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IBM 8209 Local Area Network Bridge

SA21-9994-01

**Customer Information**

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## **Second Edition (September 1990)**

This is a major revision of and obsoletes *IBM 8209 LAN Bridge Customer Information*, SA21-9994-0. Refer to the Summary of Changes page for details about the changes. Changes are made periodically to the information herein; these changes will be incorporated in new editions or this publication.

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2. To prevent a possible electrical shock when adding the device to a system, disconnect all power cords, if possible, from the existing system before connecting the signal cable to that device.

**DANGER**

To prevent a possible electrical shock from touching two surfaces with different electrical grounds, use one hand, when possible, to connect or disconnect signal cables.

**DANGER**

To prevent a possible electrical shock during an electrical storm, do not connect cables or station protectors for communications lines, display stations, printers, or telephones.



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## About This Manual

The primary purpose of this manual is to provide information about planning, installing, configuring, and using the IBM® 8209 LAN Bridge (IBM 8209) in a local area network (LAN). This manual can be used to begin problem analysis procedures.

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## Who Should Use This Manual

This manual was written for anyone planning to install and use an IBM 8209. This manual contains information and instructions for IBM 8209 planning, installation, configuration, operation, and problem resolution. These instructions or tasks can be done by a network administrator or installation planner.

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## What You Should Know

To install and use the IBM 8209, you will need:

- This *Customer Information* manual
- The *Attachment Module Guide*, which is both packaged with each attachment module and available separately
- Information from some of the publications listed in “Related Publications” on page ix.

You should be familiar with the communications needs of your organization. You do not need a background in LANs, but you will need to be familiar with the physical organization and objectives of the LAN in which the IBM 8209 will be installed.

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## How This Manual Is Organized

This manual contains the following chapters and appendixes:

- Chapter 1 summarizes the capabilities of the IBM 8209 as it functions in a LAN.
- Chapter 2 describes how to select and prepare a physical location for the IBM 8209, and how to plan for basic and advanced configuration.
- Chapter 3 contains instructions for installing the IBM 8209 and for performing basic configuration.
- Chapter 4 contains step-by-step procedures to help you identify and resolve problems when the IBM 8209 stops working or does not work as expected.
- Appendix A contains a blank Planning Checklist that you can copy and use as needed.
- Appendix B contains information about how the IBM 8209 operates.
- The last part of this manual contains a list of abbreviations, a glossary, and an index.

## Related Publications

Table 0-1 lists some related IBM manuals and the topics they address.

Title	Planning	Installation	Network Software	Network Theory	Problem Determination
<i>IBM 8209 LAN Bridge Attachment Module Guide</i> , packaged with the module		X	X		
<i>IBM 8209 LAN Bridge Service Information</i> , SY31-9077					X
<i>A Building Planning Guide for Communication Wiring</i> , G320-8059	X				
<i>Introduction to Local Area Networks</i> , GC20-8203	X			X	
<i>IBM Cabling System Planning and Installation Guide</i> , GA27-3361	X	X			X
<i>Using the IBM Cabling System with Communication Products</i> , GA27-3620	X				
<i>IBM Token-Ring Network Introduction and Planning Guide</i> , GA27-3677	X	X			
<i>IBM Token-Ring Network Installation Guide</i> , GA27-3678		X			X
<i>IBM Token-Ring Network Architecture Reference</i> , SC30-3374				X	
<i>IBM Token-Ring Network Problem Determination Guide</i> , SX27-3710					X
<i>IBM Token-Ring Network Guide for Small Networks</i> , SK2T-0300	X	X			X
<i>IBM Token-Ring Network Telephone Twisted-Pair Media Guide</i> , GA27-3714	X	X			X
<i>IBM Token-Ring Network Optical Fiber Cable Options</i> , GA27-3747	X				
<i>IBM Local Area Network Administrator's Guide</i> , GA27-3748	X	X	X	X	X
<i>IBM Cabling System Catalog</i> , G570-2040	X	X			
<i>IBM Cabling System Technical Interface Specification</i> , GA27-3773	X	X			
<i>IBM LAN Manager User's Guide</i> , packaged with program diskettes			X		X
<i>IBM Local Area Network Technical Reference</i> , SC30-3383				X	
<i>IBM Token-Ring Network Bridges and Management</i> , GG24-3062	X	X		X	
<i>Local Area Network Concepts and Products</i> , GG24-3178	X	X	X	X	
<i>IBM LAN Manager and NetView/PC Planning and Installation for Token-Ring Networks</i> , GG24-3128	X	X	X		

<i>Table 0-1 (Page 2 of 2). Related Publications</i>					
<b>Title</b>	<b>Planning</b>	<b>Installation</b>	<b>Network Software</b>	<b>Network Theory</b>	<b>Problem Determination</b>
<i>Installation Guidelines for IBM Token-Ring Network Products, GG24-3291</i>	X	X			
<i>IBM Multisegment LAN Design Guidelines, GG24-3298</i>	X	X		X	
<i>IBM LAN Manager V2.0 and LAN Manager Entry V1.0 Installation Guidelines, GG24-3388</i>	X	X	X		

The following publications contain additional information:

- *IBM 8209 LAN Bridge Safety Information* (packaged with the IBM 8209)
- *Institute of Electrical and Electronics Engineers 802.3 Local Area Network Considerations, GG22-9422*
- *IEEE Standards for Local Area Networks: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications, ANSI/IEEE Standard 802.3-1985 ISO Draft International Standard 8802/3, May 1986.*
- *IEEE Standards for Local Area Networks: Token-Ring Access Method and Physical Layer Specifications, ANSI/IEEE Standard 802.5-1985 ISO Draft International Standard 8802/5, September 1986.*

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# Contents

<b>Chapter 1. Overview of the IBM 8209 LAN Bridge</b> .....	1-1
Functions of the IBM 8209 .....	1-3
Supported LAN Types and Protocols .....	1-4
Supported Network Configurations .....	1-5
Supported Cable Systems .....	1-6
<b>Chapter 2. Planning for IBM 8209 Installation</b> .....	2-1
IBM 8209 Planning Checklist .....	2-2
Selecting and Preparing a Place for the IBM 8209 .....	2-3
Network Documentation .....	2-3
Cables .....	2-3
Size and Weight .....	2-3
Air Space .....	2-4
Operating Environment .....	2-4
Power, Power Plugs, and Electrical Wiring Requirements .....	2-5
Power Plugs and Receptacles .....	2-5
Electrical Wiring .....	2-7
Lightning Protection .....	2-7
Magnetic Compatibility .....	2-8
Static Discharge .....	2-8
Noise Levels .....	2-8
Planning for Installation and Configuration .....	2-9
Planning for Attachment Module Basic Configuration .....	2-9
Planning for Advanced Configuration .....	2-10
Programs to Use for Advanced Configuration .....	2-11
<b>Chapter 3. Installation and Configuration</b> .....	3-1
Installing the IBM 8209 .....	3-2
Unpack the Parts and Check For Shipping Damage .....	3-2
Setting Up the IBM 8209 .....	3-4
<b>Chapter 4. Problem Analysis</b> .....	4-1
Wrap Test .....	4-3
The Power Light Is Off .....	4-10
The R (Ready) Light Is Off .....	4-12
The Token-Ring Light Does Not Come On .....	4-17
The A (Attachment Module) Light Does Not Come On .....	4-19
<b>Appendix A. Planning Checklist</b> .....	A-1
Planning Checklist .....	A-3
<b>Appendix B. How the IBM 8209 LAN Bridge Functions</b> .....	B-1
The IBM 8209 Functions .....	B-1
Routing Frames through Bridges .....	B-1
IBM 8209 Routing .....	B-3
Information Field Length .....	B-3
Network Address .....	B-4
Filtering .....	B-4
Spanning-Tree Protocol .....	B-4
Frame Format Conversion .....	B-5
An Example of a Network Using an IBM 8209 .....	B-6

<b>List of Abbreviations</b> .....	X-1
<b>Glossary</b> .....	X-3
<b>Index</b> .....	X-9

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## Figures

1-1.	The IBM 8209	1-1
1-2.	The IBM 8209 between IBM Token-Ring and Ethernet Networks	1-2
1-3.	IBM 8209 Connected to an IBM Token-Ring Network 8228 and an Ethernet Network Transceiver	1-4
1-4.	Using IBM 8209s in a LAN	1-5
2-1.	Power Plugs and Receptacles	2-7
3-1.	IBM 8209 Parts	3-3
3-2.	IBM 8209 Light Sequence	3-12
4-1.	IBM 8209 Light Sequence	4-7
B-1.	An Example of a Network Using an IBM 8209	B-6

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## Tables

0-1.	Related Publications	ix
2-1.	IBM 8209 Planning Checklist	2-2
2-2.	IBM 8209 Temperature and Humidity Ranges	2-4
2-3.	IBM 8209 Power Source Specifications	2-5
2-4.	Power Cord Plugs for Each Country	2-6
4-1.	IBM 8209 Problem Symptoms	4-9



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## Summary of Changes

The changes made with this revision are:

- Removal to a separate manual of information about the IBM 8209 LAN Bridge Attachment Module for Ethernet\*\* and IEEE 802.3 LANs

Each type of attachment module has its own manual.

- Enhanced IBM 8209 LAN Bridge Utility Program Version 2.0 (Utility Program) functions, and enhanced IBM 8209 network management, frame forwarding, and configuration functions
  - Ring Error Monitor (REM) management server
  - Configuration Report Server (CRS) management server
  - Filtering on source and destination address ranges
  - Locally administered address support
  - Capability to set the IBM 8209 link password from the Utility Program
  - Capability to save to a file and retrieve from a file the address database information
  - Use of general broadcast frames by the IBM 8209 for the IBM Token-Ring Network so that the most efficient route between IBM 8209s can be discovered.
  - Mapping of physical addresses between the LANs in both directions.



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## Chapter 1. Overview of the IBM 8209 LAN Bridge

The IBM\* 8209 LAN Bridge (IBM 8209) allows devices on an IBM Token-Ring Network segment to communicate with devices on another local area network (LAN) segment. For two LAN segments that use different transmission and access protocols, the IBM 8209 performs the required access protocol conversion and data format manipulation.

To a device on the IBM Token-Ring Network segment connected to the built-in token-ring connector, the IBM 8209 appears as a source-routing bridge to another IBM Token-Ring Network segment.

The appearance of the IBM 8209 to the stations on the other LAN segment depends on the type of network and protocol being used. For some networks, the IBM 8209 is functionally transparent to the stations on the network.

The IBM 8209 provides these LAN connections:

Connection	Description
<b>IBM Token-Ring Network</b>	This connection is a four-wire lobe connection. The maximum distance of the lobe cable from the IBM 8209 to the multistation access unit depends on the media type. The IBM 8209 supports both IBM Token-Ring Network data transfer rates: 4 Megabits per second (Mbps) and 16 Mbps.
<b>Another LAN segment</b>	This connection is provided by an attachment module that is inserted in the back of the IBM 8209.

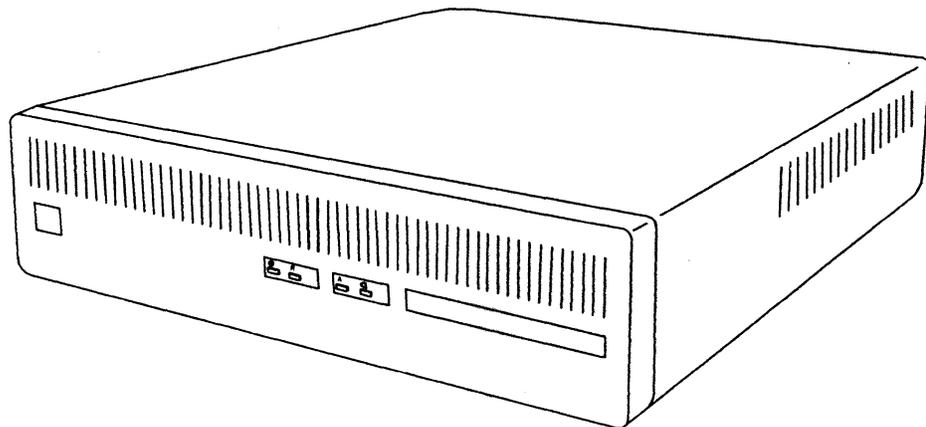


Figure 1-1. The IBM 8209

A simplified network connection diagram using the IBM 8209 is shown in Figure 1-2 on page 1-2. In this figure, the IBM 8209 connects an IBM Token-Ring Network segment and an Ethernet\*\* or IEEE 802.3 LAN segment.

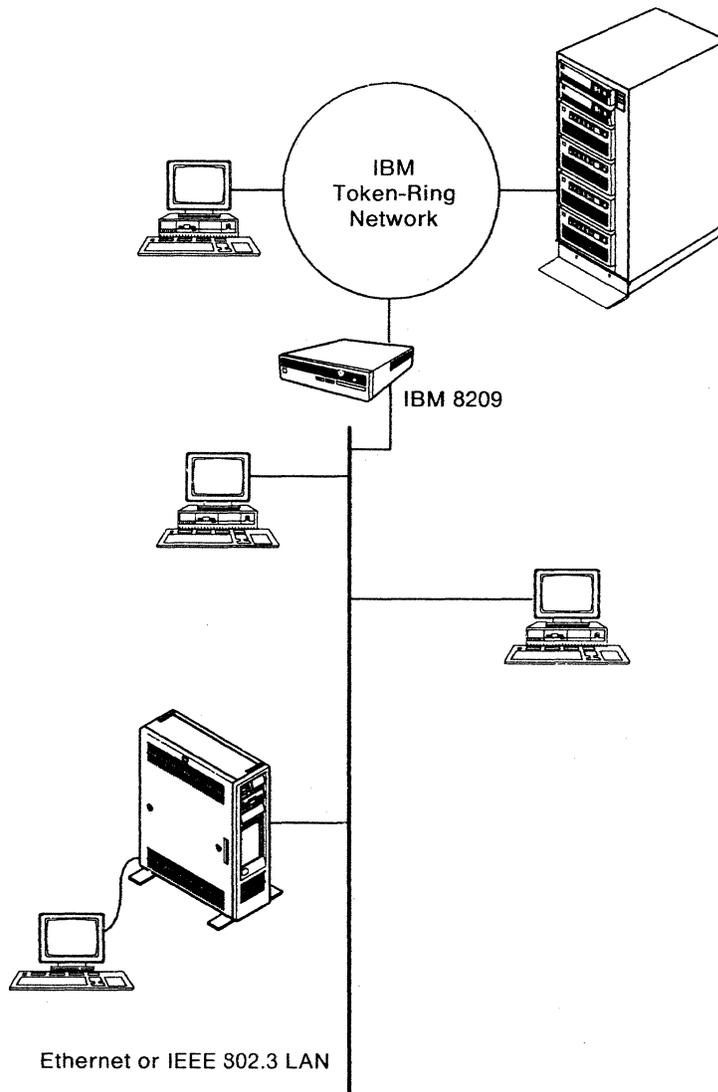


Figure 1-2. The IBM 8209 between IBM Token-Ring and Ethernet Networks

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## Functions of the IBM 8209

The IBM 8209:

- Transfers frames between stations on an IBM Token-Ring Network segment and stations on another LAN segment while performing any required protocol conversion and data format manipulation. For more information about conversions and data format manipulation, refer to the IBM 8209 LAN Bridge Attachment Module Guide (*Attachment Module Guide*) for the LAN attachment module used with the IBM 8209.
- Contains a connection and support for an IBM Token-Ring Network segment with a data transfer rate of either 4 or 16 Mbps.
- Allows IBM Token-Ring Network stations to communicate with stations on the other LAN and does not affect communications between IBM Token-Ring Network stations.
- Provides a medium access control (MAC) bridge function between an IBM Token-Ring Network segment and another LAN segment. For more information about MAC bridge functions, see “The IBM 8209 Functions” on page B-1.
- Provides *filtering*. Filtering is the process of providing isolation between the LANs so that unnecessary data transfer activity does not intrude into one network environment from the other network environment. This isolation process allows communication between devices on two active LAN segments without significantly increasing the contention problems on either LAN segment. For more information about filtering, see “Filtering” on page B-4, and refer to the information in the *Attachment Module Guide*.
- Provides LAN management support and configuration functions, though neither is required for running the IBM 8209 in many networks.
  - The IBM LAN Manager (LAN Manager), the IBM LAN Network Manager (LAN Network Manager), and the IBM 8209 LAN Bridge Utility Program (Utility Program) provide functions for modification of configuration parameters and for statistics gathering.
  - The IBM LAN Manager, the IBM LAN Network Manager, and NetView\* provide network management functions.

Figure 1-3 on page 1-4 shows the IBM 8209 connected to an IBM Token-Ring Network 8228 Multistation Access Unit and to a transceiver on an Ethernet or IEEE 802.3 LAN.

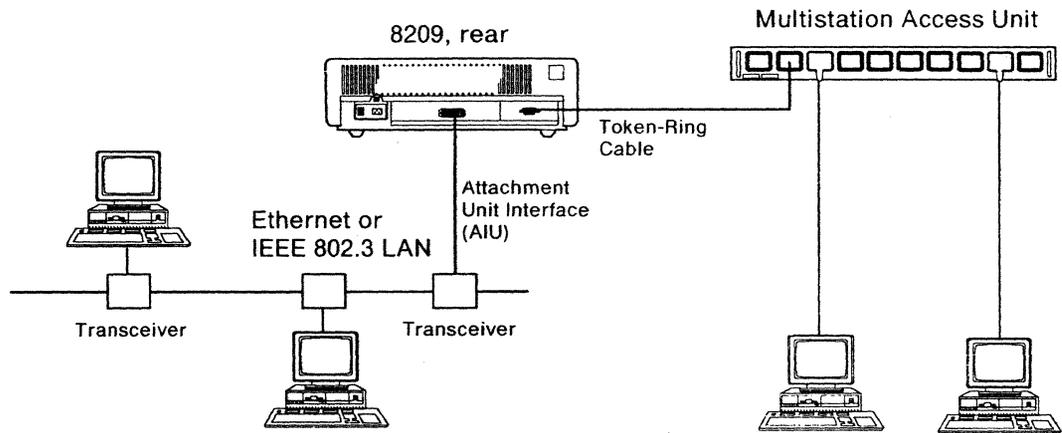


Figure 1-3. IBM 8209 Connected to an IBM Token-Ring Network 8228 and an Ethernet Network Transceiver

## Supported LAN Types and Protocols

The LAN connection and support built into the IBM 8209 is for an IBM Token-Ring Network segment.

The other LAN connection and support is provided by the attachment module inserted in the back of the IBM 8209.

The IBM 8209 supports the use of SNA, Network Basic Input/Output Services (NETBIOS), and Transmission Control Protocol/Internet Protocol (TCP/IP) on networks that use these protocols. The IBM 8209 does not limit the use of any protocols that are compatible for communication and that adhere to the industrial protocol standards for the two LANs that it connects.

Use of such protocols by stations on the LANs connected by the IBM 8209 may require IBM 8209 configuration parameter values to be changed from the preset factory default values.

See information in the *Attachment Module Guide* for:

- Considerations and specific details on using such protocols in the network with the IBM 8209
- Other IBM 8209 special configuration considerations for the LAN connected to the attachment module.

## Supported Network Configurations

The IBM 8209 supports communication between:

- Stations that are connected to a single IBM Token-Ring Network segment and stations that are connected to another LAN segment, with both LAN segments connected to the same IBM 8209 (as shown in Figure 1-2 on page 1-2).
- Stations that are separated from the IBM 8209 by one or more bridged LANs, for networks containing just IBM 8209s (see Figure 1-4), and for networks containing IBM 8209s and other types of bridges (see Figure B-1 on page B-6).

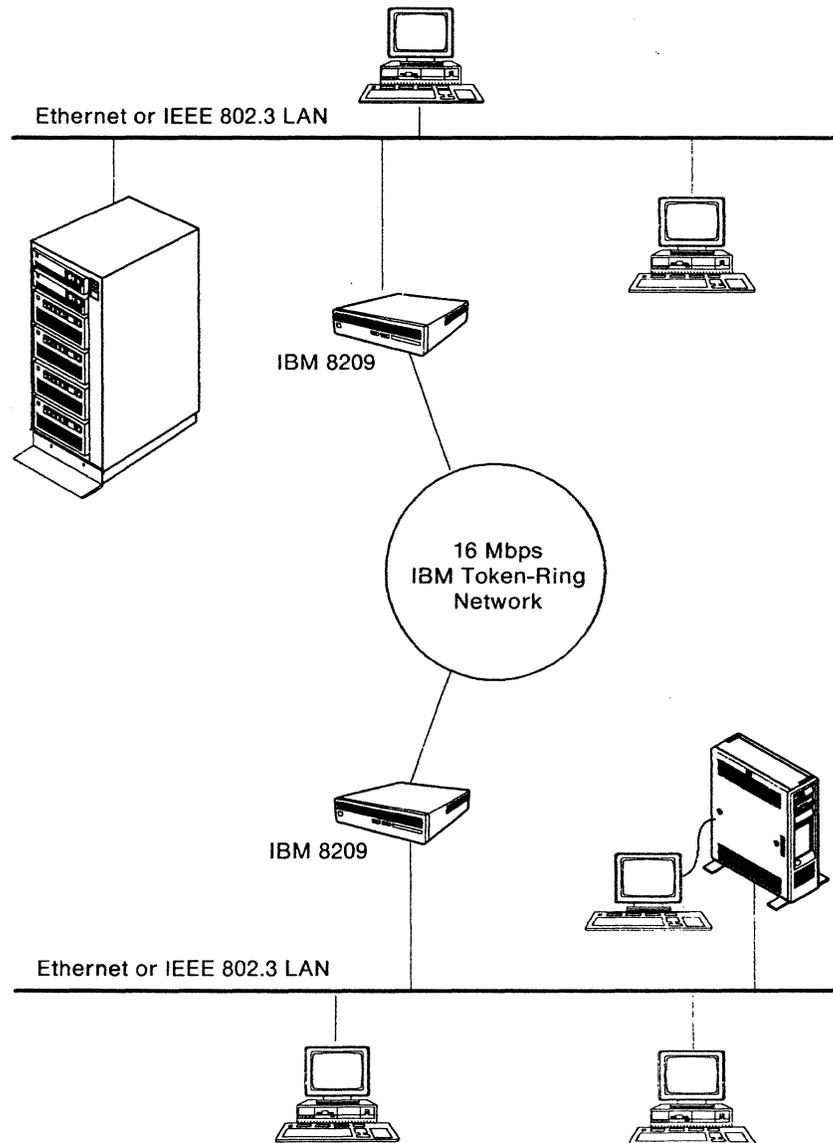


Figure 1-4. Using IBM 8209s in a LAN

For an example of how the IBM 8209 works with a network, see "An Example of a Network Using an IBM 8209" on page B-6. The IBM 8209 may be used in any of the IBM Token-Ring Network configurations recommended in the *IBM Token-Ring Network Bridges and Management Guide*.

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## Supported Cable Systems

The IBM 8209 supports the use of the IBM Cabling System media, including:

- Telephone twisted pair for use with a 4-Mbps IBM Token-Ring Network segment
- IBM Cabling System media type 1 or 2 for use with a 4- or 16-Mbps IBM Token-Ring Network segment
- Wiring that adheres to the recommendations and maximum lobe lengths for the LAN connected to the attachment module.

For wiring recommendations and the maximum lobe lengths for each LAN segment, refer to the publications listed in "Related Publications" on page ix.

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## Chapter 2. Planning for IBM 8209 Installation

This chapter helps you make the preparations needed for the installation of the IBM 8209 LAN Bridge. The preparations include:

- Completing the planning checklist shown in “IBM 8209 Planning Checklist” on page 2-2.
- Selecting and preparing a location for the IBM 8209.

See “Selecting and Preparing a Place for the IBM 8209” on page 2-3 for IBM 8209 physical and operating environment specifications.

- Determining whether the default attachment module switch settings and advanced configuration parameter values are correct for the IBM 8209 in your network.

The following information helps you to determine whether changes are needed and what the changes should be.

- “Planning for Attachment Module Basic Configuration” on page 2-9
- “Planning for Advanced Configuration” on page 2-10
- The Bridge Planning Chart, switch descriptions, and parameter descriptions in the *Attachment Module Guide*.

## IBM 8209 Planning Checklist

A blank copy of the planning checklist is provided in Appendix A, for you to copy and use as needed.

The checklist helps you decide what additional parts you may need and what steps you should take before installing an IBM 8209.

The planning steps shown in Table 2-1 cover the preparations needed for most installation, but may not contain all of the requirements for special configuration considerations or advanced configurations. See "Planning for Attachment Module Basic Configuration" on page 2-9, "Planning for Advanced Configuration" on page 2-10, and the *Attachment Module Guide* for more information about basic, special, and advanced configurations.

Use this checklist to ensure that the location you choose for an IBM 8209 is appropriate and ready. Change the checklist to meet your needs.

Table 2-1. IBM 8209 Planning Checklist

Check (✓)	Activity	Your Comments
	Plan and set up any LANs that connect to the IBM 8209. Each IBM 8209 should be set up according to the <i>Token-Ring Network Planning and Installation Guide</i> .	
	Select a place for the IBM 8209.	
	Decide what cables will be connected to the IBM 8209 (see "Cables" on page 2-3 and "Supported Cable Systems" on page 1-6).	
	Order cables and any other parts needed; for example, an Ethernet transceiver.	
	Ensure that the place chosen meets minimum temperature, humidity, and airflow requirements (see "Selecting and Preparing a Place for the IBM 8209" on page 2-3).	
	Review your setup plans with your IBM marketing representative or LAN installation provider.	
	Schedule a setup date.	
	Select employees to set up and configure the IBM 8209.	
	Determine if configuration parameter values need changing from the default values.	
	Define the new values for any parameters that need changing.	
	Prepare the place chosen for the IBM 8209.	
	Arrange for maintenance.	

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## Selecting and Preparing a Place for the IBM 8209

Use the information in this section to help you choose a place for the IBM 8209 and to make any necessary preparations. Review this section to ensure that your chosen location meets the minimum standards required to operate the IBM 8209 correctly.

### Network Documentation

Update the documentation for each network that is connected to an IBM 8209 to show the location of:

- The IBM 8209
- All equipment to be connected to the IBM 8209
- The areas where the cables will be laid
- Power receptacles for all of the equipment.

### Cables

No cables for LAN segment or workstation attachment are shipped with the IBM 8209. You can order them from IBM or from another source.

The IBM 8209 requires one cable connection for each LAN segment:

- To connect to an IBM Token-Ring Network access unit, the IBM 8209 supports the use of the IBM Cabling System media, including
  - Telephone twisted pair for use with a 4-Mbps IBM Token-Ring Network segment
  - IBM Cabling System media type 1 or 2 for use with a 4- or 16-Mbps IBM Token-Ring Network segment.

You can use IBM adapter cable (part number 6339098) or an equivalent cable.

- For the attachment module LAN connection, you will need wiring that adheres to the recommendations and maximum lobe lengths for the LAN connected to the attachment module.

Refer to the *Attachment Module Guide* for the attachment module you are using.

For wiring recommendations and the maximum lobe lengths for each LAN segment, refer to the publications listed in "Related Publications" on page ix.

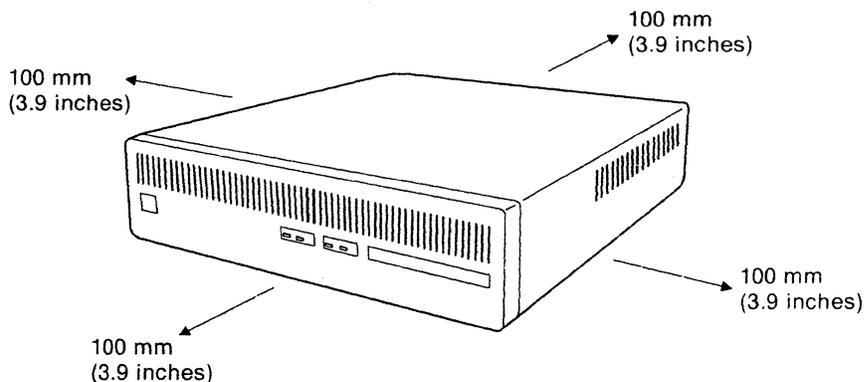
### Size and Weight

The IBM 8209 is designed to be placed on a table, stand, or shelf.

<b>Weight</b>	9.1 kg (20 lb)
<b>Width</b>	445 mm (17.5 in.)
<b>Length</b>	533 mm (21 in.)
<b>Height</b>	133 mm (5.25 in.)

## Air Space

The sides, front, and back of the IBM 8209 should have a clearance of 100 mm (3.9 in.).



## Operating Environment

The IBM 8209 is designed to operate reliably in normal business environments, with no special cooling requirements, normal winter heating, and normal ventilation.

In very hot, cold, or humid climates, you should check the temperature and humidity ranges listed in Table 2-2.

Table 2-2. IBM 8209 Temperature and Humidity Ranges

Type of Environment	Temperature	Relative Humidity	Maximum Wet-Bulb Thermometer Reading
Operating	10° C to 40° C (50° F to 104° F)	8% to 80%	27° C (80° F)
Nonoperating	10° C to 50° C (50° F to 125° F)	8% to 80%	27° C (80° F)
Storage	1° C to 60° C (32° F to 140° F)	5% to 80%	29° C (85° F)
Shipment	-40° C to 60° C (-40° F to 140° F)	5% to 180%	29° C (85° F)

## Power, Power Plugs, and Electrical Wiring Requirements

The power source (wall outlet or receptacle) at the place you have chosen for the IBM 8209 must meet the electrical specifications shown in Table 2-3 to ensure that the IBM 8209 is not damaged.

Table 2-3. IBM 8209 Power Source Specifications

Phase	Single Phase
Power	0.115 kVA (maximum operational)
Frequency	50 or 60 Hz $\pm$ 2%
110-volt range	90 V AC (minimum), 140 V AC (maximum)
220-volt range	180 V AC (minimum), 265 V AC (maximum)
Power cable length	2.7 m (9 ft), shipped with the IBM 8209 1.8 m (6 ft), shipped with the IBM 8209 in the U.S.

## Power Plugs and Receptacles

Different countries use different power plugs and receptacles. Table 2-4 on page 2-6 identifies, by country, which power plugs can be shipped with the IBM 8209. The letters in Table 2-4 refer to the power plugs illustrated in Figure 2-1 on page 2-7. Use Table 2-4 and Figure 2-1 to ensure that you have received the correct power cable with your IBM 8209 and to plan for the correct receptacle. This list does not include all countries. If you do not see the country you want, consult your IBM representative.

<i>Table 2-4. Power Cord Plugs for Each Country</i>		
<b>Type of Plug</b>	<b>Power Cords</b>	<b>Country</b>
A	2952300 2.7 m (9 ft)	Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (S), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Philippines, Puerto Rico, Taiwan, Trinidad & Tobago, and Venezuela
A	6952302 1.8 m (6 ft)	USA
B	1838574 2.7 m (9 ft)	Peru and Thailand
C	6952356 2.7 m (9 ft)	Antigua, Bahrain, Brunei, Channel Islands, Cyprus, Ghana, Hong Kong, India, Iraq, Ireland, Jordan, Kenya, Kuwait, Libya, Malawi, Malaysia, Malta, Nigeria, Oman, Qatar, Saudi Arabia, Sierra Leone, Singapore, Somalia, Tanzania, Uganda, United Kingdom, United Arab Emirates, Yemen, and Zambia
D	6952383 2.7 m (9 ft)	Israel
E	6952311 2.7 m (9 ft)	Argentina, Australia, Mainland China, New Zealand, Paraguay, and Western Samoa
F	6952320 2.7 m (9 ft)	Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Cameroon, Central African Empire, Chad, Congo, Czechoslovakia, Egypt, Finland, France, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Lebanon, Luxembourg, Monaco, Morocco, Mozambique, Netherlands, Niger, Norway, Poland, Portugal, Romania, Spain, Sudan, Sweden, Syria, Tunisia, Turkey, Uruguay, USSR, Yugoslavia, and Zaire
G	6952329 2.7 m (9 ft)	Denmark
H	6952365 2.7 m (9 ft)	Liechtenstein and Switzerland
J	6952374 2.7 m (9 ft)	Chile, Ethiopia, and Italy

Plug Type	Voltage Rating	Amp Rating	Plug Configuration	Plug Type	Voltage Rating	Amp Rating	Plug Configuration
A	125 V	15 A		F	250 V	16 A	
B	250 V	15 A		G	250 V	10 A	
C	250 V	13 A		H	250 V	10 A	
D	250 V	10 A		J	250 V	16 A	
E	250 V	10 A					

Figure 2-1. Power Plugs and Receptacles

## Electrical Wiring

For safe operation of the IBM 8209, IBM recommends using a 15-amp electrical wire (branch circuit) to supply power to the IBM 8209. This circuit must be grounded to a safety ground, not to a neutral ground that carries current back to the transformer.

**Note:** Do not use a conduit as the only means of grounding.

## Lightning Protection

### Power Lines

You should add lightning protection on your secondary power source when:

- The utility company installs lightning protectors on the primary power source
- The area is subject to electrical storms or equivalent power surges.

### Signal Lines

You are responsible for selecting and setting up lightning protection, if needed. For more information, see the *IBM Token-Ring Network Installation Guide*.

## Magnetic Compatibility

In some instances, the site chosen for the setup of the IBM 8209 may have surrounding magnetic fields.

These fields can result from nearby radio-frequency sources, such as transmitting antennas (AM radio, FM radio, television, and two-way radios), radar, and industrial equipment (radio-frequency induction heaters, arc welders, and insulation testers).

Other sources of interference are transformers (including those within other units), distribution displays, rotating machinery, fluorescent light fixtures, and electric floor heating.

Check with your building engineer to get help in identifying possible sources of magnetic interference at the site you choose for setup of the IBM 8209.

Before positioning control units or cabling, a setup planning review may be appropriate to evaluate the environment and to determine whether any special setup or product considerations are required to ensure normal system operation and maintenance. Consult your IBM representative or LAN installation provider.

## Static Discharge

Static charges can build up on people and furniture as a result of:

- Movement of personnel, carts, or furniture in contact with floor covering
- Personnel in contact with furniture coverings, such as plastic seat covers.

Discharge of these static charges to the metal parts of the IBM 8209, or to the furniture on which it is situated, may cause interference with the operation of electronic equipment.

Major factors that contribute to this problem include:

- High-resistance floor surface material
- Carpeting without antistatic properties
- Plastic seat covering
- Very low humidity (usually less than 20%)
- Metal frame furniture.

If any of the above factors are present at your site, review the building with your IBM representative or LAN installation provider.

## Noise Levels

The IBM 8209 makes no audible noise and can be set up in a quiet office environment.

## Planning for Installation and Configuration

Installing the IBM 8209 consists of setting up the hardware and doing bridge configuration.

Instructions for setting up the IBM 8209 are in "Installing the IBM 8209" on page 3-2, with additional information in the *Attachment Module Guide*.

If the factory preset default configuration parameter values do not meet the needs of your network, you can perform basic configuration, advanced configuration, or both.

Basic configuration is done during IBM 8209 installation, before you install the attachment module.

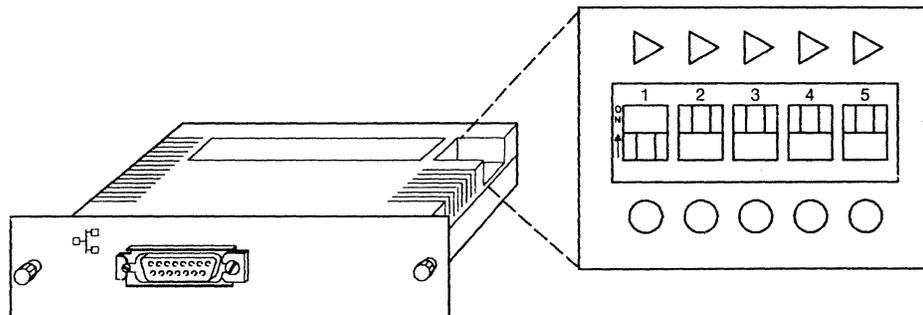
Before you can do advanced configuration, you must:

- Successfully install the IBM 8209
- Install one or more programs to use for the configuration
- Establish a communication link between each program and the IBM 8209.

## Planning for Attachment Module Basic Configuration

Basic configuration consists of setting switches on the attachment module to define how you want the IBM 8209 to operate in your network. The information indicated by the switches can include:

- Types and amounts of access protocol conversion and frame format manipulation provided between the two LANs
- Bridge and LAN segment numbers
- IBM Token-Ring Network segment data transfer rate.



Each *Attachment Module Guide* contains a Bridge Planning Chart and explanation of the functions controlled by the attachment module switches. You can use the explanations to determine which switch settings to change, and the chart to record how you want the attachment module switches reset for basic configuration during IBM 8209 installation.

If you fill in the section of the Bridge Planning Chart for changing the switch settings, be sure to provide a copy of the chart to the person who installs the IBM 8209.

The IBM 8209 installation procedures that begin in "Installing the IBM 8209" on page 3-2 indicate when to change the switches, if necessary, during installation.

## Planning for Advanced Configuration

IBM 8209 advanced configuration requires the use of programs such as the Utility Program, the LAN Manager and the LAN Network Manager to:

- Set values for additional configuration parameters that are not controlled by the attachment module switches
- Override the settings of the switches without physically resetting the switch positions.

## Determining Your Need for Advanced Configuration

You will need to do advanced configuration if you need to:

- Set one or more of the bridge and LAN segment numbers to a value other than
  - The preset factory default
  - The values that can be set in the attachment module configuration switches.
- Override the attachment module configuration switch settings without actually changing the switch positions.
- Define filter range values in the IBM 8209, or disable filter functions.
- Change any of the values for configuration parameters that cannot be set by the attachment module switches.
- Accommodate special configuration considerations in your network, such as multiple bridges in the network, frame forwarding, or access protocol conversion.

Refer to the *Attachment Module Guide* for more information about each of these considerations.

## Programs to Use for Advanced Configuration

Advanced configuration is performed by using one or more programs to change IBM 8209 configuration parameter values from the defaults to the values needed for your network.

Programs that can be used for IBM 8209 advanced configuration are the:

- **IBM 8209 LAN Bridge Utility Program**

This program is included with each attachment module, and runs in a personal computer connected to a LAN segment in the network with the IBM 8209.

The Utility Program allows you to display and change configuration parameter values for:

- The LAN segment number for either LAN
- The bridge number for the IBM 8209
- Bridge adapter addresses and configuration options
- Frame forwarding parameters, including servers, filters, and address mapping
- Spanning-tree parameters.

Refer to the *Attachment Module Guide* for:

- Explanations of the IBM 8209 configuration parameters
- A Bridge Planning Chart to help you choose and record the value to use for each parameter
- Instructions for using the Utility Program.

- **IBM LAN Manager and IBM LAN Network Manager programs**

These programs must be purchased separately, and each runs in a personal computer connected to a LAN segment in the network with the IBM 8209.

In addition to providing network management for part or all of your entire network, these programs allow you to do some or all of the following for the IBM 8209, depending on the LAN type and the program being used:

- Set configuration parameter values that are related to any IBM Token-Ring Network segment connected to the IBM 8209
- Set configuration parameter values that are related to the LAN connected to the attachment module
- Display and log bridge performance counters for each LAN segment connected to the IBM 8209
- Obtain LAN segment status for one or both segments connected to the IBM 8209.

Refer to the *Attachment Module Guide* for information about the parameter values, performance information, and network status provided by these programs for specific LAN types.

Refer to the *User's Guide* packaged with each program for information about installing and using the program.

## Performing Advanced Configuration

The *Attachment Module Guide* for each attachment module contains specific procedures for planning and doing advanced configuration.

The general sequence of steps to follow to do advanced configuration is:

- 1 Install each program that you choose to use.

The instructions shipped with each program provide information about installing and using the program, and about the operating system and adapter support required for each program.

- 2 Load the program.

Instructions for loading the program are packaged with the program.

- 3 Define to the program each bridge that you want to access from that program.

To be able to define each bridge, you will need to know information about the bridge, such as the bridge number, bridge adapter addresses, and the LAN segment numbers of the segments connected to the bridge.

The *Attachment Module Guide* contains information on how to determine or assign numbers and addresses for the IBM 8209.

- 4 From the program, establish a link to each defined bridge.

- 5 Use the program to communicate with a bridge, to do advanced configuration, and to retrieve performance and status information.

The *Attachment Module Guide* contains detailed instructions for doing advanced configuration for the IBM 8209.

---

## Chapter 3. Installation and Configuration

Installing the IBM 8209 consists of setting up the hardware and doing bridge configuration.

Instructions for setting up the IBM 8209 are in "Installing the IBM 8209" on page 3-2, with additional information in the *Attachment Module Guide*.

If the factory preset default configuration parameter values do not meet the needs of your network, you can perform basic configuration, advanced configuration, or both.

- Basic configuration consists of setting switches on the attachment module to define the operation of the IBM 8209 in your network.

The IBM 8209 installation procedures that begin in "Installing the IBM 8209" on page 3-2 indicate when to change the switches, if necessary, during installation.

The *Attachment Module Guide* contains a Bridge Planning Chart and explanation of the functions controlled by the attachment module switches. You can use the completed chart to reset attachment module switches for basic configuration during IBM 8209 installation.

- Advanced configuration requires the use of programs such as the Utility Program Version 2.0, the LAN Manager, and the LAN Network Manager.

IBM 8209 installation must be completed successfully before you can do advanced configuration.

- You must install one or more programs to use for the configuration, and establish a communication link between each program and the IBM 8209.
- Then, use the information on the completed Bridge Planning Chart and the instructions in the *Attachment Module Guide* to do advanced configuration, if required, for the IBM 8209.

---

## Installing the IBM 8209

IBM 8209 installation involves the following tasks:

- Verifying that you have the correct parts and that the parts were not damaged during shipment
- Installing the IBM 8209
- Doing basic configuration if required
- Installing the attachment module in the back of the IBM 8209
- Connecting cables: the power cable to the IBM 8209 and to an AC wall outlet, and the LAN cables to the IBM 8209 and to the two network connection points
- Verifying that the IBM 8209 is operating correctly, by running the power-on wrap test
- Resolving any problems with the installation
- Doing advanced configuration if required.

The installation instructions in the rest of this chapter and in the *Attachment Module Guide* describe the tasks in detail.

### Unpack the Parts and Check For Shipping Damage

Before you begin hardware setup and configuration:

- 1 Unpack the IBM 8209 and inspect it for shipping damage. Report any damage to your supervisor.
- 2 Remove the attachment module from the packaging material.
- 3 Make sure that you have all of the parts shown in Figure 3-1 on page 3-3. If any parts are missing, contact your supervisor or IBM representative.

The diskettes contain the Utility Program. This program can be used to do advanced configuration and to gather performance statistics and status information.

**Note:** Keep the *IBM 8209 Service Information* manual, *IBM 8209 Safety Information*, and wrap plugs near the IBM 8209 for your hardware service representative to use in problem analysis.

- 4 You also need a LAN cable to connect each LAN segment to the IBM 8209.

LAN cables are not shipped with the IBM 8209. LAN cables must be ordered separately from IBM or another supplier.

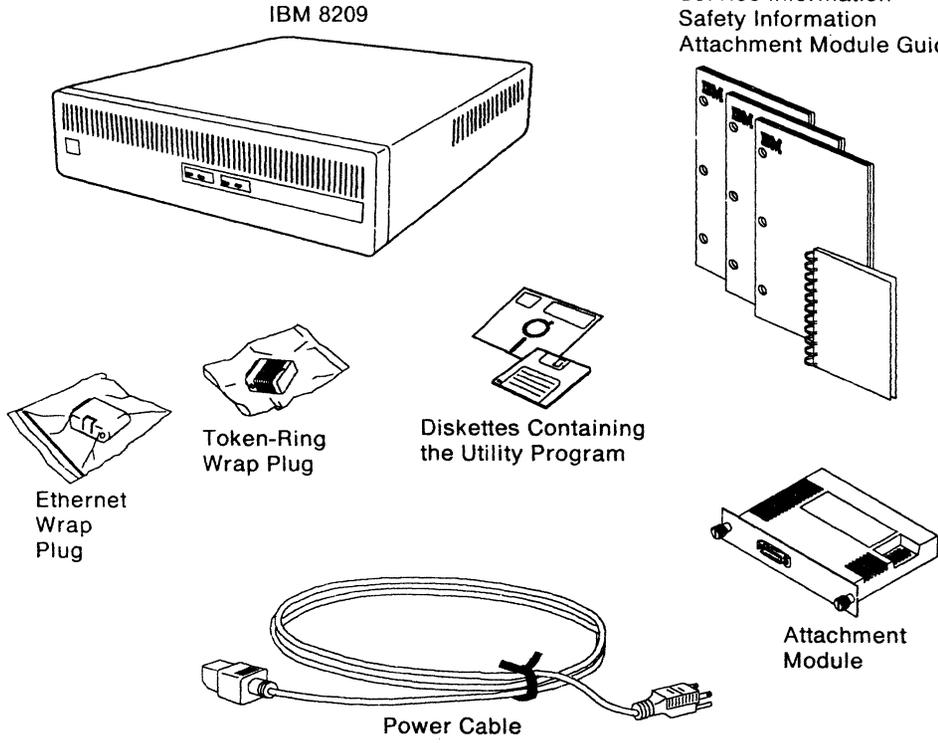


Figure 3-1. IBM 8209 Parts

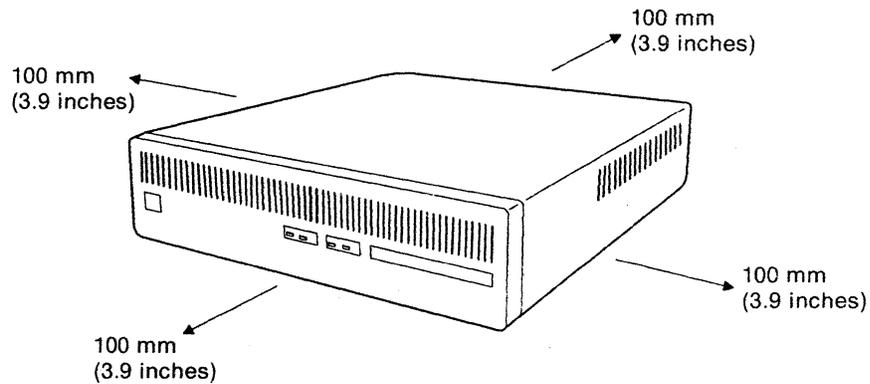
## Setting Up the IBM 8209

To set up an IBM 8209:

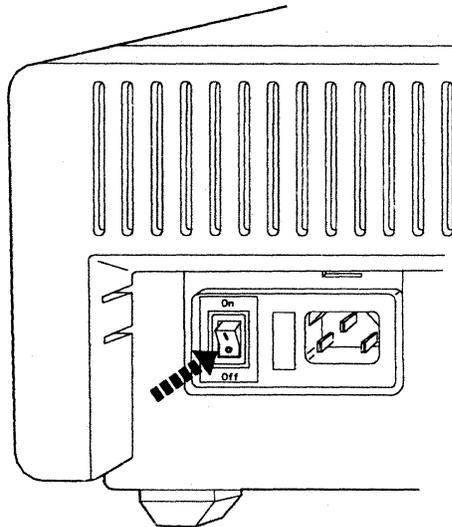
- 1 Place the IBM 8209 in the prepared location on a table, shelf, or stand.

Position the IBM 8209 so that the cooling vents are not blocked. Allow the recommended clearances for correct airflow around the IBM 8209, as shown.

See "Operating Environment" on page 2-4 for information on the operating environment for the IBM 8209.

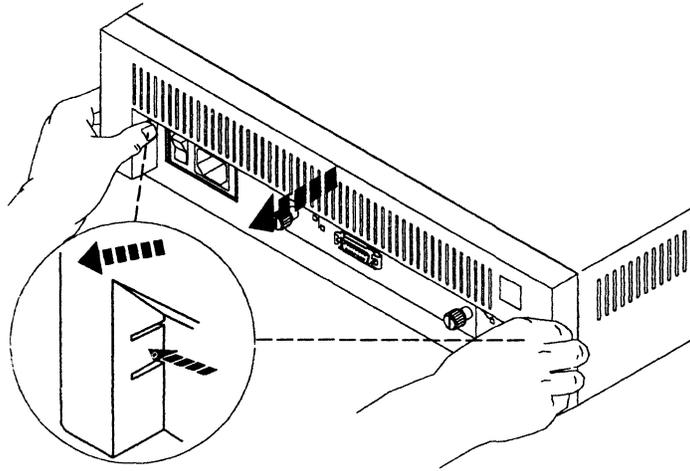


- 2 Ensure that the Power switch on the rear of the IBM 8209 is set to the O (Off) position.

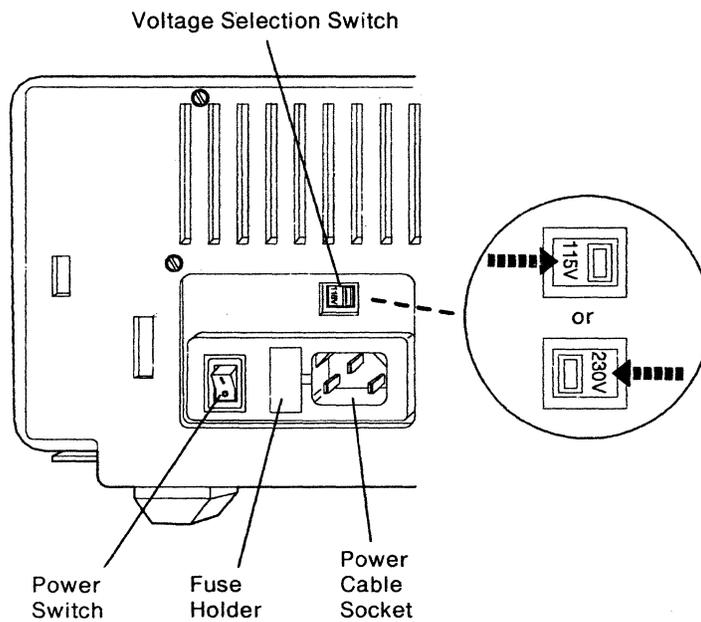


**3 Remove the rear cover.**

Hold the cover as shown, and press in the plastic tabs with your thumbs while you pull the cover toward you.



**4 Remove the label that covers the power cable socket.**



**5 Set the Voltage Selection switch to the input voltage provided by the AC wall outlet you are using for the IBM 8209.**

The Voltage Selection switch is above the power cable socket. When you slide the switch to the right, the label on the switch shows “115 V.” When you slide the switch to the left, the label on the switch shows “230 V.”

- If the IBM 8209 plugs into an outlet that uses a voltage range of 90 V AC to 140 V AC, set the switch so that 115 V shows on the label.
- If the IBM 8209 plugs into an outlet that uses a voltage range of 180 V AC to 265 V AC, set the switch so that 230 V shows on the label.

6 Do basic configuration, if required for this IBM 8209.

**Note:** A symbol is shown on the front of some of the attachment module in the figures in this section. The symbol shown may not be the same as the symbol on your attachment module, depending on the type of module you are using.

The instructions and figures apply to all types of attachment modules.

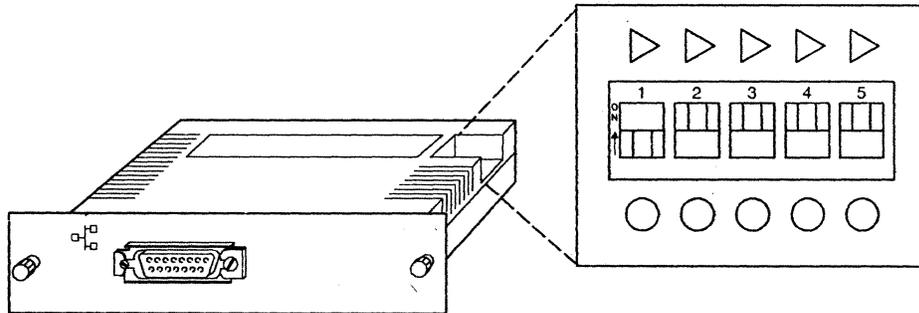
If this IBM 8209 does **not** require basic configuration, go to step 7.

If this IBM 8209 requires basic configuration, do the following to change the attachment module switch settings from the factory defaults:

- a From your supervisor or network administrator, obtain the new switch settings.

The settings for basic configuration should be indicated on a completed copy of the Bridge Planning Chart provided in the *Attachment Module Guide*.

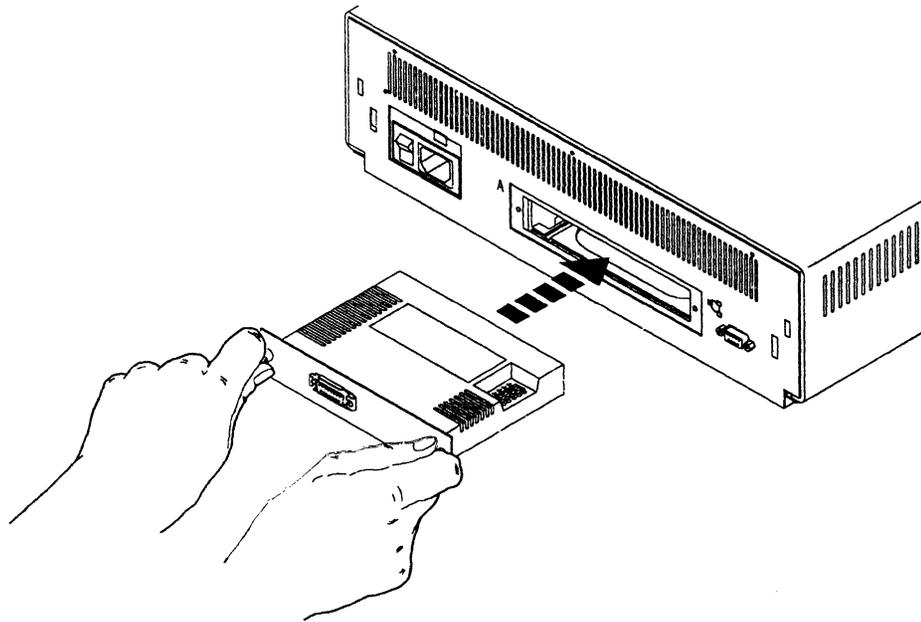
- b Locate the configuration switches on the attachment module.



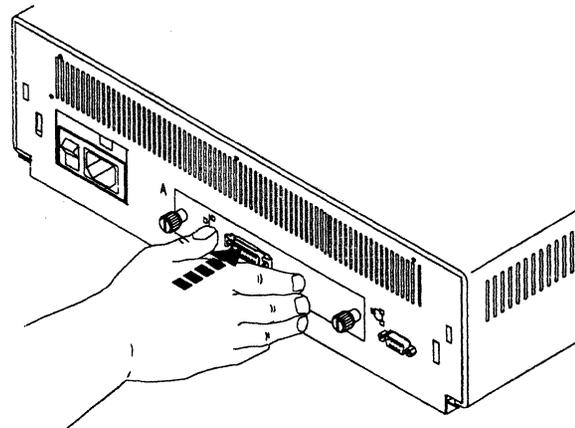
- c Set the switches on the attachment module to the new settings indicated on the Bridge Planning Chart.

7 Install the attachment module.

Grasp the two thumbscrews and insert the module in the back of the IBM 8209.

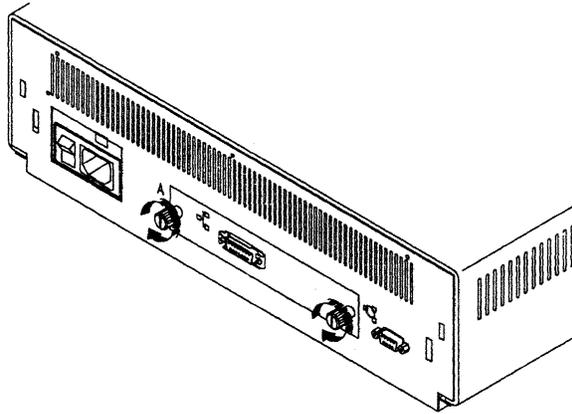


Push the attachment module in until it is secure.



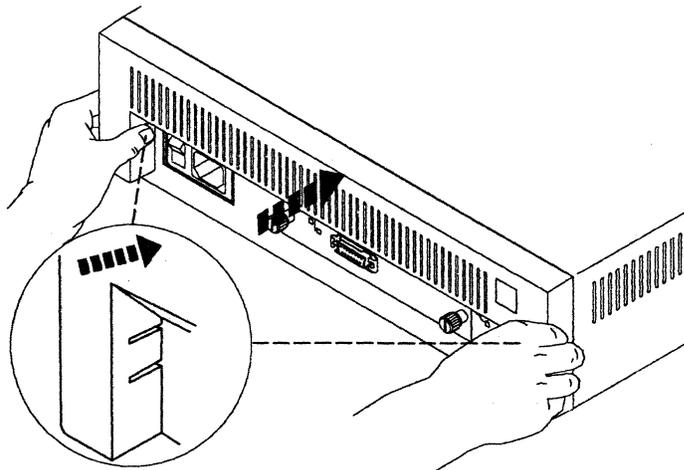
- 8 Tighten the two thumbscrews that fasten the attachment module to the rear of the IBM 8209.

Tighten the thumbscrews by turning them clockwise with your fingers.



- 9 Put the rear cover on the IBM 8209.

Hold the rear cover as shown and use your thumbs to push the plastic tabs into the slots.



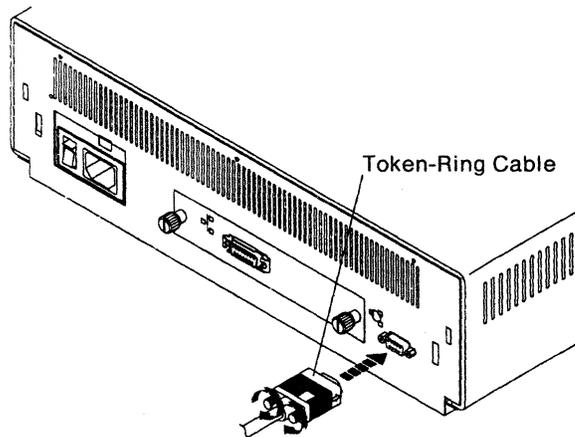
**DANGER**

To prevent a possible electrical shock during an electrical storm, do not connect cables or station protectors for communications lines, display stations, printers, or telephones.

**DANGER**

To prevent a possible electrical shock from touching two surfaces with different electrical grounds, use one hand, when possible, to connect or disconnect signal cables.

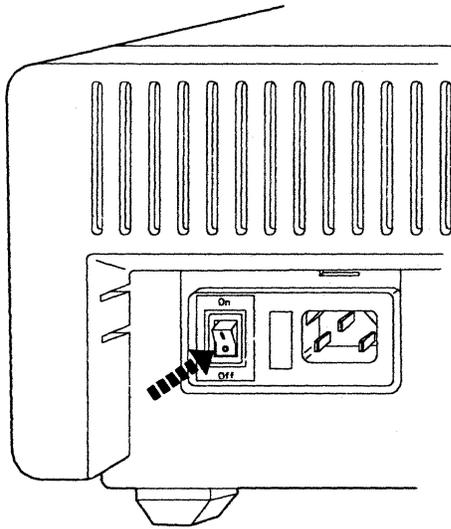
- 10 Connect the IBM Token-Ring Network cable to an access unit port and to the token-ring connector on the back of the IBM 8209.



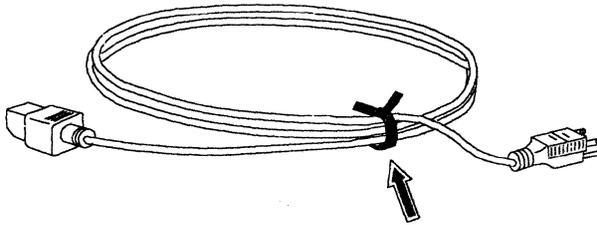
- 11 Connect the other LAN cable to a network connection point and to the attachment module connector at the back of the IBM 8209.

Refer to the instructions in the *Attachment Module Guide* for connecting the cable to the module.

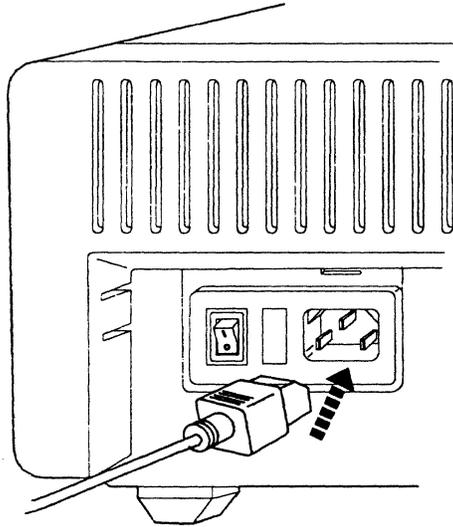
12 Ensure that the Power switch is set to the O (Off) position.



13 Remove the strap from the power cable.



- 14 Connect the power cable to the power cable socket at the back of the IBM 8209.

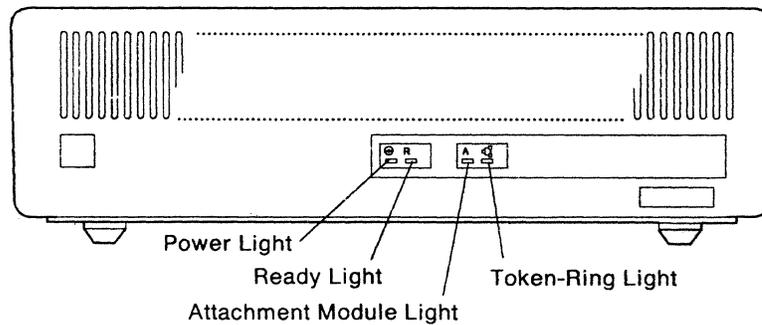


- 15 Plug the power cable into the AC wall outlet.  
16 Begin verification that the IBM 8209 operates correctly.

**Note:** Read this entire step before you set the Power switch to the | (On) position in step 17 on page 3-12.

When the Power switch is set to the | (On) position, the lights on the front of the IBM 8209 should turn on or flash in the order shown in Figure 3-2 on page 3-12.

**Front View**



Sequence	Lights	Action
<b>Note:</b> Any lights that come on or go off before all the lights turn on should be ignored.		
All lights turned on.	       	The wrap test has begun.
The right three lights turn off and the Power light remains on.	       	
The Ready light flashes while the Power light is on.	       	The wrap test is running.
The Token-Ring and Attachment Module lights flash once. The Ready and Power lights stay on.	       	Half of the wrap test is complete.
After 20 seconds, the Token-Ring and Attachment Module lights come on.	       	The wrap test is running through the Token-Ring and LAN attachment connectors.
After 20 seconds, the Token-Ring and Attachment Module lights turn off.	       	The wrap test is complete.
<b>Note:</b> The Power and the Ready lights remain on.		

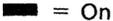
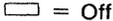
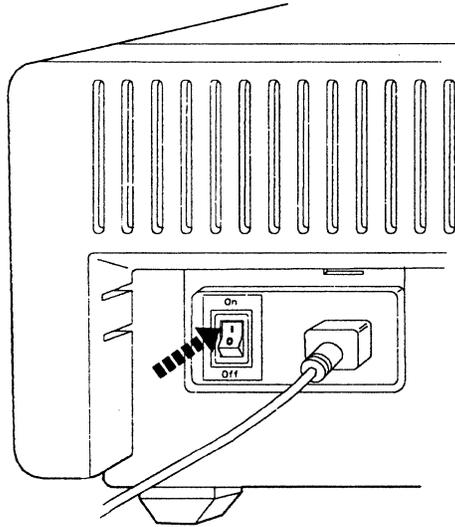
 = Power light  
 R = Ready light  
 A = Attachment Module light  
 = Token-Ring light  
 = On  
 = Off  
 = Flashing

Figure 3-2. IBM 8209 Light Sequence

**Note:** After the R (Ready) light comes on, the IBM 8209 does not start forwarding frames for approximately 30 seconds.

- After reading the previous step, set the Power switch to the | (On) position and carefully observe the lights for the sequence described in Figure 3-2 above.



If you are not sure that you observed the light sequence as described in Figure 3-2 on page 3-12, set the Power switch to the O (Off) position and try this step again.

If the lights do not turn on and off as described in Figure 3-2, go to Chapter 4 and begin problem resolution.

- 18 If the lights on the front of the IBM 8209 operate as described in Figure 3-2, you have successfully installed the IBM 8209 with the basic configuration.

If this IBM 8209 does **not** require advanced configuration, the IBM 8209 is ready for use.

If this IBM 8209 requires advanced configuration, go to the information and instructions in the *Attachment Module Guide* to install one or more programs and do the configuration.

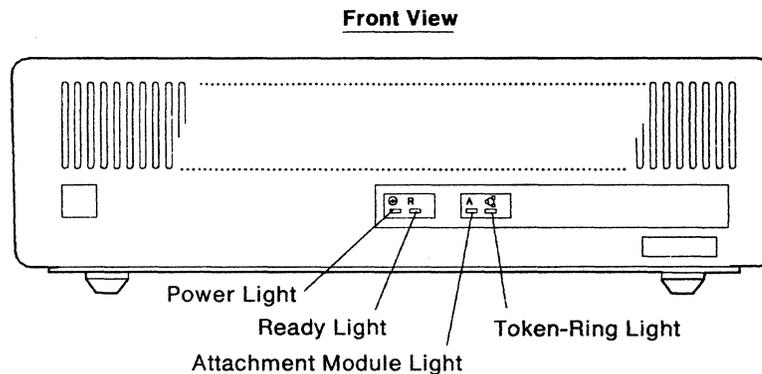


## Chapter 4. Problem Analysis

This chapter contains procedures for identifying IBM 8209 problems that might occur during initialization or operation.

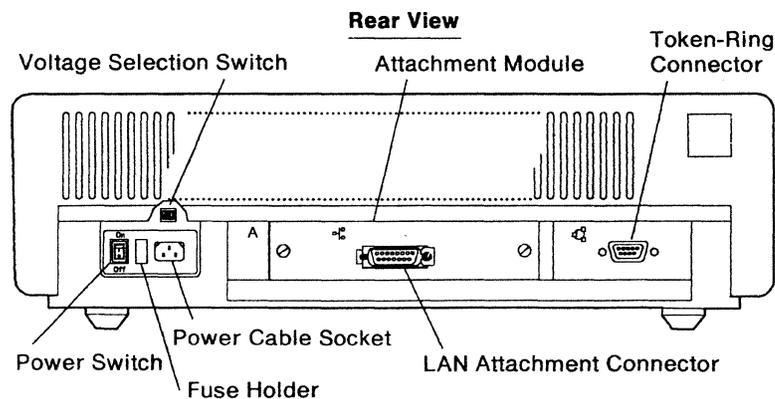
The IBM 8209 contains no customer-serviceable components. Any problems other than the ones in the following list must be referred to your hardware service representative for resolution.

The procedures use the lights on the front of the IBM 8209 to help you identify problems and to determine whether you need to request hardware service.



You can use the procedures to help you to identify and correct the following problems:

- A LAN cable that is not connected correctly or that is not seated securely
- An incorrect setting of the Voltage Selection switch
- An IBM 8209 power cord that is not connected correctly or securely to the IBM 8209 or to the AC wall outlet
- An AC wall outlet that has no electrical power
- An attachment module that is not seated securely
- A wrap plug that is not connected correctly or that is not seated securely.



An IBM 8209 diagnostic self-test called the *wrap test* runs automatically each time the IBM 8209 power is turned on.

When the LAN cables are connected to the IBM 8209, successful completion of the wrap test indicates that the IBM 8209 is operating correctly.

If there appears to be a problem with IBM 8209 operation (the wrap test was not completed successfully or there is some other indication of IBM 8209 malfunction), the problem analysis procedures described in "Wrap Test" on page 4-3 instruct you to replace the LAN cables with the wrap plugs and run the wrap test again to begin isolating the problem.

## Wrap Test

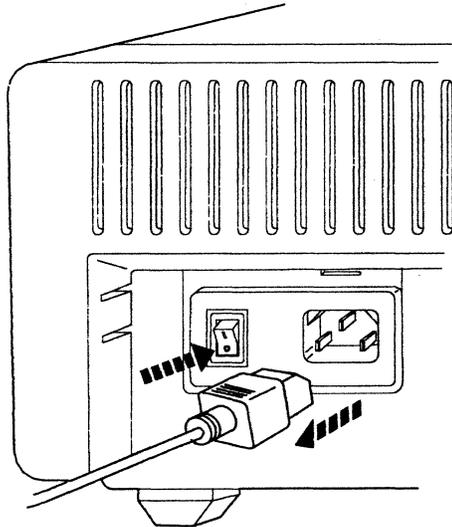
### DANGER

To prevent a possible electrical shock during an electrical storm, do not connect cables or station protectors for communications lines, display stations, printers, or telephones.

### DANGER

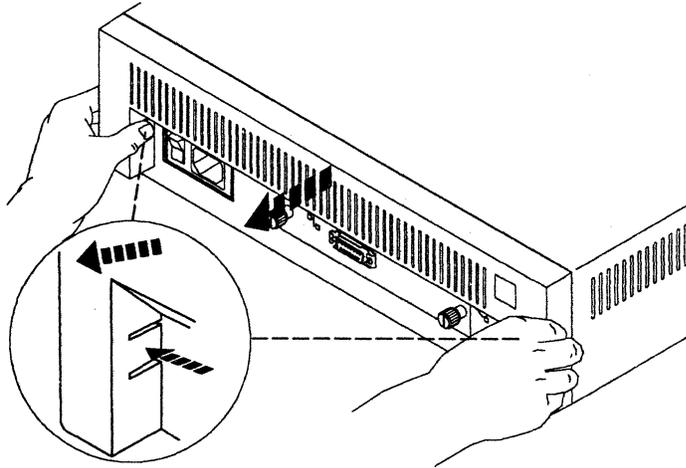
To prevent a possible electrical shock from touching two surfaces with different electrical grounds, use one hand, when possible, to connect or disconnect signal cables.

- 1 Set the Power switch to the O (Off) position and disconnect the power cord from the IBM 8209.



**2** Remove the rear cover.

Place your thumbs on the two tabs that hold the rear cover in place. Press in the tabs and pull the cover toward you.

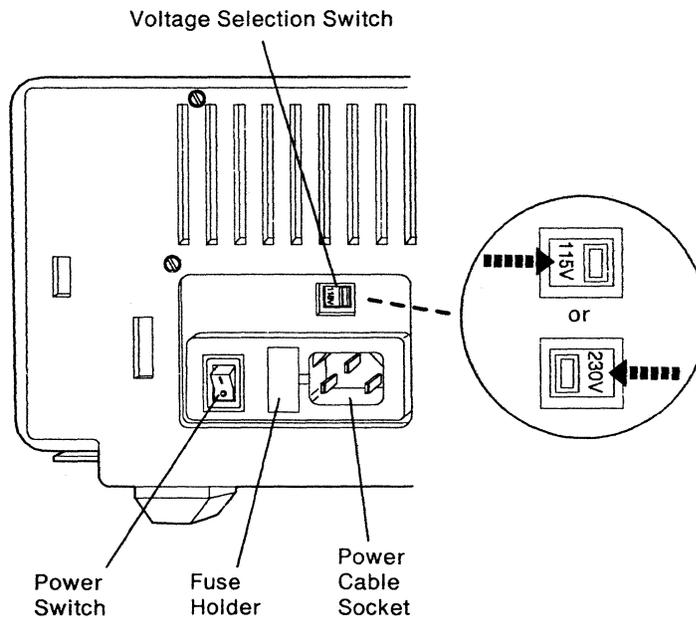


**3** Check the setting of the Voltage Selection switch.

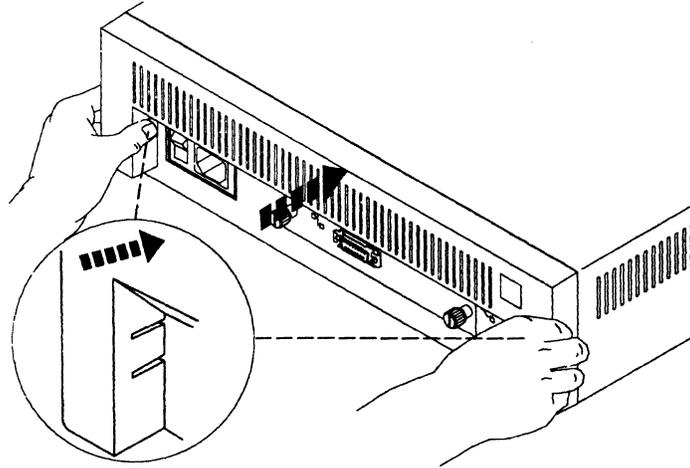
The Voltage Selection switch is above the power cable socket. When you slide the switch to the right, "115 V" is showing. When you slide the switch to the left, "230 V" is showing.

Set the switch so that:

- "115 V" is showing if the outlet used to plug in the IBM 8209 uses a voltage range of 90 V AC to 140 V AC
- "230 V" is showing if the outlet used to plug in the IBM 8209 uses a voltage range of 180 V AC to 265 V AC.



- 4 Attach the rear cover by pushing the plastic tabs into the slots on the back of the IBM 8209.

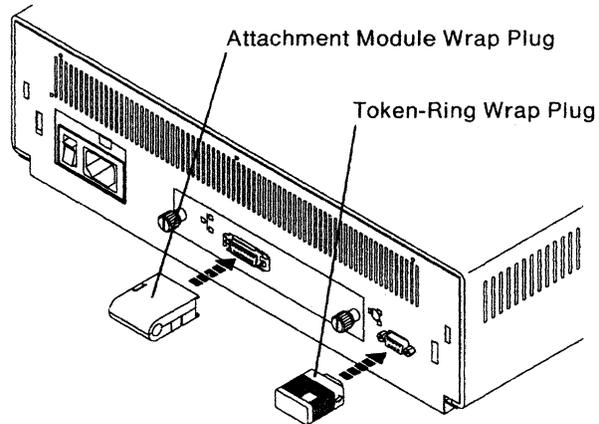


- 5 Disconnect the LAN cables from the built-in connector and the attachment module connector on the IBM 8209.

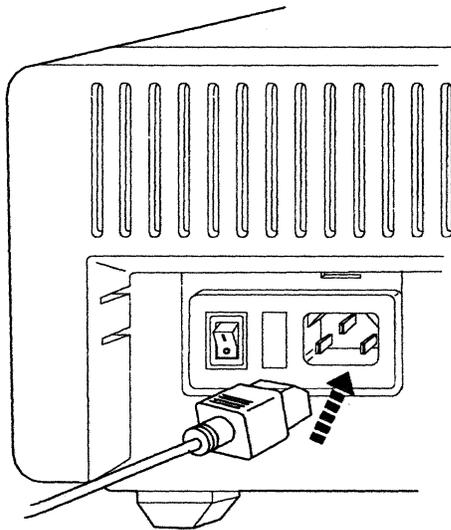
Loosen the thumbscrews on a token-ring cable by turning them counterclockwise.

Refer to the *Attachment Module Guide* for instructions on removing the cable connected to the attachment module.

- 6 Connect the appropriate wrap plug to the built-in connector and to the attachment module connector on the back of the IBM 8209.

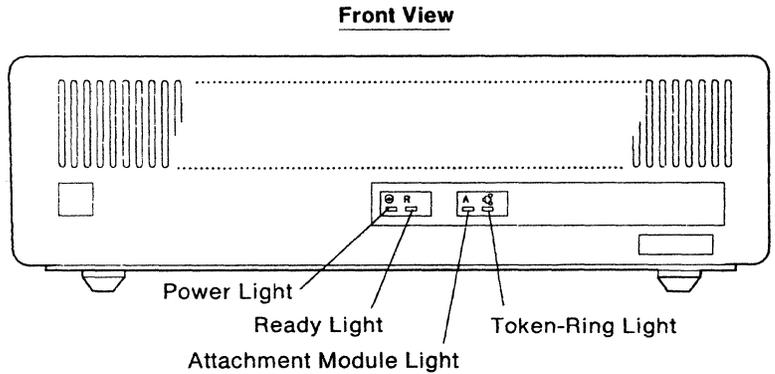


- 7 Connect the power cord to the IBM 8209.



- 8 Plug the power cord into an AC outlet of the correct voltage.

- 9 Read this entire step before you continue to step 10 to set the Power switch to the | (On) position.

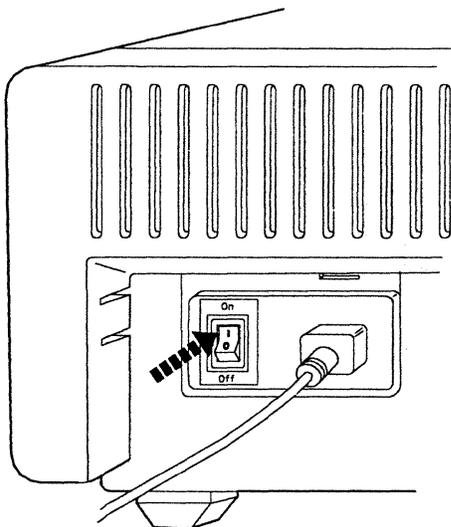


When the Power switch is set to the | (On) position, the lights on front of the IBM 8209 should turn on or flash in the order shown in Figure 4-1 on page 4-7:

Sequence	Lights	Action
<b>Note:</b> Any lights that come on or go off before all the lights turn on should be ignored.		
All lights turned on.	R A 	The wrap test has begun.
The right three lights turn off and the Power light remains on.	R A 	
The Ready light flashes while the Power light is on.	R A 	The wrap test is running.
The Token-Ring and Attachment Module lights flash once. The Ready and Power lights stay on.	R A 	Half of the wrap test is complete.
After 20 seconds, the Token-Ring and Attachment Module lights come on.	R A 	The wrap test is running through the Token-Ring and LAN attachment connectors.
After 20 seconds, the Token-Ring and Attachment Module lights turn off.	R A 	The wrap test is complete.
<b>Note:</b> The Power and the Ready lights remain on.		
= Power light R = Ready light A = Attachment Module light = Token-Ring light		= On = Off = Flashing

Figure 4-1. IBM 8209 Light Sequence

- 10 After reading the entire previous step, set the Power switch to the | (On) position and carefully observe the lights for the sequence described in Figure 4-1 on page 4-7.



The wrap test is successful if the lights turn on and off and flash in the sequence shown in Figure 4-1, and the test ends with the Power and Ready lights both on and the token-ring and attachment module lights off for at least 30 seconds.

Did the wrap test end successfully?

**Yes** The IBM 8209 is operating correctly and can be used in the network.

However, if a problem seems to exist, check the status of the LANs that are connected to the IBM 8209. Use the *IBM Token-Ring Network Problem Determination Guide* and your local problem analysis procedures to correct any LAN problems.

If a problem still seems to exist, check the configuration of the IBM 8209.

If a problem continues to exist, call for hardware service.

**No** If this is the first time through this step, set the Power switch to the O (Off) position, wait 10 seconds, and repeat steps 9 and 10 of the wrap test.

If this is not the first time through this step in this wrap test, write down which light or lights are off or which lights did not follow the correct sequence in the wrap test.

Read the symptoms, in the order shown, in Table 4-1 on page 4-9 and select the first symptom you come to that describes the problem you wrote down.

Go to the page shown in the table for that symptom to determine whether you can correct the problem or must call for hardware service.

*Table 4-1. IBM 8209 Problem Symptoms*

<b>Symptoms</b>	<b>Procedure</b>
The Ⓢ (Power) light is off.	"The Power Light Is Off" on page 4-10
The R (Ready) light does not flash during the wrap test, or does not stay on after the wrap test ends.	"The R (Ready) Light Is Off" on page 4-12
The Ⓡ (token-ring) light does not come on after the R (Ready) light is on.	"The Token-Ring Light Does Not Come On" on page 4-17
The A (Attachment Module) light does not come on after the R (Ready) and the Ⓡ (token-ring) lights are on.	"The A (Attachment Module) Light Does Not Come On" on page 4-19

## The Power Light Is Off

You should have come to this procedure as a result of the Power light not being on at the end of the wrap test.

If you have not run the wrap test, go to "Wrap Test" on page 4-3 and do so.

- 1 During the wrap test, did other lights on the front of the IBM 8209 come on?

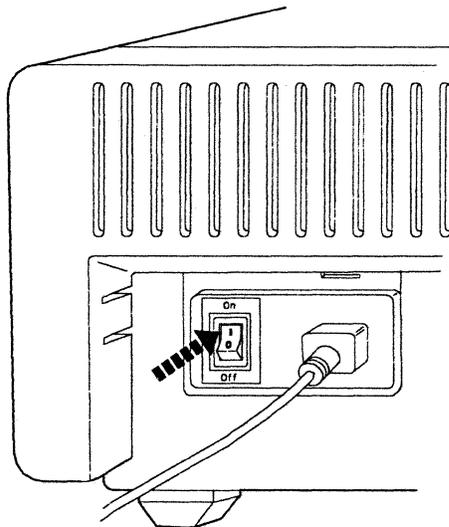
Yes The Power light is burned out. Call for hardware service.

No Continue with step 2.

- 2 Set the Power switch to the O (Off) position.

Ensure that the power cord is connected securely to the AC outlet and to the IBM 8209. Continue with step 3.

- 3 Set the Power switch to the | (On) position and watch for the light sequence shown in Figure 4-1 on page 4-7.



At the end of the sequence, is the Power light on?

No Continue with step 4.

Yes Did the light sequence end successfully, with the correct lights on and off?

Yes The procedure is complete. The IBM 8209 is operating correctly.

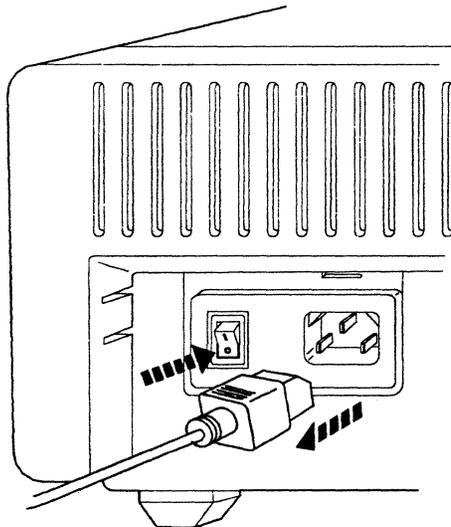
No Write down the lights that are on and off at the end of the sequence, find the symptom in Table 4-1 on page 4-9, and go to the indicated procedure.

## DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the products that attach to the system. It is the customer's responsibility to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

- a. To prevent a possible electrical shock when installing the device, ensure that the power cord for that device is unplugged before installing signal cables.
- b. To prevent a possible electrical shock when adding the device to a system, disconnect all power cords, if possible, from the existing system before connecting the signal cable to that device.

- 4 Set the Power switch to the O (Off) position and disconnect the power cord from the IBM 8209.



- 5 Check the AC wall outlet.

Unplug the IBM 8209 power cord from the AC outlet. Plug a lamp or a workstation into the AC outlet and turn the power on.

Does the AC outlet have electrical power?

Yes Call for hardware service for the IBM 8209.

No Call building maintenance to repair the outlet, or use another outlet for the IBM 8209.

## The R (Ready) Light Is Off

You should have come to this procedure as a result of the R (Ready) light not remaining on at the end of the wrap test.

If you have not run the wrap test, go to "Wrap Test" on page 4-3 and do so.

**Note:** This procedure assumes that the Power light is on, but the Ready light did not come on after the Power light came on.

If the Power light is not on, go to "The Power Light Is Off" on page 4-10.

### DANGER

**To prevent a possible electrical shock during an electrical storm, do not connect cables or station protectors for communications lines, display stations, printers, or telephones.**

- 1 While watching the lights on the front of the IBM 8209, set the Power switch to the O (Off) position, then to the | (On) position.

Watch to see if:

- All of the lights come on at one time soon after you set the Power switch to the | (On) position.
- The R (Ready) light flashes at a slow rate during the sequence.

Did you see all of the lights come on? Repeat this step if you are not sure.

Yes Continue with step 2.

No Write down the light or lights that did not come on, and call for hardware service.

- 2 During the wrap test, does the R (Ready) light flash at a slow rate?

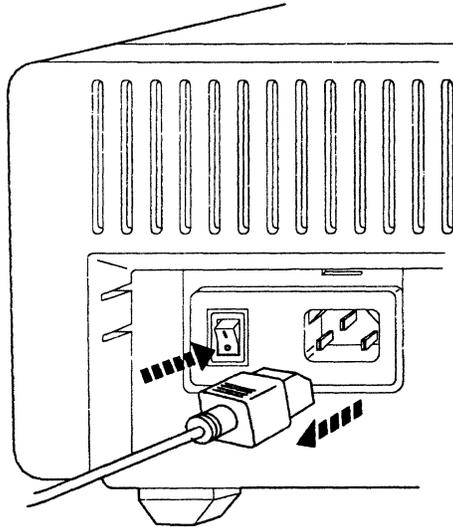
Yes Go to step 8.

No Continue with step 3.

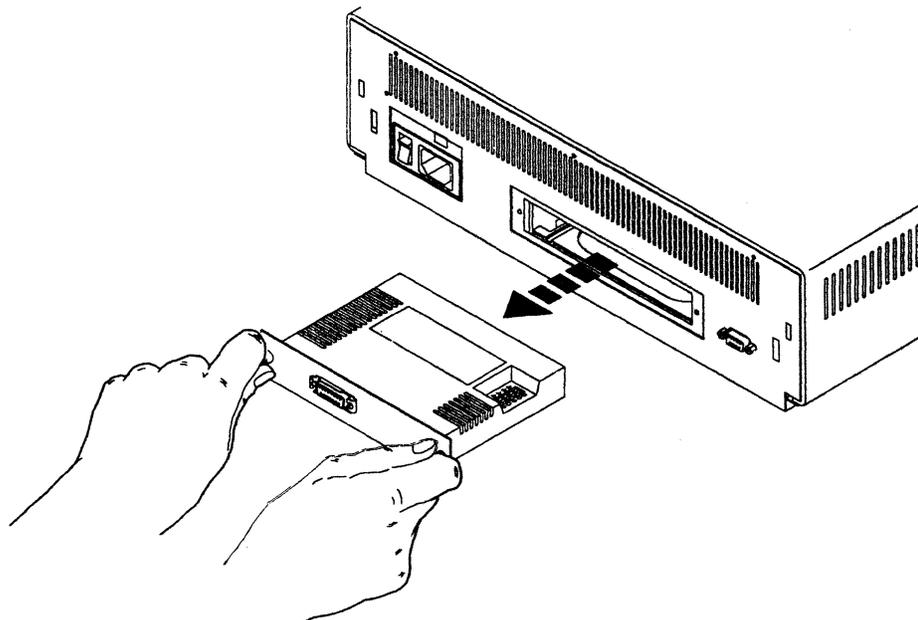
**DANGER**

Ensure that you complete the following step. An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the products that attach to the system.

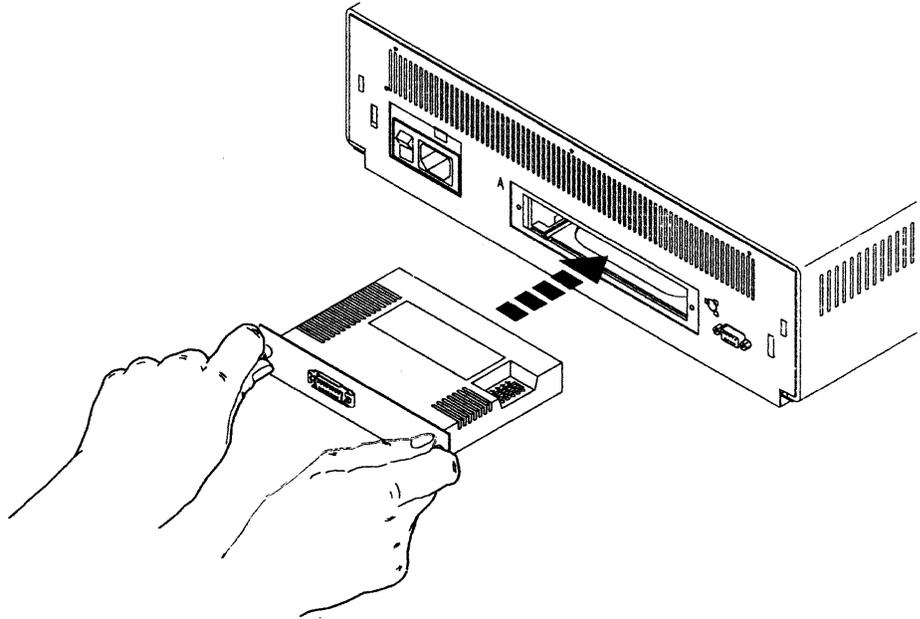
- 3 Set the Power switch to the O (Off) position, and disconnect the power cable from the IBM 8209.



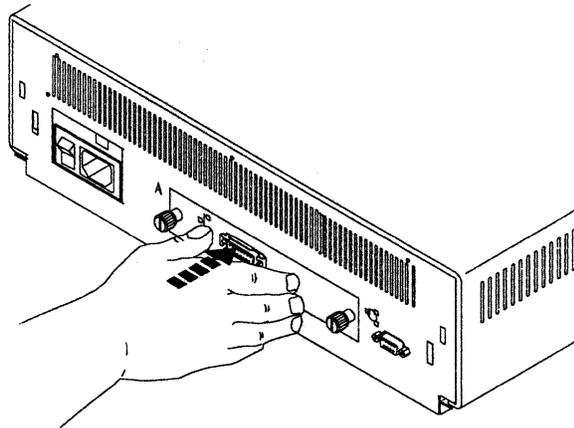
- 4 Reseat the attachment module.
  - a. Loosen the thumbscrews and remove the attachment module.



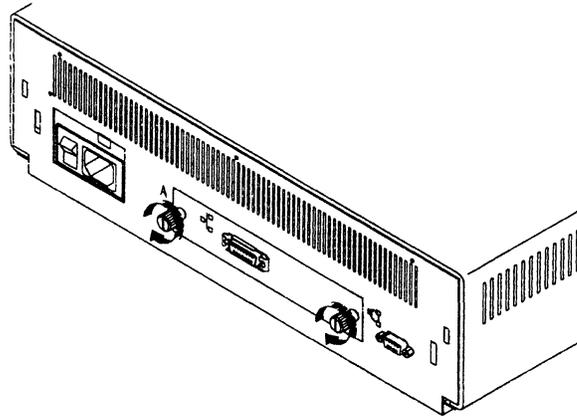
b. Insert the attachment module in the IBM 8209 again.



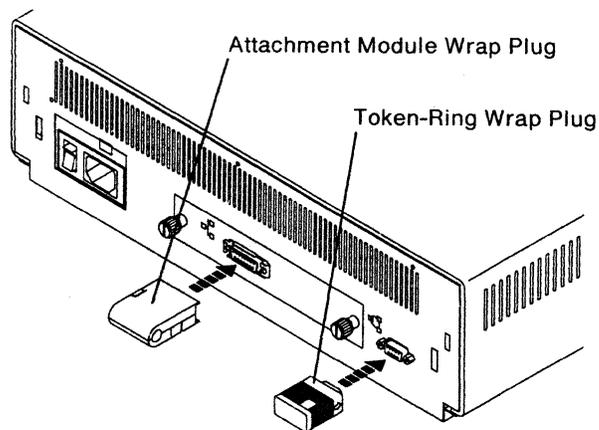
c. Push the attachment module in until it is secure.



- d. Tighten the two thumbscrews that fasten the attachment module to the back of the IBM 8209.



- 5 Ensure that the attachment module wrap plug is connected securely to the module.



- 6 Connect the power cord to the IBM 8209.
- 7 Set the Power switch to the | (On) position and watch the lights for the sequence in Figure 4-1 on page 4-7.

**8** Does the R (Ready) light come on at the end of the wrap test?

**Yes** If the Power light and the Ready light are on at the end of the wrap test, this procedure is complete. The IBM 8209 is ready for advanced configuration or for use in the network.

However, if both the Power and Ready lights are on at the end of the wrap test and there still seems to be a problem, write down the problem symptoms and go to step 10 on page 4-8.

**No** Write down which light or lights are on and which are off, and call for hardware service.

## The Token-Ring Light Does Not Come On

You should have come to this procedure as a result of the  (token-ring) light not coming on after the R (Ready) light came on during the wrap test.

If you have not run the wrap test, go to "Wrap Test" on page 4-3 and do so.

**Note:** This procedure assumes that the Power light is on and the Ready light is on, but the token-ring light did not come on after the Ready light came on.

If the Power light is not on, go to "The Power Light Is Off" on page 4-10.

If the Ready light is not on, go to "The R (Ready) Light Is Off" on page 4-12.

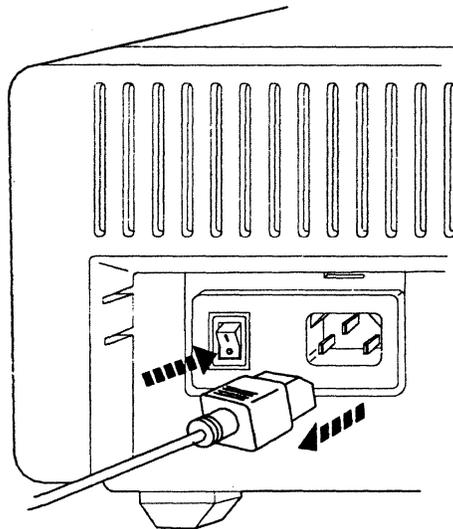
### DANGER

To prevent a possible electrical shock during an electrical storm, do not connect cables or station protectors for communications lines, display stations, printers, or telephones.

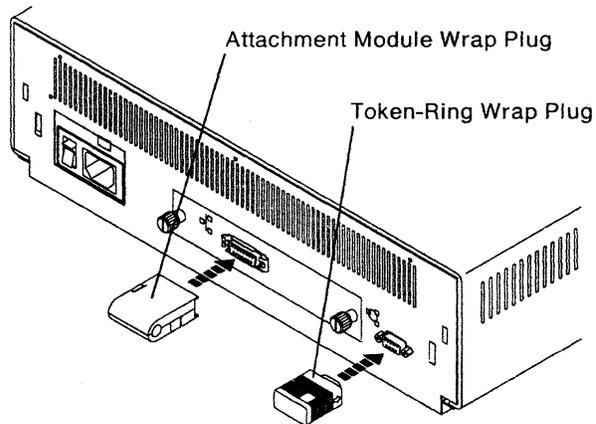
### DANGER

Ensure that you complete the following step. An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the products that attach to the system.

- 1 Set the Power switch to the O (Off) position and disconnect the power cord from the IBM 8209.



- 2 Disconnect and reconnect the token-ring wrap plug at the back of the IBM 8209 to ensure that the token-ring wrap plug is connected correctly.



- 3 Connect the power cord to the IBM 8209.  
Watch for the light sequence shown in Figure 4-1 on page 4-7 while you set the Power switch to the | (On) position.
- 4 Did the token-ring light come on after the Ready light came on during the wrap test?
  - Yes If the wrap test ended successfully, the procedure is complete and the IBM 8209 is ready for use.  
  
If there still seems to be a problem, write down the problem symptoms and go to step 10 on page 4-8.
  - No Write down the problem symptoms and call for hardware service.

## The A (Attachment Module) Light Does Not Come On

You should have come to this procedure as a result of the A (Attachment Module) light not coming on after the R (Ready) light and the token-ring light came on during the wrap test.

If you have not run the wrap test, go to "Wrap Test" on page 4-3 and do so.

**Note:** This procedure assumes that the Power light is on and the Ready light is on, but the attachment module light did not come on after the Ready and token-ring lights came on.

If the Power light is not on, go to "The Power Light Is Off" on page 4-10.

If the Ready light is not on, go to "The R (Ready) Light Is Off" on page 4-12.

If the token-ring light did not come on, go to "The Token-Ring Light Does Not Come On" on page 4-17.

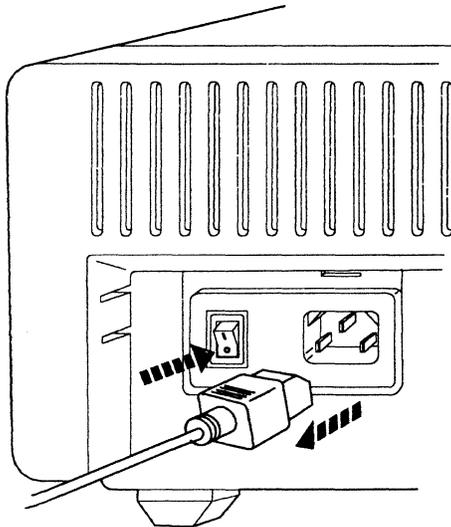
### DANGER

To prevent a possible electrical shock during an electrical storm, do not connect cables or station protectors for communications lines, display stations, printers, or telephones.

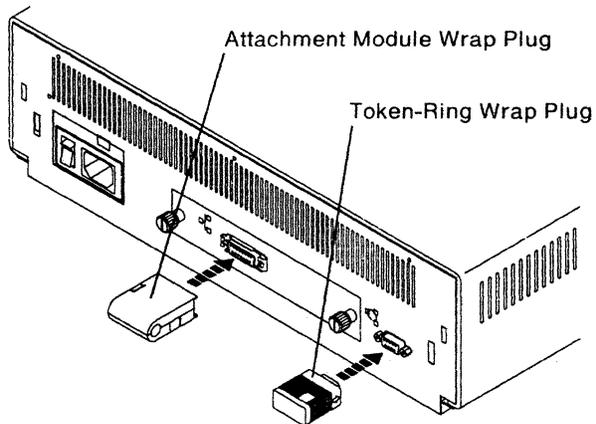
### DANGER

Ensure that you complete the following step. An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the products that attach to the system.

- 1 Set the Power switch to the O (Off) position, and disconnect the power cord from the IBM 8209.



- 2 Disconnect and reconnect the attachment module wrap plug at the back of the IBM 8209 to ensure that the plug is connected correctly and securely.



- 3 Connect the power cord to the IBM 8209.
- 4 Watch for the light sequence shown in Figure 4-1 on page 4-7 while you set the Power switch to the | (On) position.

Did the attachment module light come on after the Ready light and the token-ring light came on during the wrap test?

Yes. If the wrap test ended successfully, the procedure is complete and the IBM 8209 is ready for use.

However, if the lights operated in the correct sequence, but there still seems to be a problem, write down the problem symptoms and go to step 10 on page 4-8.

No Write down the problem symptoms and call for hardware service.

---

## **Appendix A. Planning Checklist**

This appendix contains a blank copy of the Planning Checklist, which is described in Chapter 1.

You may copy this form and save the original for copying again later.



## Planning Checklist

Check (✓)	Activity	Your Comments
	Plan and set up any LANs that connect to the IBM 8209. Each IBM 8209 should be set up according to the <i>Token-Ring Network Planning and Installation Guide</i> .	
	Select a place for the IBM 8209.	
	Decide what cables will be connected to the IBM 8209 (see "Supported Cable Systems" on page 1-6 and "Cables" on page 2-3).	
	Order cables and any other parts needed; for example, an Ethernet transceiver.	
	Ensure that the place chosen meets minimum temperature, humidity, and airflow requirements (see "Selecting and Preparing a Place for the IBM 8209" on page 2-3).	
	Review your setup plans with your IBM marketing representative or LAN installation provider.	
	Schedule a setup date.	
	Select employees to set up and configure the IBM 8209.	
	Determine if configuration parameter values need changing from the default values.	
	Define the new values for any parameters that need changing.	
	Prepare the place chosen for the IBM 8209.	
	Arrange for maintenance.	



---

## Appendix B. How the IBM 8209 LAN Bridge Functions

The IBM 8209 is a two-port medium access control (MAC) bridge for connecting an IBM Token-Ring Network segment (IEEE 802.5) to another LAN of the same or a different type. The IBM 8209 provides the necessary conversion of information frames (groups of data blocks) exchanged between two dissimilar LANs.

The IBM 8209 appears to stations on the IBM Token-Ring Network segment as a bridge to another IBM Token-Ring Network segment. The appearance of the IBM 8209 to the stations on the other LAN depends on the type of network and protocol being used. For some networks, the IBM 8209 is functionally transparent to other stations on the network.

The functions provided by the IBM 8209 depend in part on the type of attachment module installed in the IBM 8209.

The following sections describe the implementation of bridging functions provided by the IBM 8209 regardless of which attachment module is installed.

Functions specific to a certain type of attachment module are described in its *Attachment Module Guide*.

---

### The IBM 8209 Functions

This appendix describes the IBM 8209 implementation of the following bridge functions:

- Routing through bridges
- Information field length
- Station address
- Filtering
- Access protocols
- Frame format conversion.

These functions can be enabled, disabled, or assigned values by using the IBM 8209 LAN Bridge Utility Program, IBM LAN Manager, and/or the IBM LAN Network Manager to set advanced configuration parameters.

### Routing Frames through Bridges

Bridges must have access to routing information in order to determine whether to forward a frame to the next LAN segment.

### Source Routing

The IBM 8209 supports the IBM Token-Ring Network implementation of source routing for bridging multi-ring networks.

Source routing requires that the source station on a multi-ring network specify in each frame the rings and bridges that must be traversed in the route to reach the destination station. Source routing specifies an algorithm that can be used by a station to dynamically obtain the necessary routing information to reach any other station on a multi-ring network.

To determine the routing information, the source station issues a search frame on its ring. If a response is received from the desired destination station, it shows that both the source and destination stations are on the same ring and that no routing information is needed.

If no response is received, the source station issues a multi-ring search frame that fans out to every ring in the network. As the frame is copied from one ring to another, each associated bridge updates the routing information in the search frame. When the search frame finally reaches the destination, it contains the routing between the source and destination stations. The destination station then sends a response frame back to the source station with the routing information. Both stations then use the routing information in each subsequent information frame sent between them.

Two options are available for sending a multi-ring search frame:

- The search frame can be sent so that only one copy of the frame is received by the destination station even if multiple paths exist between the source and destination stations. Bridge configuration parameters can be set to ensure that only one bridge between any two rings is authorized to copy and forward the search frame. This option is called *single-route broadcast* by IBM, and *spanning-tree explorer* by IEEE.
- The search frame can be sent so that multiple copies of the frame are received by the destination station if multiple paths exist between the source and destination stations. The destination station receives one copy of the frame for each unique path. This option is called *all-routes broadcast* by IBM, and *all-routes explorer* by IEEE.

The destination station may:

- Send one response frame for each of multiple search frames it received.
- Send, for a single search frame received, an all-routes broadcast response frame. Either response allows the source station the option to choose the most direct route to the destination station.

Several IBM bridging products (including the IBM 8209) provide configuration parameters that indicate whether:

- The bridge is to participate in discovering and setting parameters automatically and dynamically to maintain one and only one single-route broadcast path between any two rings in the network. This option uses an implementation of the IEEE 802.5 spanning-tree protocol.
- Parameters are to be set during configuration specifically for each bridge to enable or disable the single-route broadcast function. The single-route broadcast path is maintained manually by changing the parameter settings every time a bridge enters or leaves the network.

## Transparent Bridging

Transparent bridging is used on most MAC bridges for interconnecting IEEE 802.3 or Ethernet LANs. The IBM 8209 incorporates transparent bridging for use with the attachment module that supports Ethernet and IEEE 802.3 LANs.

Transparent bridging provides a transparent interconnection of LANs so that any station can communicate with any other station in the network as though both stations were on the same LAN. All routing functions are handled entirely within the transparent bridges.

Transparent bridging requires that the bridges dynamically maintain a source address database for each of their LAN connections. Each bridge connection operates in a *promiscuous* mode so that every frame on the LAN is received. The source address from each frame is saved in the database. The database is then searched to determine if the destination address of the frame is in the database. If so, the frame is discarded since both the source and the destination station are on the same LAN. If, however, the destination address is not found in the database, the bridge forwards the frame on its other port. This decision process is a type of **filtering**.

Transparent bridging requires that there be only one path between any two stations in the network configuration. Otherwise, the frames loop and stay in the network permanently, causing the network to fail.

A spanning-tree protocol for transparent bridging results in a loop-free network configuration. By enabling and disabling the ability of a bridge to forward frames to the other network, this protocol ensures dynamically that there is only one active bridge between any two LANs in the entire transparent bridging network.

## IBM 8209 Routing

For the IBM 8209, the source-routing network and transparent bridging network are considered as two separate domains. Each domain consists of one or more LAN segments connected by bridges using a common bridging method. Each domain uses its specific spanning-tree protocol independent of any other domain. For more information about spanning-tree protocol, see the *Attachment Module Guide* for the type of attachment module used with the IBM 8209.

A station on a token-ring network uses source routing to communicate with any station on a network that uses transparent bridging. A station on a network that uses transparent bridging communicates with any station on a token-ring network as though that station were on the same LAN.

Though a transparent bridging domain allows only one active bridge between any two LAN segments in the domain, parallel bridges can be installed for backup purposes.

**Note:** Higher level protocols (for example, TCP/IP and SNA) must be identical for two stations to communicate successfully across a bridge.

## Information Field Length

The IBM 8209 supports frames with a maximum information field length that is compatible with the LANs connected to it.

For example, 1500 bytes is the maximum supported by Ethernet or IEEE 802.3. An IBM 8209 that connects an IBM Token-Ring Network and an Ethernet or IEEE 802.3 LAN sets the largest frame field of the routing field to binary 001, indicating a maximum information field of 1470 bytes. However, the IBM 8209 accepts and sends token-ring frames with up to 1500 bytes in the information field.

Maximum frame sizes or information field lengths may need to be set in application programs that use the bridge, so that the frame size does not exceed the maximum supported by the bridge.

## Network Address

The network address (also called the adapter address or the station address) identifies a station or adapter in a station to others on the network.

The IBM 8209 supports the IEEE 48-bit (12 hexadecimal digits) address format only. Each network address must be unique in the network. If the IBM 8209 detects a duplicate address on either LAN connected to it, the IBM 8209 does not send any frames to that address.

Each IBM 8209 connection to a LAN has a network or adapter address. From the point of view of each LAN, the *bridge address* is the adapter address assigned to that LAN connection.

## Filtering

The IBM 8209 supports filters to reduce any unnecessary traffic between LANs. Filters may be set up so that the only frames forwarded across a bridge are those that meet the filtering criteria. Information within each frame is compared to the specified filtering range values. If the information meets the compare criteria (is either within the range or outside the range, depending on the filter), the frame is forwarded across the bridge. Otherwise, the frame is discarded.

Such filtering results in improved performance of the IBM 8209. It also ensures that unnecessary traffic does not decrease the performance of attached networks.

The information contained in frames that can be used to compare to the filtering criteria can include:

- Frame type
- Source and/or destination addresses
- Some other field or value used to establish the filtering criteria.

The *Attachment Module Guide* for each type of module describes the filters available with each module and explains how to specify the filter criteria and ranges.

## Spanning-Tree Protocol

Spanning-tree protocol is used between bridges in a LAN to ensure that a single path exists between any two stations in the network.

The IBM Token-Ring Network uses the spanning-tree protocol called *single-route broadcast* to maintain a single path between any two LAN segments in the network for single-route broadcast messages used in route discovery.

Ethernet and IEEE 802.3 LANs use the spanning-tree protocol to allow only one of two or more parallel bridges to forward frames. If more than one parallel bridge in an Ethernet domain is allowed to forward frames, the frames can loop endlessly in the network.

Bridges use messages, timers, and configuration parameter values to provide the spanning-tree protocol support required for the LANs connected to each bridge.

## Frame Format Conversion

The IBM 8209 provides frame format conversion of two main types:

- Bit inversion

The bit order of the bytes for the destination and source address fields is inverted by the IBM 8209 as part of the copy process, when the bit order of these fields is reversed between the two LAN types.

- Frame header manipulation

Address, control, routing, and length information is copied to or deleted from a frame before the frame is forwarded, to provide the fields required by the destination LAN type.

The *Attachment Module Guide* for each type of attachment module describes the frame conversions done by the IBM 8209 for the attached LANs.

## An Example of a Network Using an IBM 8209

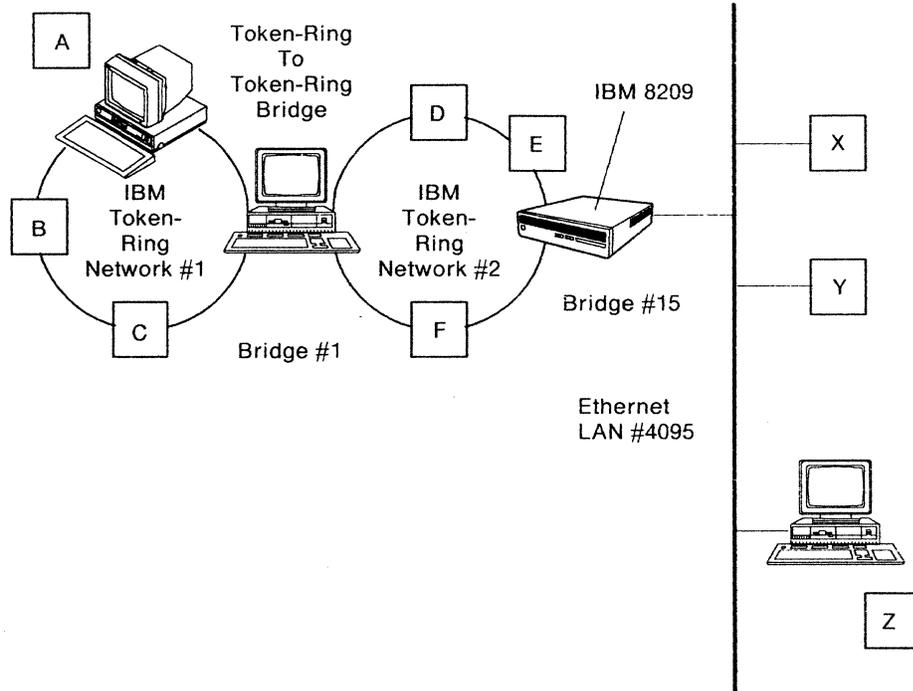


Figure B-1. An Example of a Network Using an IBM 8209

In Figure B-1, devices with addresses A, B, and C coexist on token-ring LAN 1. The devices with addresses X, Y, and Z coexist on the Ethernet LAN. If A were to send a frame to Z, it would first send an explorer frame without any routing information. When no response is received within a certain time limit, A adds a routing field to the frame and retransmits the frame, as shown below:

<b>Source address</b>	A
<b>Destination address</b>	Z
<b>Routing</b>	Single-route broadcast Direction is 0 Largest frame is 4472 bytes

Bridge number 1 would change the routing field and copy the frame on LAN 2. The new routing field is as follows:

<b>Source address</b>	A
<b>Destination address</b>	Z
<b>Routing</b>	Single-route broadcast Direction is 0 Largest frame is 4472 bytes Ring in is 1 Bridge number is 1 Ring out is 2

Bridge number 15 would then add the A address and its routing information to its database. The routing information stored would be as follows:

<b>Source address</b>	A
<b>Routing</b>	Specific route Direction is 1 Largest frame is 1470 bytes Ring in is 1 Bridge number is 1 Ring out is 2 Bridge number is 15 Ring out is 4095

**Note:** The IBM 8209 (bridge 15) changes the direction and largest frame size fields. The direction field is changed to show the reverse direction; the largest frame size is changed to the maximum for Ethernet.

The IBM 8209 (bridge 15) removes the routing from the frame and sends the frame on the Ethernet port after the appropriate frame conversion.

When any frame is received from the Ethernet port with the destination address A, the IBM 8209 will insert the above routing field in the frame before transmitting the frame on the token-ring port. Station A can then save the routing field and use it in all future transmissions to Z.



---

## List of Abbreviations

<b>AC</b>	alternating current	<b>kg</b>	kilogram
<b>ARP</b>	address resolution protocol	<b>kVa</b>	kilovolt-amperes
<b>ASCII</b>	American National Standard Code for Information Interchange	<b>LAN</b>	local area network
<b>AUI</b>	attachment unit interface	<b>lb</b>	pound, pounds
<b>BPDU</b>	bridge protocol data unit	<b>LLC</b>	logical link control
<b>CSMA/CD</b>	carrier sense multiple access with collision detection	<b>m</b>	meter, meters
<b>° C</b>	degrees Centigrade	<b>MAC</b>	medium access control
<b>° F</b>	degrees Fahrenheit	<b>Mbps</b>	million bits per second
<b>FCC</b>	Federal Communication Commission (U.S.)	<b>mm</b>	millimeter, millimeters
<b>ft</b>	foot, feet	<b>NETBIOS</b>	Network Basic Input/Output System
<b>Hz</b>	hertz	<b>RARP</b>	reverse address resolution protocol
<b>IEEE</b>	Institute of Electrical and Electronics Engineers, Inc.	<b>SNA</b>	Systems Network Architecture
<b>in.</b>	inch, inches	<b>SNAP</b>	subnetwork access protocol
<b>KB</b>	kilobyte = 1024 bytes for processor storage (memory) size, otherwise = 1000 bytes	<b>TCP/IP</b>	Transmission Control Protocol/Internet Protocol
		<b>V</b>	volts



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# Glossary

This Glossary defines local area network terms and abbreviations used in this manual. It includes terms and definitions from the *IBM Dictionary of Computing (Information Processing, Personal Computing, Telecommunications, Office Systems, IBM-Specific Terms)*, SC20-1699.

- The symbol (A) identifies definitions from the *American National Dictionary for Information Processing Systems*, copyright 1982 by the Computer and Business Equipment Manufacturers Association (CBEMA).
- The symbol (I) identifies definitions from the *ISO Vocabulary-Information Processing* and *ISO Vocabulary-Office Machines*, developed by the International Organization for Standardization, Technical Committee 97, Subcommittee 1.
- The symbol (T) identifies definitions from draft international standards, draft proposals, and working papers in development by the International Organization for Standardization, Technical Committee 97, Subcommittee 1.

## A

**access unit.** A unit that allows multiple attaching devices access to a token-ring network at a central point such as a wiring closet or in an open work area.

**active.** (1) Able to communicate on the network. A token-ring network adapter is active if it is able to transmit and receive on the network. (2) Operational. (3) Pertaining to a node or device that is connected or is available for connection to another node or device. (4) Currently transmitting or receiving.

**adapter.** In a LAN, within a communicating device, a circuit card that, with its associated software and/or microcode, enables the device to communicate over the network.

**adapter address.** Twelve hexadecimal digits that identify a local area network adapter.

**address.** (1) In data communication, the unique code assigned to each adapter, device, or workstation connected to a network. (2) A character, group of characters, or a value that identifies a register, a particular part of storage, a data source, or a data sink. The value is represented by one or more characters. (T)

(3) To refer to a device or an item of data by its address. (A) (4) The location in the storage of a computer where data is stored. (5) In word processing, the location, identified by the address code, of a specific section of the recording medium or storage. (T)

**attach.** To make a device a part of a network logically. Contrast with *connect*.

**attaching device.** Any device that is physically connected to a network and can communicate over the network.

**automatic single-route broadcast.** A function used by some IBM bridge programs to determine the correct settings for, and set the bridge single-route broadcast configuration parameters dynamically, without operator intervention. As bridges enter and leave the network, the parameter settings may need to change to maintain a single path between any two LAN segments for single-route broadcast messages. See also *single-route broadcast*.

## B

**bit.** Either of the binary digits: 0 or 1.

**bridge.** (1) An attaching device that connects two LAN segments to allow the transfer of information from one LAN segment to the other. A bridge may connect the LAN segments directly by network adapters and software in a single device, or may connect network adapters in two separate devices through software and use of a telecommunications link between the two adapters. (2) A functional unit that connects two LANs that use the same logical link control (LLC) procedures but may use the same or different medium access control (MAC) procedures. (T) Contrast with *gateway* and *router*.

**bridge number.** The bridge identifier that the user specifies in the bridge configuration. The bridge number distinguishes among parallel bridges. Parallel bridges connect the same two LAN segments.

**broadcast.** Simultaneous transmission of data to more than one destination.

**broadcast frame.** A frame that is simultaneously transmitted to more than one destination. A broadcast frame is forwarded by all bridges, unless otherwise restricted.

## C

**configuration.** (1) The arrangement of a computer system or network as defined by the nature, number, and chief characteristics of its functional units. More specifically, the term may refer to a hardware configuration or a software configuration. (I) (A) (2) The devices and programs that make up a system, subsystem, or network. (3) See also *system configuration*.

**configuration parameters.** Variables in a configuration definition, the values of which characterize the relationship of a product, such as a bridge, to other products in the same network.

**connect.** In a LAN, to physically join a cable from a station to an access unit or network connection point. Contrast with *attach*.

## D

**data.** (1) A representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by human or automatic means. (I) (A) (2) Any representations such as characters or analog quantities to which meaning is or might be assigned. (A)

**data rate.** See *data transfer rate, line data rate*.

**data transfer.** (1) The result of the transmission of data signals from any data source to a data receiver. (2) The movement, or copying, of data from one location and the storage of the data at another location.

**data transfer rate.** The average number of bits, characters, or blocks per unit of time passing between equipment in a data-transmission session. (I) The rate is expressed in bits, characters, or blocks per second, minute, or hour.

**default.** Pertaining to an attribute, value, or option that is assumed when none is explicitly specified.

**default value.** A value assumed when no value has been specified.

**destination.** Any point or location, such as a node, station, or particular terminal, to which information is to be sent.

**destination address.** A field in the medium access control (MAC) frame that identifies the physical location to which information is to be sent. Contrast with *source address*.

**disabled.** (1) Pertaining to a function or feature of a device or program that is prevented from operating or from being used by some action or specification, such

as a switch or a parameter value. (2) Contrast with *enabled*.

## E

**enabled.** (1) On a LAN, pertaining to an adapter or device that is active, operational, and able to receive frames from the network. (2) Pertaining to a function or feature that is allowed to operate or be used by some action or specification, such as a switch or parameter value. (3) Contrast with *disabled*.

**Ethernet network.** A baseband LAN with a bus topology in which messages are broadcast on a coaxial cable using a carrier sense multiple access/collision detection (CSMA/CD) transmission method.

## F

**file.** A named set of records stored or processed as a unit. (T)

**file name.** (1) A name assigned or declared for a file. (2) The name used by a program to identify a file.

**filter.** A device or program that separates data, signals, or material in accordance with specified criteria. (A)

**frame.** (1) The unit of transmission in some LANs, including the IBM Token-Ring Network and the IBM PC Network\*. It includes delimiters, control characters, information, and checking characters. On a token-ring network, a frame is created from a token when the token has data appended to it. On a token bus network (IBM PC Network), all frames including the token frame contain a preamble, start delimiter, control address, optional data and checking characters, end delimiter, and are followed by a minimum silence period. (2) In synchronous data link control (SDLC), the vehicle for every command, every response, and all information that is transmitted using SDLC procedures. Each frame begins and ends with a flag.

**function.** (1) A specific purpose of an entity, or its characteristic action. (A) (2) In data communications, a machine action such as carriage return or line feed.

## H

**header.** The portion of a message that contains control information for the message such as one or more destination fields, name of the originating station, input sequence number, character string indicating the type of message, and priority level for the message.

**hertz (Hz).** A unit of frequency equal to one cycle per second.

**Note:** In the United States, line frequency is 60Hz or a change in voltage polarity 120 times per second; in Europe, line frequency is 50Hz or a change in voltage polarity 100 times per second.

**Hz.** See *hertz*.

## I

**IEEE.** Institute of Electrical and Electronics Engineers, Inc.

**inactive.** (1) Not operational. (2) Pertaining to a node or device not connected or not available for connection to another node or device. (3) Pertaining to a station that is only repeating frames or tokens, or both.

## L

**LAN.** Local area network.

**LAN segment.** (1) Any portion of a LAN (for example, a single bus or ring) that can operate independently but is connected to other parts of the establishment network through bridges. (2) An entire ring or bus network without bridges.

**LAN segment number.** The identifier that uniquely distinguishes a LAN segment in a multi-segment LAN.

**limited broadcast.** Synonym for *single-route broadcast*.

**link.** (1) The logical connection between nodes including the end-to-end link control procedures. (2) The combination of physical media, protocols, and programming that connects devices on a network. (3) In computer programming, the part of a program, in some cases a single instruction or an address, that passes control and parameters between separate portions of the computer program. (4) To interconnect items of data or portions of one or more computer programs. (5) In SNA, the combination of the link connection and link stations joining network nodes.

**LLC protocol.** Logical link control protocol.

**lobe.** In the IBM Token-Ring Network, the section of cable (which may consist of several cable segments) that connects an attaching device to an access unit.

**lobe receptacle.** In the IBM Token-Ring Network, an outlet on an access unit for connecting a lobe.

**local area network (LAN).** A computer network located on a user's premises within a limited geographical area.

**Note:** Communication within a local area network is not subject to external regulations; however, communication across the LAN boundary may be subject to some form of regulation. (T)

**locally administered address.** An adapter address that the user can assign to override the universally administered address. Contrast with *universally administered address*.

## M

**MAC.** Medium access control.

**medium access control (MAC) protocol.** In a local area network, the part of the protocol that governs communication on the transmission medium without concern for the physical characteristics of the medium, but taking into account the topological aspects of the network, in order to enable the exchange of data between data stations. (T)

**message.** (1) A logical partition of the user device's data stream to and from the adapter. (2) A group of characters and control bits transferred as an entity.

## N

**name.** An alphanumeric term that identifies a data set, statement, program, cataloged procedure, or other hardware or software entity.

**NetView.** A host-based IBM licensed program that provides communication network management (CNM) or communications and systems management (C&SM) services.

**network.** (1) A configuration of data processing devices and software connected for information interchange. (2) An arrangement of nodes and connecting branches. Connections are made between data stations. (T)

**network administrator.** A person who manages the use and maintenance of a network.

**network management.** The conceptual control element of a station that interfaces with all of the architectural layers of that station and is responsible for the resetting and setting of control parameters, obtaining reports of error conditions, and determining if the station should be connected to or disconnected from the network.

**network status.** The condition of the network.

## O

**operating system.** Software that controls the execution of programs. An operating system may provide services such as resource allocation, scheduling, input/output control, and data management. (A) Examples are IBM PC DOS and IBM OS/2\*.

## P

**parallel bridge.** One of the two or more bridges that connect the same two LAN segments in a network.

**parameter.** (1) A variable that is given a constant value for a specified application and that may denote the application. (l) (A) (2) An item in a menu or for which the user specifies a value or for which the system provides a value when the menu is interpreted. (3) Data passed between programs or procedures.

**path.** (1) In a network, any route between any two nodes. (T) (2) The route traversed by the information exchanged between two attaching devices in a network. (3) A command in IBM Personal Computer Disk Operating System (PC DOS) and IBM Operating System/2\* (OS/2) that specifies directories to be searched for commands or batch files that are not found by a search of the current directory.

**phase.** The relative timing (position) of periodic electrical signals.

**physical connection.** The ability of two connectors to mate and make electrical contact. In a network, devices that are physically connected can communicate only if they share the same protocol. See also *logical connection*.

**plug.** (1) A connector designed to insert into a receptacle or socket. (2) To insert a connector into a receptacle or socket.

**port.** (1) An access point for data entry or exit. (2) A connector on a device to which cables for other devices such as display stations and printers are attached. Synonymous with *socket*.

**procedure.** A set of instructions that gives a service representative a step-by-step procedure for tracing a symptom to the cause of failure.

**protocol.** (1) A set of semantic and syntactic rules that determines the behavior of functional units in achieving communication. (l) (2) In SNA, the meanings of and the sequencing rules for requests and responses used for managing the network, transferring data, and synchronizing the states of network components. (3) A specification for the format and relative timing of information exchanged between communicating parties.

## R

**receive.** To obtain and store information transmitted from a device.

**receptacle.** Electrically, a fitting equipped to receive a plug and used to complete a data connection or electrical path. See also *lobe receptacle*.

**remove.** (1) To take an attaching device off a network. (2) To stop an adapter from participating in data passing on a network.

**ring network.** A network configuration in which a series of attaching devices is connected by unidirectional transmission links to form a closed path. A ring of an IBM Token-Ring Network is referred to as a LAN segment or as a Token-Ring Network segment.

**router.** An attaching device that connects two LAN segments, which use similar or different architectures, at the reference model network layer. Contrast with *bridge* and *gateway*.

**routing.** (1) The assignment of the path by which a message will reach its destination. (2) The forwarding of a message unit along a particular path through a network, as determined by the parameters carried in the message unit, such as the destination network address in a transmission header.

## S

**server.** (1) A device, program, or code module on a network dedicated to providing a specific service to a network. (2) On a LAN, a data station that provides facilities to other data stations. Examples are a file server, print server, and mail server.

**single-route broadcast.** The forwarding of specially designated broadcast frames only by bridges which have single-route broadcast enabled. If the network is configured correctly, a single-route broadcast frame will have exactly one copy delivered to every LAN segment in the network. Synonymous with *limited broadcast*. See also *automatic single-route broadcast*.

**SNA.** Systems Network Architecture.

**source address.** A field in the medium access control (MAC) frame that identifies the location from which information is sent. Contrast with *destination address*.

**station.** (1) A communication device attached to a network. The term used most often in LANs is an *attaching device* or *workstation*. (2) An input or output point of a system that uses telecommunication facilities; for example, one or more systems, computers, terminals, devices, and associated programs at a particular location that can send or receive data over a

telecommunication line. See also *attaching device, workstation*.

**switch.** On an adapter, a mechanism used to select a value for, enable, or disable a configurable option or feature.

**system.** In data processing, a collection of people, machines, and methods organized to accomplish a set of specific functions. (I) (A)

**system configuration.** A process that specifies the devices and programs that form a particular data processing system.

**Systems Network Architecture (SNA).** The description of the logical structure, formats, protocols, and operational sequences for transmitting information units through, and controlling the configuration and operation of, networks.

**Note:** The layered structure of SNA allows the ultimate origins and destinations of information, that is, the end users, to be independent of and unaffected by the specific SNA network services and facilities used for information exchange.

## T

**telephone twisted pair.** One or more twisted pairs of copper wire in the unshielded voice-grade cable commonly used to connect a telephone to its wall jack. Also referred to as "unshielded twisted pair" (UTP).

**token.** A sequence of bits passed from one device to another on the token-ring network that signifies permission to transmit over the network. It consists of a starting delimiter, an access control field, and an end delimiter. The access control field contains a bit that indicates to a receiving device that the token is ready to accept information. If a device has data to send along the network, it appends the data to the token. When data is appended, the token then becomes a frame. See *frame*.

**token ring.** A network with a ring topology that passes tokens from one attaching device (node) to another. A node that is ready to send can capture a token and insert data for transmission.

**token-ring network.** (1) A ring network that allows unidirectional data transmission between data stations by a token-passing procedure over one transmission medium so that the transmitted data returns to and is removed by the transmitting station. (T) The IBM Token-Ring Network is a baseband LAN with a star-

wired ring topology that passes tokens from network adapter to network adapter. (2) A network that uses a ring topology, in which tokens are passed in a sequence from node to node. A node that is ready to send can capture the token and insert data for transmission. (3) A group of interconnected token rings.

**transceiver.** Any device that can transmit and receive traffic.

**transfer rate.** See *data transfer rate*.

**Transmission Control Protocol/Internet Protocol (TCP/IP).** A set of protocols that allow cooperating computers to share resources across a heterogeneous network.

**transmit.** To send information from one place for reception elsewhere.

**transparent bridging.** Interconnection of LANs with bridges so that any station can communicate with any other station in the network as though both stations were on the same LAN. All routing functions are handled entirely by the bridges.

**twisted pair.** A transmission medium that consists of two insulated conductors twisted together to reduce noise. (T)

## U

**universally administered address.** The address permanently encoded in an adapter at the time of manufacture. All universally administered addresses are unique. Contrast with *locally administered address*.

## V

**version.** A separate IBM-licensed program, based on an existing IBM-licensed program, that usually has significant new code or new function.

## W

**workstation.** (1) An I/O device that allows either transmission of data or the reception of data (or both) from a host system, as needed to perform a job: for example, a display station or printer. (2) A configuration of I/O equipment at which an operator works. (T) (3) A terminal or microcomputer, usually one connected to a mainframe or network, at which a user can perform tasks.



# Index

## A

- address
  - adapter B-4
  - network B-4
  - station B-4
- advanced configuration
  - procedure sequence 2-12
  - program requirements 2-11
  - rationale 2-10
- air circulation clearance 2-4
- attachment module
  - cabling 2-3
  - configuration planning
    - advanced 2-10
    - basic 2-9
  - connector 3-9
  - function 1-4
  - installation 3-7
  - light 4-19
  - switch settings 3-6

## B

- bridge
  - planning chart 3-6
  - spanning-tree protocol B-4
- bridges, transparent B-2

## C

- cable
  - attachment module 2-3
  - IBM Token-Ring Network 3-9
  - requirements 2-3
  - support 1-6
- clearance, air circulation 2-4
- configuration
  - advanced
    - See advanced configuration
  - basic 2-9
  - setting switches 3-6
- configurations, network 1-5
- connections, LAN
  - IBM Token-Ring 1-1, 1-4
  - other LAN 1-1
- connectors
  - attachment module 3-9
  - token-ring 3-9
- conversion, frame format B-5
- cover, rear
  - reattachment 3-8
  - removal 3-5

## D

- data transfer rate 1-3
- diagnostic self-test
  - overview 4-2
  - procedure 4-3—4-9
  - wrap plug installation 4-6
- discharge, static 2-8
- documentation update at installation 2-3

## E

- electrical requirements 2-5
- environment, operating 2-4

## F

- filters
  - overview 1-3, B-4
  - types B-4
- flashing light sequence 3-11
- frame format conversion B-5
- frame transfer 1-3
- functions (IBM 8209)
  - filtering B-4
  - frame conversion B-5
  - information field length B-3
  - source routing B-1
  - spanning-tree protocol B-4
  - station address B-4
  - transparent bridging B-2

## H

- hardware setup 3-4

## I

- IBM LAN Manager 2-11
- IBM LAN Network Manager 2-11
- IBM 8209 LAN Bridge
  - connections 1-1
  - functions 1-3
    - See also functions (IBM 8209)
  - installation
    - See installation
  - operation verification 3-11
  - overview 1-1
  - physical characteristics 2-3
  - Utility Program 2-11
- installation
  - attachment module 3-7
  - clearance, air space 2-4
  - configuration planning
    - advanced 2-10
    - basic 2-9

installation (*continued*)  
  electrical requirements 2-5  
  hardware setup 3-4  
  location 2-3  
  magnetic interference 2-8  
  network documentation 2-3  
  noise level 2-8  
  operating environment 2-4  
  overview 2-1  
  planning checklist 2-2, A-1  
  plugs and receptacles 2-5  
  static discharge 2-8  
  tasks 3-2  
  wrap plug (for test) 4-6  
interference, magnetic 2-8

## L

LAN connections  
  IBM Token-Ring 1-1, 1-4  
  other LAN 1-1  
LAN management support 1-3  
LAN type support 1-4  
lightning protection 2-7  
lights  
  A (attachment module) 4-19  
  Power 4-10  
  Ready (R) 4-12  
  sequence (flashing) 3-11  
  token-ring 4-17

## M

magnetic interference 2-8

## N

network  
  address  
    See address, network  
  configurations supported 1-5  
  connections  
    See connections, LAN  
  documentation update 2-3  
  example with IBM 8209 B-6  
noise levels 2-8

## O

operating environment 2-4  
operation verification 3-11

## P

planning checklist A-1  
power light 4-10  
power plugs 2-5  
power switch 3-4

problem determination 4-1—4-20  
  attachment module light off 4-19  
  Power light off 4-10  
  Ready light off/no flash 4-12  
  token-ring light off 4-17  
protocols supported 1-4  
protocol, Spanning-Tree B-4  
publications, related ix

## R

R (Ready) light 4-12  
rate, data transfer 1-3  
reattaching rear cover 3-8  
receptacles 2-5  
related publications ix  
removing rear cover 3-5

## S

source routing B-1  
Spanning-Tree protocol B-4  
static discharge 2-8  
station address B-4  
switches, setting  
  attachment module 3-6  
  voltage selection 3-5

## T

test, wrap  
  overview 4-2  
  procedure 4-3—4-9  
  wrap plug installation 4-6  
token-ring light 4-17  
transparent bridging B-2  
troubleshooting 4-1—4-20  
  attachment module light off 4-19  
  Power light off 4-10  
  Ready light off/no flash 4-12  
  token-ring light off 4-17

## U

unpacking the IBM 8209 3-2

## V

verification of 8209 operation 3-11  
voltage selection switch 3-5

## W

wrap plug 4-6  
wrap test  
  overview 4-2  
  procedure 4-3—4-9  
  wrap plug installation 4-6

## Numerics

8209 LAN Bridge

connections 1-1

functions 1-3

*See also* functions (IBM 8209)

installation

*See* installation

operation verification 3-11

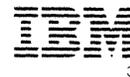
overview 1-1

physical characteristics 2-3

Utility Program 2-11







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