



IBM ARTIC960 4-Port T1/E1 Mezzanine Card Guide to Operations



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Important

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

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

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About This Book

This book describes the IBM ARTIC960 4-Port T1/E1 Mezzanine Card (hereafter referred to as the *mezzanine card*) and provides step-by-step installation instructions. When you have finished reading this book, you should be able to:

- Install the mezzanine card on a base adapter
- Download diagnostic and operating system support programs
- Locate optional cable connector pin numbers and assignments
- Obtain a list of replaceable parts
- Run a wrap test on connectors and cable ends

Terminology Note

Throughout this book, any adapter that supports a mezzanine connection will be referred to as a *base adapter*.

Who Should Read This Book

This book is written for an experienced computer user or a person who sets up the mezzanine card in conjunction with any adapter that supports a compatible mezzanine card connection.

Related Information

- Operating and installation documentation provided with any base adapter 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://www.radisys.com/support/artic/ibm>

Chapter 1. Product Description

The IBM ARTIC960 4-Port T1/E1 Mezzanine Card is an optional card that can be used with IBM ARTIC adapters that support a full-size PCI daughter card with a PMC connection.

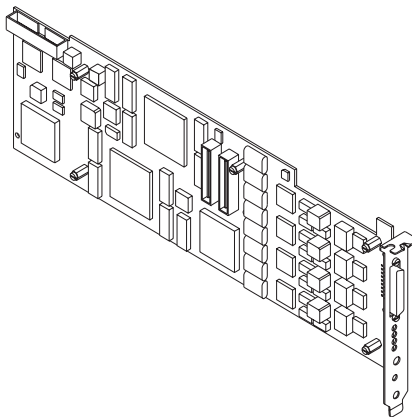


Figure 1-1. IBM ARTIC960 4-Port T1/E1 Mezzanine Card

IBM Part Numbers

The following table lists the IBM part numbers for field-replaceable units (FRUs) associated with the mezzanine card.

Description	FRU Part No.
IBM ARTIC960 4-Port T1/E1 Mezzanine Card	87H3428

Features and Function

The mezzanine card has the following features:

- Two dedicated IBM MWave Digital Signal Processors (DSPs)
- A serial ROM for configuration data
- An internal SC Bus connector
- Up to 32 channels for any of four T1/E1 digital communication lines

This mezzanine card connects to the base adapter by two 64-pin connectors. Interface signals connect to the mezzanine card through the 36-pin connector at the rear of the card. The base adapter and the attached mezzanine card occupy a single 32-bit expansion slot in personal computers that are peripheral component interconnect (PCI) compliant.

The 26-pin SC Bus connector allows the mezzanine card to connect to the SC buses on similarly-capable neighboring adapters in the system unit. The mezzanine card SC bus conforms to the Signal Computing System Architecture (SCSA) hardware model for real-time computer telephony.

Optional Cables

Optional cable assemblies are available for the mezzanine card. See Chapter 5, “Cables and Connectors” for information.

Specifications

The following describes the physical attributes, environment, and electrical requirements for the mezzanine card.

Size

Length: 319 mm overall (12.6 inches)
Depth: 131 mm overall (5 inches)

Environment

- Air temperature:
 - Operating: 0 to 55°C (32 to 131°F)
 - Non-Operating: –40 to 70°C (–40 to 158°F)
- Humidity:
 - Operating: 5% through 95%.
 - Wet Bulb Temperature: 29.4°C (85°F)

Electrical

No load on outputs, normal operating mode.

- Power Requirements
 - +3.3 V dc, 1.3 A (maximum)
 - +5 V dc, 2.1 A (maximum)

Manuals and Software Support

Manuals and software support (operating-system and diagnostic programs) are available for downloading at:

| <http://www.radisys.com/support/artic/ibm>

Chapter 2. Installation Requirements and Instructions

| This chapter provides instructions for installing the mezzanine card and attaching an optional cable.

Note: The IBM ARTIC960 4-Port T1/E1 Mezzanine Card 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 system unit would change to Class A. For more information, see "Class A Federal Communications Commission Statement" on page A-3.

Hardware Requirements

The mezzanine card requires an IBM ARTIC960 adapter or another base adapter that supports a full-size mezzanine card with a PMC connection.

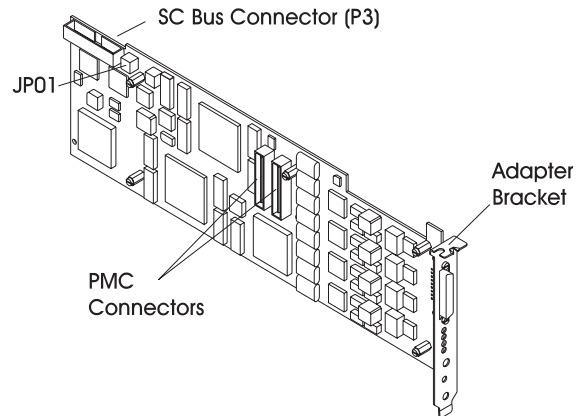
Handling Static-Sensitive Devices

Components for your mezzanine card can be damaged by static discharge. To prevent this damage, the card is shipped in an anti-static bag. Observe the following precautions when handling any static-sensitive device:

- Keep the device 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 an adapter. Always turn the computer off before removing an adapter from the system unit.
- *Do not touch the printed circuits, connector pins, or components.* Where possible, hold the circuit board by its edges or mounting hardware.
- Do not place the card on the system unit cover or on a metal table. The cover and metal table increase the risk of damage because they provide an electrical path from your body through the card.

Component Locations

The following shows some important locations on the mezzanine card.



Installation

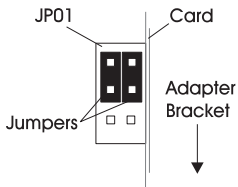
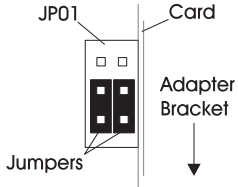
This section provides step-by-step instructions for installing the mezzanine card on the base adapter. This section also describes how to connect an optional cable to the mezzanine card and the base adapter.

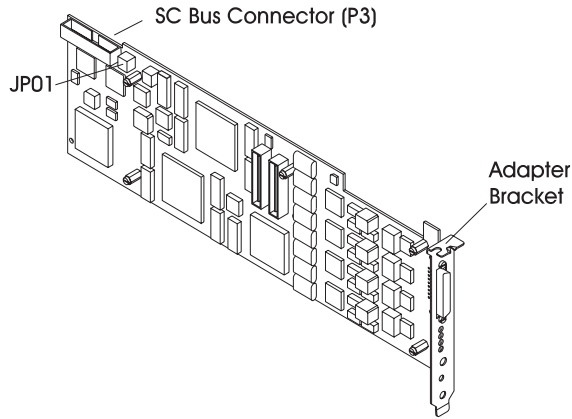
Step 1. Installing the Mezzanine Card

The following instructions assume that you have the base adapter out of the system unit and are ready to install the mezzanine card.

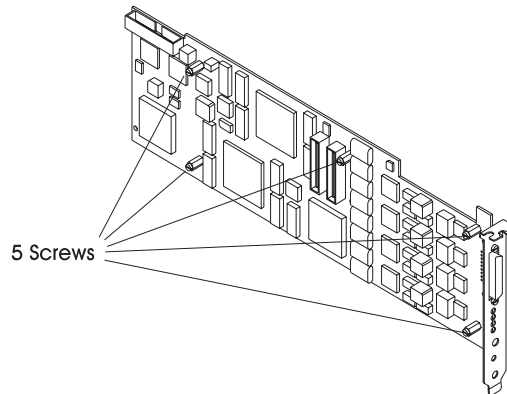
1. Place the base adapter on a clean, static-free surface with the component side up.
2. Hold the mezzanine card (still wrapped in the anti-static bag) in one hand and touch a metal part of your system unit with the other hand. This places your body, the mezzanine card, and the system unit at the same ground potential, preventing an accidental static discharge.
3. Remove the mezzanine card from the anti-static bag. Be sure to hold the circuit board by the edges only. Do not touch the component pins, solder joints, or connector contacts.

4. The jumpers at JP01 should be positioned based on the following conditions.

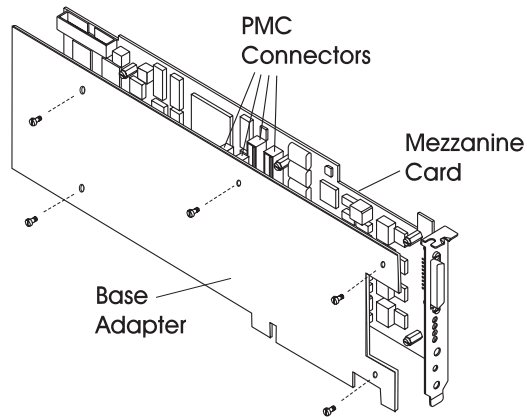
Jumper Positions	Condition
 <p>The diagram shows a side view of a card with an adapter bracket. JP01 is located on the card. Two jumpers are shown installed on the pins that are farthest from the adapter bracket. Labels include 'JP01', 'Card', 'Adapter Bracket', and 'Jumpers'.</p>	<p>If no cable will be connected to the SC bus connector (P3), or if the card will be connected to the end of the SC bus cable, ensure that the two jumpers at JP01 are installed, parallel with the card surface, on the pins that are farthest from the adapter bracket.</p>
 <p>The diagram shows a side view of a card with an adapter bracket. JP01 is located on the card. Two jumpers are shown installed on the pins that are closest to the adapter bracket. Labels include 'JP01', 'Card', 'Adapter Bracket', and 'Jumpers'.</p>	<p>Otherwise, install the jumpers on the JP01 pins that are closest to the adapter bracket.</p>



5. The mezzanine card attaches to the base adapter with up to five screws. Depending on the size of your base adapter, the two screws farthest from the adapter bracket may not be needed. Remove as many screws from the stand-offs as necessary for your base adapter.



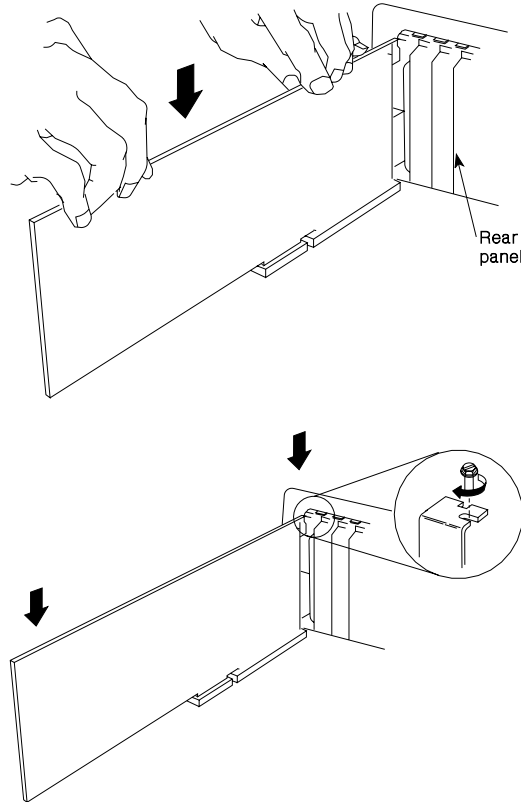
6. Position the mezzanine card over the base adapter with the component sides of both the mezzanine card and the base adapter facing each other.
7. Align the PMC connectors on the mezzanine card with the PMC connectors on the base adapter, and then press them together. Turn the assembled pair over so that the base adapter is on top. Re-install the screws you removed earlier.



Step 2. Installing the Base Adapter

The following describes how to install the base adapter, with the mezzanine card, into the system unit. For more information, refer to the documentation that came with the computer or the installation documentation that came with the base adapter.

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



2. Reinstall the system unit cover and reconnect all cables to their appropriate connectors (refer to the documentation that came with your computer).
3. If you plan to connect an optional cable to the mezzanine card, skip the next step and go directly to “Step 3. Connecting an Optional Cable.”
4. Plug all power cords into electrical outlets.

Step 3. Connecting an Optional Cable

DANGER

Do not connect or handle the cable during a lightning storm.

The following instructions assume that you have the base adapter in the system unit and are ready to attach an optional cable to the mezzanine card.

1. Align the 36-pin connector of the cable with the 36-pin connector at the rear of the mezzanine card.
2. Depress the latch buttons on either side of the cable connector and firmly press the cable connector into the 36-pin connector.
3. Release the latch buttons and make sure that the cable connector latches are securely seated.

If required, connect a lightning protection device to the other ends of the cable. Refer to the instructions that came with the device.

At the very least, the grounding strap on the lightning protection device should be connected to an earth-ground on or near the computer.

4. Connect one or more of the four ports of the optional cable to the target device. Each connector is marked with its port number.

Note: Moving the system unit with a cable attached can result in dislodging the base adapter or the mezzanine card. Should these (or any other adapters or cards) become dislodged while power is applied, proceed as follows:

1. Turn the computer off and unplug all power cords.
2. Remove the system unit cover.
3. Loosen the expansion-slot screw of the dislodged adapter. Press down on the top edge of the adapter to reseat it. Then, re-tighten the expansion-slot screw.
4. Reinstall the system unit cover and replug power cords.
5. Turn the computer on.

| **Step 4. Downloading the Diagnostic Programs**

| Download the adapter diagnostic and operating-system support programs from:

| <http://radisys.com/support/artic/ibm>

| For telephone assistance, call: **1-800-237-5511**. At the Voice Response Unit, enter **0** (ignore all other options).

| For e-mail assistance, send to: **artic@radisys.com**

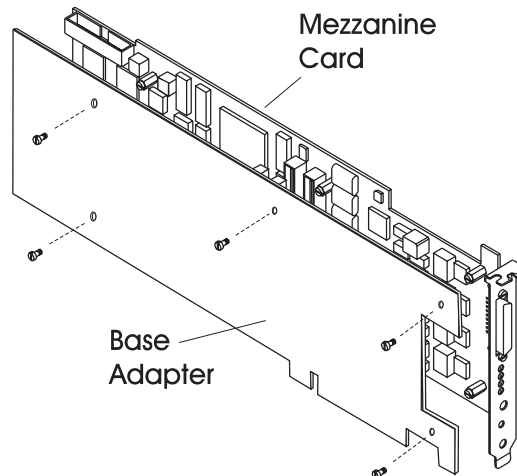
Chapter 3. Removing the Mezzanine Card

To remove the mezzanine card from a 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 mezzanine card and record its slot number.
6. Remove the expansion-slot screw that locks the assembled adapter in place.
7. Remove the assembled adapter from the system unit by grasping the top edge and pulling upward.

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

8. Remove the screws on the *base adapter* side of the assembled adapter. Although the two cards should still be held together by the PMC connectors, keep a firm grip on both cards.



9. Carefully separate the connector on the mezzanine card from the connector on the base adapter using a gentle rocking motion.
10. If you wish, you may reinstall just the base adapter in 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 mezzanine card attached to the base adapter, refer to the operating system support programs
| you downloaded from the Web in “Step 4. Downloading the Diagnostic Programs” on page 2-6. If no
| problems are found, have the system unit serviced.

Chapter 4. Troubleshooting

This chapter discusses how to identify possible problems with the mezzanine card. This chapter also describes how to:

- Run a wrap test on connectors and cable ends
- Obtain a list of wrap plug part numbers

Problem Determination

For system testing information, refer to the documentation 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:

- The host computer, industrial computer, or device with which you are trying to communicate (such as a printer)
- The base adapter to which the mezzanine card is attached
- An attached communications device, such as a modem
- The communications cable

| To test the mezzanine card attached to the base adapter, refer to the operating system support programs
| you downloaded from the Web in "Step 4. Downloading the Diagnostic Programs" on page 2-6. If no
| problems are found, have the system unit serviced.

Diagnostic Testing

The diagnostic program is designed to prompt you through making a wrap test selection, either to test the mezzanine card using the 36-pin connector of the mezzanine card, or to test one of the ports of the optional cable.

36-pin connector of the mezzanine card

If you choose to test the mezzanine card without a cable, you must connect the 36-pin wrap plug (part number 87H3502) to the 36-pin connector of the mezzanine card. After making this wrap plug connection, start the diagnostic program (if it is not already running) and respond to the test program prompts for this interface. The testing will proceed automatically.

One or more ports of the optional cable.

If you choose to test one or more ports on any of the optional cables on the mezzanine card, you must connect the appropriate wrap plug to the desired port (0, 1, 2, or 3) of the optional cable. After making this wrap plug connection, start the diagnostic program (if it is not already running) and respond to the test program prompts for this interface. The testing will proceed automatically.

Note: It is recommended that you disconnect the remaining ports on the same cable as the port you plan to test.

You will need a short 75-ohm BNC-male-to-BNC-male cable to test the BNC cables. Connect the cable between the *Transmit* and *Receive* connectors of the port you are testing.

You will need a short telephone patch cord to test the telephone jack cable. Connect the patch cord between the *Transmit (Tx)* and the *Receive (Rx)* connectors of the port you are testing.

Diagnostic Wrap Plugs

Table 4-1 lists the IBM part numbers of the wrap plugs used during wrap testing.

Description	Part Number
36-pin wrap plug	87H3502
RJ-48 plug cable wrap	87H3588

Chapter 5. Cables and Connectors

Optional cable assemblies (similar in general makeup to that in Figure 5-1) are available for the mezzanine card. They are designed to provide four ports of one electrical interface as follows.

- 4-port T1 RJ-48 cable
- 4-port E1 RJ-48 cable
- 4-port E1 BNC grounded cable
- 4-port E1 BNC ungrounded cable
- 4-port T1 Phone Jack cable

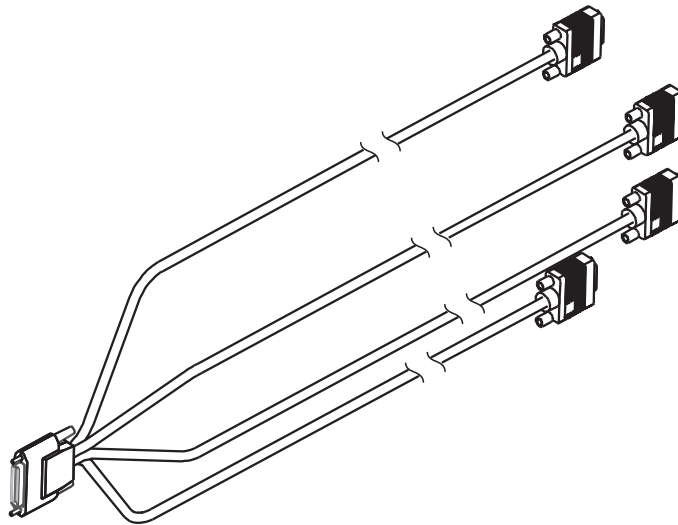


Figure 5-1. Typical 4-Port Cable Design

The T1 RJ-48 and the E1 RJ-48 assemblies consist of a 36-pin male connector at one end of a cable that branches into four individual cables, each of which provides access to one of four independent ports.

The T1 Phone Jack cable and the two E1 BNC cables (grounded and ungrounded) branches into four cables. Then, each of the four cables splits into two, resulting in eight connectors. Each of the four ports has two connectors: a transmit (Tx) connector and a receive (Rx) connector.

The following table lists the electrical interface and IBM part numbers associated with each optional cable.

Each cable assembly has two part numbers associated with it: a field-replaceable unit (FRU) number and an assembly number. Use the FRU part number to order a replacement cable. Use the assembly part number to identify the cable type (the assembly part number is printed on the cable assembly).

<i>Table 5-1. IBM Numbers for the Optional Cables</i>		
Electrical Interface	Part Number	
	FRU	Assembly
T1 RJ-48 jack	87H3518	87H3587
E1 RJ-48 jack	87H3515	87H3586
E1 BNC jack (grounded)	87H3521	87H3522
E1 BNC (ungrounded)	87H3629	87H3537
T1 Phone Jack	87H3524	87H3525
IBM ARTIC960 Surge Protection - RJ48	87H3651	87H3652
IBM ARTIC960 Surge Protection - BNC	87H3656	87H3657

Port Speeds

The mezzanine card supports four ports running simultaneously at a maximum data rate of 2 048 000 bps duplexed. The following table shows the maximum port speed supported for each electrical interface.

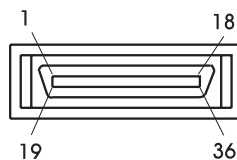
<i>Table 5-2. Port Speeds for the 4-Port T1/E1 Mezzanine Card</i>	
Electrical Interface	Maximum Speed (per port)
T1	1 544 000 bps
E1	2 048 000 bps

Connector Pin Numbers and Assignments

This section provides pin numbering and signal assignments for each of the optional cables. For each cable, a table shows the pin assignments for the 36-pin connector and the correlation to the four port connectors. Each signal is identified as input (I) or output (O), as viewed from the mezzanine card.

36-pin Connector

The individual signals for all ports connect to the mezzanine card through the 36-pin connector at the rear of the card. The following shows the male 36-pin connector at one end of the cable.



RJ-48 Jack Connector

The following illustration shows an RJ-48 jack connector. Table 5-3 lists the pin assignments for the T1 and E1 electrical interfaces. The “x” in the signal name is the number of the port. The ID is 9h for the T1; 1h for the E1.

Note: Use an AMP terminal block (part number 5-557972-3) to connect 28 AWG solid wire to the E1 RJ-48 cable.

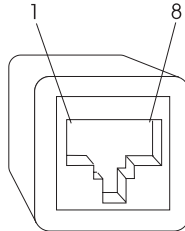


Table 5-3. RJ-48 Connector Pin Assignments

Signal Name	I/O	36-pin Connector				RJ-48 Connector
		0	1	2	3	
TX1_x	O	33	29	23	19	04
TX2_x	O	34	30	24	20	05
FGND_x	---	16	12	08	04	06,03
RX1_x	I	35	31	25	21	01
RX2_x	I	36	32	26	22	02
FGND	---	Housing				Housing

E1 BNC Connector (Grounded)

The following illustration shows a BNC connector. Table 5-4 lists the pin assignments for the E1 BNC electrical interface. The “x” in the signal name is the number of the port. The ID is 8h for the E1 grounded BNC.

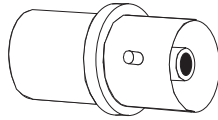


Table 5-4. E1 BNC (Grounded) Connector Pin Assignments

Signal Name	I/O	36-pin Connector				BNC Connector
		0	1	2	3	
TX1_x	O	33	29	23	19	TX inner conductor RX inner conductor
RX1_x	I	35	31	25	21	
FGND, TX2_x, RX2_x_	---	Housing, 20, 22, 24, 26, 30, 32, 34, 36				TX and RX outer conductors

E1 BNC Connector (Ungrounded)

The following illustration shows a BNC connector. Table 5-5 lists the pin assignments for the E1 BNC electrical interface. The “x” in the signal name is the number of the port. The ID is Ch for the E1 ungrounded BNC.

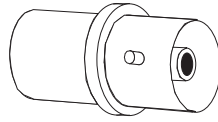
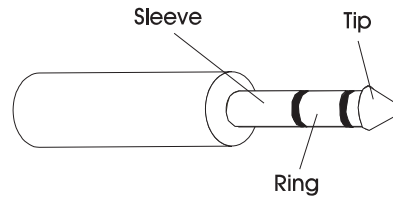


Table 5-5. E1 BNC Connector (Ungrounded) Pin Assignments

Signal Name	I/O	36-pin Connector				BNC Connector
		0	1	2	3	
TX1_x	O	33	29	23	19	TX inner conductor
RX1_x	I	35	31	25	21	RX inner conductor
RX2_x	I	36	32	26	22	RX outer conductor
FGND, TX2_x	---	Housing, 20, 24, 30, 34				TX outer conductor

T1 Phone Jack Connector

The following shows the T1 phone jack plug that matches the T1 phone jack connector. Table 5-6 lists pin assignments for the electrical interface. The “x” in the signal name is the number of the port. The ID is Ah for the T1 phone jack connector.



Signal Name	I/O	36-pin Connector				Phone Jack Connector
		0	1	2	3	
TX1_x	O	33	29	23	19	TX Tip
TX2_x	O	34	30	24	20	TX Ring
RX1_x	I	35	31	25	21	RX Tip
RX2_x	I	36	32	26	22	RX Ring
FGND	---	Housing, 4, 8, 12, 16				TX and RX Sleeve

Appendix A. 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.

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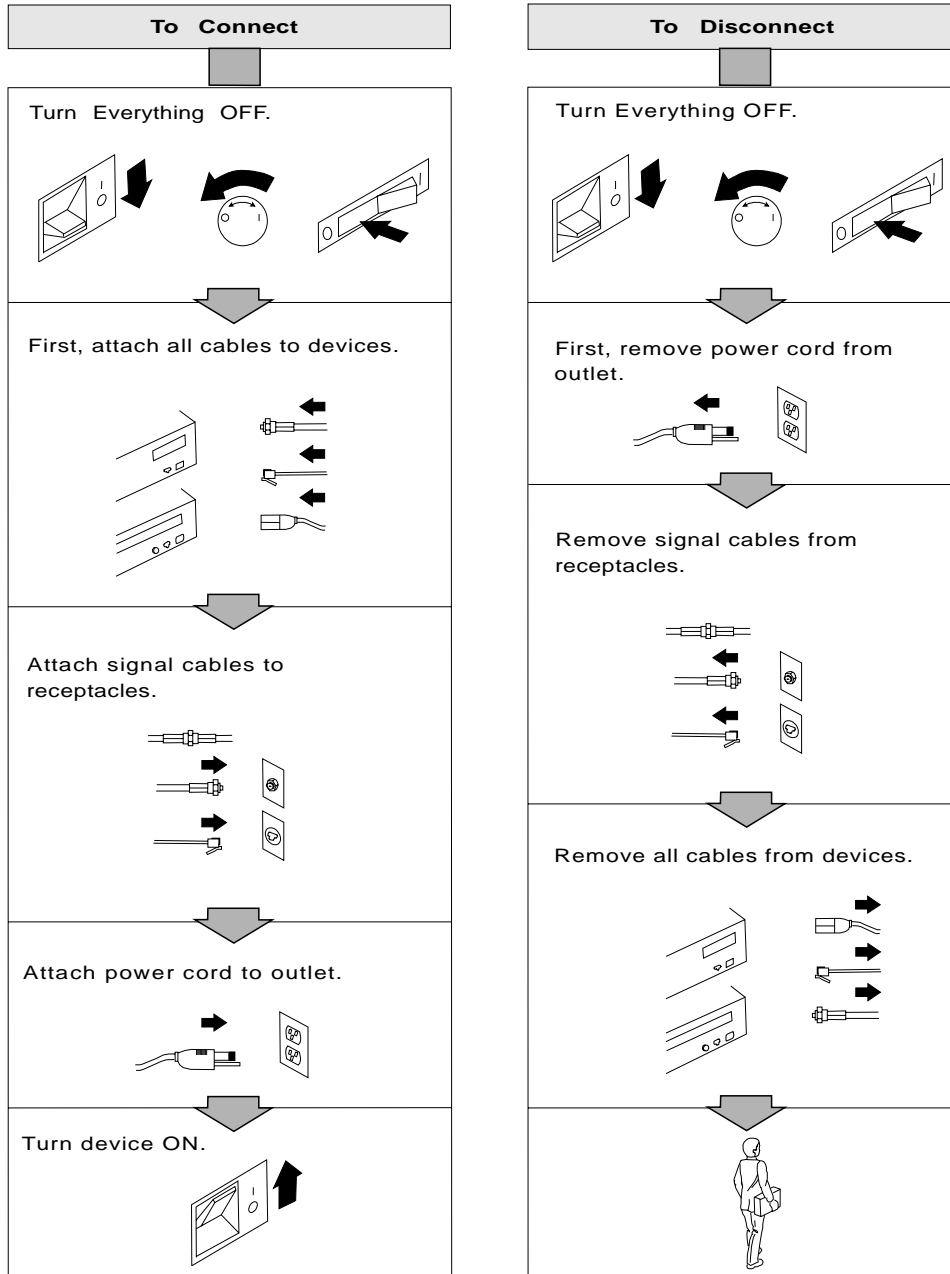
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All other trademarks, registered trademarks, service marks, and trade names are property of their respective owners.

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

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 complies with the Canadian ICES-003.

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

United Kingdom

Notice to United Kingdom Users

This apparatus is approved under General Approval number NS/G/1234/J/100003 for indirect connection to public telecommunications systems in the United Kingdom.

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:

RadiSys Corporation
5445 NE Dawson Creek Drive
Hillsboro, OR 97124 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

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

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラス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。

Australia

Australian Telecommunications Statement

WARNING

THIS CARD SHOULD BE CONNECTED TO TELECOMMUNICATIONS NETWORK
THROUGH AN ACA APPROVED CHANNEL SERVICE UNIT (CSU).

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