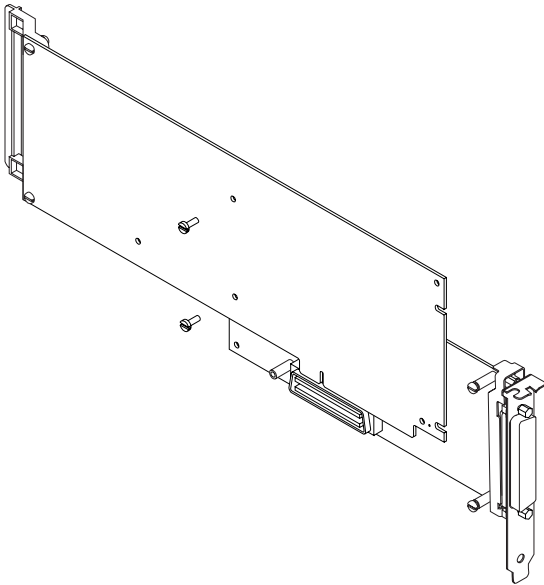
1. Verify that the jumper plug on **P4** of the co-processor adapter is installed between pins 1 and 2. (A new co-processor adapter is shipped this way.)



2. The AIB attaches to the co-processor adapter with four screws. Only two of the screws have to be removed from the AIB during the installation procedure; however, the other two screws must be loosened a few turns to allow the slots in the co-processor adapter to slide under the screw heads. As shown in the following figure, loosen two screws, and then remove the two screws from the standoffs on the component side of the AIB.

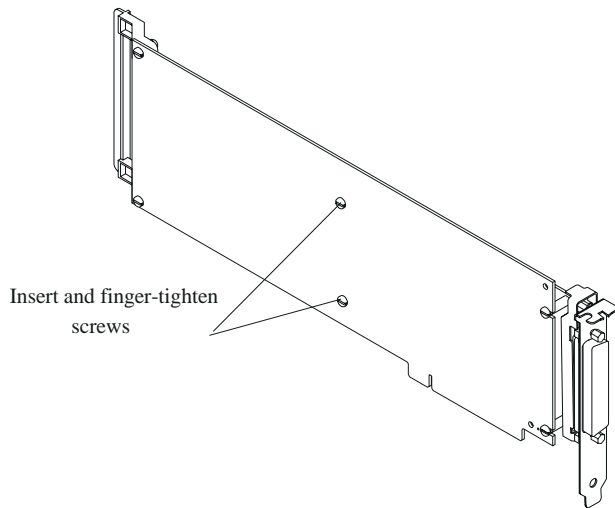


3. Slide the co-processor adapter over the AIB standoffs containing the screws.

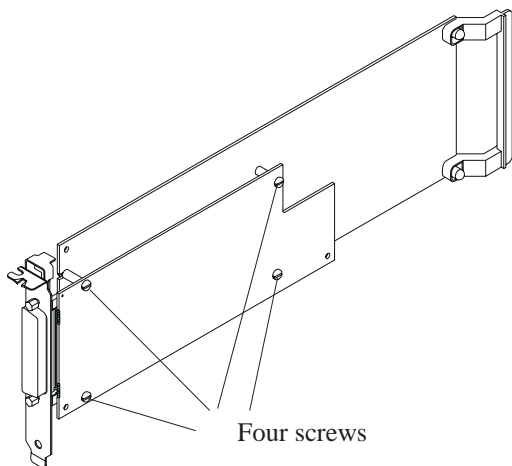


4. Align the connector on the AIB with the mating connector on the co-processor adapter.
5. Inspect the alignment of the two connectors to ensure they are mating correctly. Misalignment could cause damage to the co-processor adapter and the AIB.
6. Firmly press the AIB and the co-processor adapter connectors together.

7. Insert the two screws through the two holes of the co-processor adapter and finger-tighten these screws.



8. Tighten all four screws on both sides of the co-processor adapter AIB assembly, but do not overtighten them.





## **Step 4: Install the Co-Processor Platform and Attached AIB into the System Unit**

**Note:** For specific cover removal and adapter installation instructions, refer to the Operating and Installation documentation provided with your computer system.

1. Set all power switches for your system unit to 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 expansion slot in your system unit that supports a full-length PCI adapter card.
6. Loosen the expansion-slot screw and remove the expansion-slot cover.
7. Install the co-processor adapter and attached AIB by firmly pressing it into the expansion-slot connector until it clicks into place.
8. Before tightening the expansion-slot screw, ensure there is no interference with adjacent expansion-slot screws. Then tighten the expansion-slot screw to lock the co-processor adapter in place.
9. If you have other adapters (or options) to install, do so now. Refer to the Operating and Installation documentation provided with your computer system if more information is required for the other adapters or options.
10. Replace the system unit cover.
11. Reconnect all cables previously removed from the system unit.
12. Plug all power cords into electrical outlets.

## Step 5. Download the Diagnostics and Operating System Support Programs

Diagnostics and support programs for various operating systems are available with the purchase of this card. Specific operating system support programs can be obtained through either the World Wide Web (WWW) or the Bulletin Board System (BBS).

**Note:** The IBM ARTIC960 Platforms Operating System Support Programs have no compatible interfaces to prior IBM Realtime Interface Co-Processors.

### Downloading from the WWW

Do the following.

1. Using a Web Browser of your choice, open the Universal Resource Locator (URL):  
`http://wwprodsoln.bocaratn.ibm.com/artic/file_rep.html`
2. Select **Operating System Support**.
3. Select the operating support you want.
4. Download the **Program** file.
5. Download the **Installation/File Creation Instructions** file.
6. Follow the steps in the Installation/File Creation Instructions file for installing and configuring the product support.

### Downloading from the BBS

Do the following.

1. Dial the U.S.A. number **561-443-0134**. Your modem settings should be as follows:

<b>Data Bit</b>	8
<b>Parity Bit</b>	N
<b>Stop Bit</b>	1
2. Select the operating system support you want.
3. Choose the **Transfer Protocol** supported by your communications software.

4. View online or download the **Readme/Instruction** file.
5. Follow the instructions in this file for downloading and installing the program support or diagnostics.

### **Obtaining Operating System Software when WWW/BBS Support Is Unavailable**

For those who are unable to retrieve the files from either the WWW 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@vnet.ibm.com**

---

### **Problem Determination Procedures**

For system testing information, refer to the manual supplied 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, industrial computer, or device with which you are trying to communicate (such as a printer)
- Communications link
- Attached communications devices, such as a modem
- Communications cable.

To test the ARTIC960 PCI adapter or an AIB attached to an ARTIC960 PCI Adapter, refer to the operating system support programs you downloaded from the WWW or BBS in "Step 5. Download the Diagnostics and Operating System Support Programs" on page 2-10. If no problems are found, have the system unit serviced.



---

## Chapter 3. AIB Removal Procedure

To remove an AIB from an ARTIC960 PCI adapter, do the following.

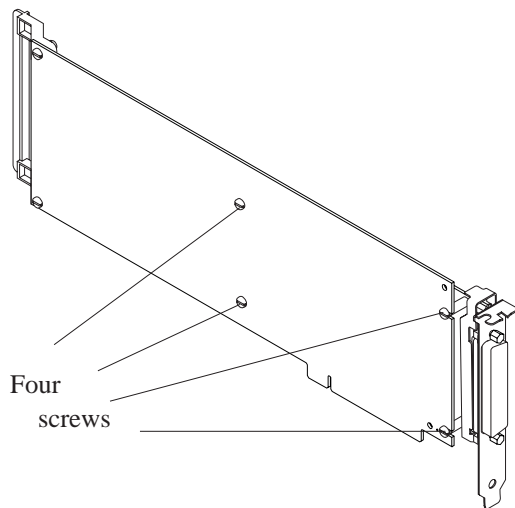
1. Set all power switches for your system unit to Off.
2. Unplug the power cords from the electrical outlets.
3. Disconnect all cables from the rear of the system unit.
4. Remove the system unit cover.
5. Locate the assembled co-processor adapter (containing the suspect AIB) in your system unit and record the slot number.
6. Loosen the expansion-slot screw that locks the assembled co-processor adapter in place.
7. Remove the assembled co-processor adapter from the system unit by grasping the handle and the connector bracket, and pulling upward.

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

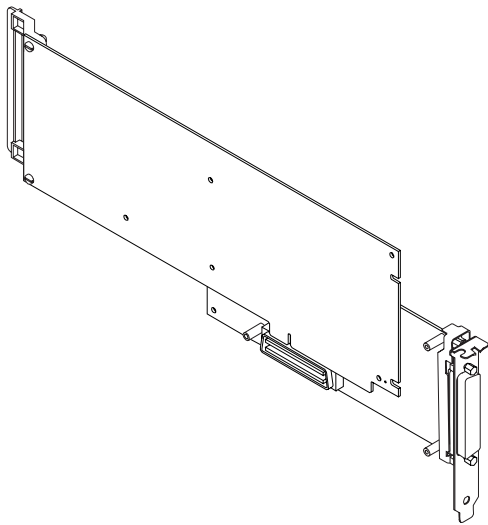
8. Remove the four screws on the assembled co-processor adapter. (The two cards are still held together by the AIB connector.)

**Attention:**

Do not attempt to expedite the removal by simply *loosening* the two screws in the slotted holes. Damage could result when you attempt to separate the two cards.



9. Carefully separate the AIB from the co-processor adapter.  
(Remember, the two cards are held together by the AIB connector near the bottom of each card.)



10. Reinstall just the co-processor 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. Switch on power to your computer system.





## Appendix A. Diagnostic Information

### IBM ARTIC960 PCI Co-Processor Platform

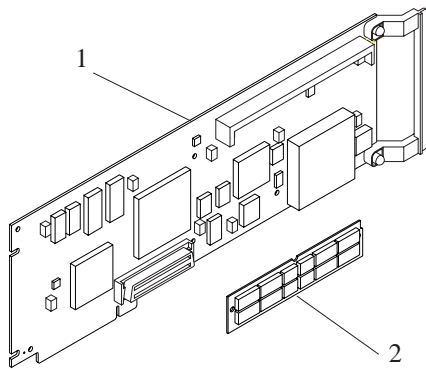


Table A-1. Co-Processor Platform Parts Listing

Index	Description	FRU No.
1	IBM ARTIC960 PCI Co-Processor Platform with a minimum of 1MB of instruction memory and without item 2	39G8084
2	4MB packet memory module	70F9973
2	8MB packet memory module	71G6450
2	16MB packet memory module	43G1796
--	Miscellaneous Hardware Kit, consisting of: <ul style="list-style-type: none"> <li>• Micro Channel bracket</li> <li>• 78-pin PCI bracket</li> <li>• Micro Channel stiffener</li> <li>• PCI stiffener</li> <li>• Micro Channel Card Retainer</li> <li>• PCI Card Retainer</li> <li>• Shield Screw Locks (2)</li> <li>• Card Insulator Shield</li> <li>• Standoffs (4)</li> <li>• Standoff Screws (4)</li> <li>• Cable Screws (4) 4-40, Male</li> <li>• Cable Screws (2) M3, Male</li> </ul>	61G2917

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## **RICDIAG Utility**

The RICDIAG utility can be used to diagnose problems with the ARTIC960 PCI adapter. This utility is included with the operating system support you must download. See “Step 5. Download the Diagnostics and Operating System Support Programs” for information about how to download the software support and diagnostics information.

For details on how to run the RICDIAG utility and diagnose problems, refer to “Using the RICDIAG Utility” in the following files you downloaded from the WWW or BBS:

**Installation/File Creation Instructions** file from the WWW  
**Readme/Instruction** file from the BBS.

---

## **Appendix B. 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.

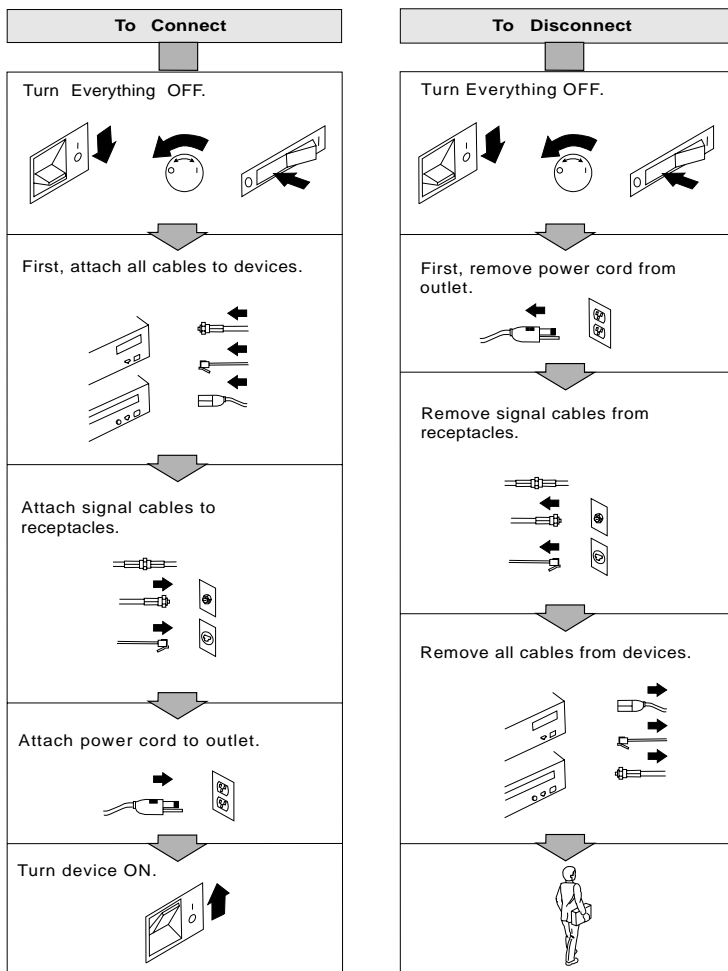
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IBM Corporation  
Purchase, NY 10577

## 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.

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## **Required Electronic Emission and Connectivity Notices**

### **Class A Federal Communications Commission Statement**

#### **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.

## **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 Deutschland Informationssysteme GmbH  
Pascalstrasse 100  
70548 Stuttgart

Dieses Gerät erfüllt die Bedingungen der EN 55022 Klasse B.

## Japan

This equipment is in the 2nd Class category (information equipment to be used in a residential area or an adjacent area thereto) and conforms to the standards set by the Voluntary Control Council for Interference by Information Technology Equipment aimed at preventing radio interference in such residential areas.

When used near a radio or TV receiver, it may become the cause of radio interference.

Read the instructions for correct handling.

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Guide to Operations

Part Number 87H3294

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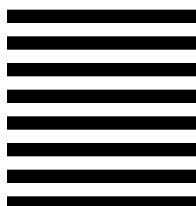
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