

# P-Com DataMetro II Wireless Router

Hardware Installation Guide  
Rev A





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P/N 81170-010 Rev A

TPN 81170-00A

February 1999

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This product, except as stated otherwise in an applicable price list, is warranted against defects in workmanship and material for a period of three (3) years from date of delivery as evidenced by the manufacturer's packing slip or other transportation receipt.

The manufacturer's sole responsibility under this warranty shall be to either repair or replace, at its option, any component which fails during the applicable warranty period because of a defect in workmanship and material, provided PURCHASER has promptly reported same to the manufacturer in writing. All replaced Products or parts shall become property of the manufacturer.

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## **PRODUCT COMPATIBILITY**

While every effort has been made to verify operation of this product with many different communications products and networks, P-Com Corporation makes no claim of compatibility between its products and other vendors' equipment. It is assumed that users have thoroughly evaluated this product's performance in the communications environment in which it will be used.

## **SAFETY**

The following general safety precautions must be observed during all phases of operation and service of this product. Failure to comply with these precautions or with specific warnings elsewhere in this Manual willfully violates standards of design, manufacture, and intended use of the product. P-Com Corporation assumes no liability for the customer's failure to comply with these requirements.

This product must be grounded. In the event of a short circuit, grounding reduces the risk of electrical shock by providing an escape wire for the current.

We recommend that you use preferred power—a dedicated power circuit with an assigned circuit breaker.

The product's AC power cord ends in a three-pole grounding plug. Do not use a three-pole to two-pole adapter with the plug. Verify that the outlet you intend to use is properly installed and grounded; the outlet used must comply with the National Electric Code (NEC) NFPA70 (1990) in U.S.A. or other local and national or international applicable code.

Do not install or operate this product in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

No user maintained or adjustable components are present within this product. Do NOT attempt to open this unit. Do not attempt to service this unit except under the direction of Customer Service. Only P-Com-authorized service personnel should service this equipment. The potential for electrical shock exists within the enclosures at all times unless they are unplugged.

Do not install substitute parts or perform any unauthorized modification to the product. Return the product to the factory for service and repair to ensure that safety features are maintained. Prior to returning any product(s) for repair, contact P-Com at the telephone numbers or address located in this Manual, and obtain a Return Material Authorization (RMA) number.

Changes or modifications not expressly approved by P-Com Corporation can void the user's authority to operate this equipment.

## **SYSTEM GROUNDING**

Direct grounding of the antenna, mast, and tower serves as protection from lightning strikes and static buildup. A direct electrical connection should be made to a suitable grounding rod at the base of the tower or mast using at least #10 AWG ground wire, or its equivalent, and non-corrosive hardware. For details and safety standards, consult the appropriate local Electrical Codes or a similar document. Use lightning arresters in appropriate places.

## **TOWER CONSTRUCTION**

Compliance with local zoning and tower construction regulations is recommended when DataMetro II systems require a tower. These regulations generally mandate that permits be obtained before any tower construction begins. Check with local zoning and aviation authorities for more information.

---

## **FCC NOTICE TO USERS**

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference that may cause undesired operation.

Changes or modifications not expressly approved by P-Com Inc. can void the user's authority to operate the equipment.

FCC regulations require that this device be professionally installed by a person knowledgeable in electronics and trained in the correct installation of this device.

All interface cables must be shielded.

## **CANADIAN DEPARTMENT OF COMMUNICATIONS COMPLIANCE**

This Class B digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations. This digital apparatus does not exceed the Class B limits for radio noise from digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications.

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



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# Before You Begin

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## PURPOSE OF THIS GUIDE

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This *P-Com DataMetro II Hardware Installation Guide* is directed to persons who must perform or coordinate the tasks associated with the process of installing a DataMetro II wireless router in a local area network (LAN).

## PRIOR KNOWLEDGE

.....

This *Installation Guide* assumes that you are knowledgeable about basic hardware installation concepts and practices. If you are not, the information in this *Installation Guide* may be difficult for you to understand and implement.

## HOW THIS GUIDE IS ORGANIZED

.....

This *Installation Guide* is organized in chapters and appendix material in the following manner:

- Chapter 1 - provides a product overview of the DataMetro II wireless router
- Chapter 2 - describes different wireless network topologies
- Chapter 3 - tells you how to perform a basic radio configuration and hardware installation
- Chapter 4 - provides instructions for mounting the DataMetro II in an equipment rack
- Appendix A - provides DataMetro II specifications

## HOW TO USE THIS GUIDE

Before beginning the installation process, review all the chapters so that you have a sense of what each chapter provides. Verify that you have selected the proper installation procedure to meet site-specific needs.

Read through an entire procedure before you begin performing the step-by-step instructions. By doing this, you will be prepared with the appropriate information, equipment, or tools.

## TYPOGRAPHIC CONVENTIONS

Notes, Cautions, and Warnings are shown as:

**NOTE** *A note gives you information of special interest.*



*A caution gives you information that you need so that you will not damage the equipment or lose data.*



*A warning gives you information that you need so that you do not cause harm to yourself or any other person, and so that you do not damage or interfere with the network application.*

## CUSTOMER SERVICE

P-Com distributors are authorized local service providers and are responsible for immediate customer support. If problems are not resolved, you can contact P-Com Customer Service for assistance.

## E-MAIL SERVICE

P-Com Customer Service provides the following e-mail address for customer assistance:

[customer\\_service@p-com.com](mailto:customer_service@p-com.com)

## TELEPHONE AND FAX SERVICE

P-Com Customer Service maintains a 24-hour answering service for emergency telephone support. Customer Service responses to emergency calls consist of over-the-phone troubleshooting and assistance in obtaining distributor support.

See Table A for Customer Service telephone numbers.



**Table A Customer Service Telephone Numbers**

| If you are in this location       | Call this number     |
|-----------------------------------|----------------------|
| Within the USA                    | 1-800-500-PCOM       |
| United Kingdom                    | 44.1256.841919       |
| Singapore                         | 65.297.6196          |
| China                             | 86.10.6467.1905      |
| India                             | 91.124.3599.45/46/47 |
| Pakistan                          | 92.21.584.6240       |
| Dubai                             | 97.148.13993         |
| Any other country outside the USA | 1-408-866-3666       |

## SERVICE AND REPAIR CENTERS

Service and repair centers are located in the United States, Brazil, China, and India.

### UNITED STATES SERVICE AND REPAIR CENTER

**Address:**  
P-Com, Inc.  
1355 Dell Avenue  
Campbell CA 95008 USA

**Telephone and fax:**  
1.408.866.3666  
1.408.866.3161 (fax)

### BRAZIL SERVICE AND REPAIR CENTER

**Address:**  
Mapra  
Rue Caio Graco, 798-lapa  
CEP 05044-000 Sao Paulo

**Telephone and fax:**  
55.11.3872.6776  
55.11.3871.3667 (fax)

### CHINA SERVICE AND REPAIR CENTER

**Address:**  
Airlink Wireless  
Room 227, Towercrest Place  
No. 3 Mai Zi Dian Xi Road  
Beijing 100016 PRC

**Telephone and fax:**  
86.10.6467.1905  
86.10.6467.1906 (fax)

### INDIA SERVICE AND REPAIR CENTER

**Address:**  
P-Com India  
A27/4  
DLF QUTAB Enclave-I  
Gurgaon 122002 India

**Telephone and fax:**  
91.124.3599.45/46/47  
91.124.3587.43 (fax)

## RETURN MATERIAL AUTHORIZATION (RMA)

Before you return equipment to a Service/Repair Center, you need a Return Material Authorization (RMA) number.

To get the RMA number:

- 1 Gather the following information:
  - unit model number
  - unit serial number
  - address to where unit was sold, billed, or shipped
  - purchase order number (if unit not under warranty)
  - whether credit or service is required
  - description of unit failure (no sync, no output, etc.)
- 2 From within the USA, call Customer Service at 1-800-500-PCOM. From outside the USA, call Customer Service at 408-866-3666, or contact one of the Service and Repair centers (see page xv).
- 3 Provide Customer Service with the information gathered in Step 1.

**NOTE**



When returning equipment, be sure to write the RMA number on the outside of the shipping carton.

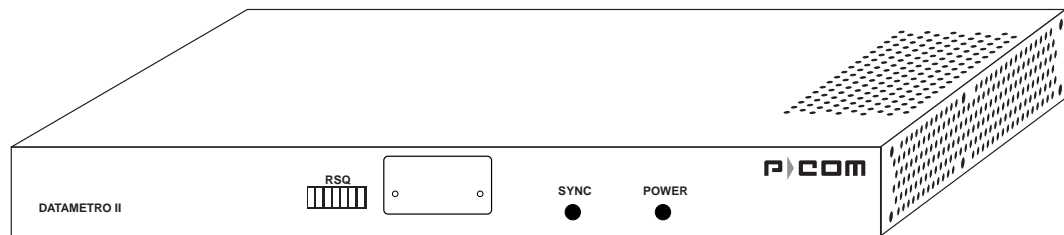
## INTERNATIONAL SALES OFFICES

P-Com, Inc. international sales offices are located throughout the world. See Table B.

**Table B International Sales Offices**

| Country        | Telephone            | FAX             |
|----------------|----------------------|-----------------|
| United Kingdom | 44.1256.841919       | 44.1256.324156  |
| Singapore      | 65.297.6196          | 65.297.6195     |
| China          | 86.10.6467.1905      | 86.10.6467.1906 |
| India          | 91.124.3599.45/46/47 | 91.124.3587.43  |
| Pakistan       | 92.21.584.6240       | 92.21.584.0727  |
| Russia         | 095.280.4759         | 095.280.4759    |
| Latin America  | 408.874.4668         | 408.866.3664    |
| Dubai          | 97.148.13993         | 97.148.13994    |

## PRODUCT OVERVIEW



*Figure 1-1 Data Metro II*

The P-Com DataMetro II is a wireless remote access router with an embedded computing engine. The radio is based on direct sequence spread spectrum technology, operating in the 2400 MHz to 2483.5 MHz RF band.

DataMetro II uses time division multiple access (TDMA) to provide access to the wireless media. The Media Access Control (MAC) protocol is implemented by hardware, providing high performance throughput without software intervention.

## PRODUCT DESCRIPTION

The DataMetro II is easy to install and configure as a wireless router. All software that controls the PC is included for the network administrator. Initial configuration is implemented via

- a 12-bank set of DIP switches, or
- a Command Line Interface running on a terminal, or
- the Site Manager application running on a PC connected to the DataMetro II unit through a local area network (LAN) or through the public telephone network.

The DataMetro II offers wide area network connectivity when cables cannot be used due to distance, physical obstructions, or

price constraints. The wireless network can be dynamically reconfigured to provide new permanent or temporary services. Adding or removing nodes does not affect network operation.

The DataMetro II lowers networking costs by combining routing and wireless transceiver functions in a single package. It lowers unit cost by using an embedded computing engine rather than an external PC. It provides remote downloading of firmware and provides password and hard-coded serial number protected management. The Ethernet 10baseT port connects to the LAN.

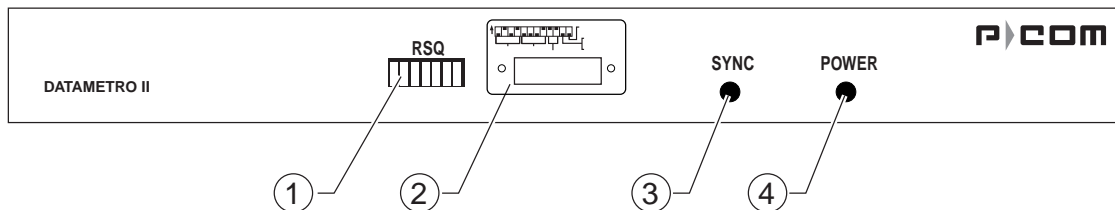
The P-Com DataMetro II Model 320 and Model 1280 are distinguished by data rate.

## TOPOLOGIES

The DataMetro II provides bi-directional communication for multiple WAN nodes. The wireless network can be configured to one of three network topologies:

- point-to-point—where two nodes are communicating directly with each other (see section *Point-to-Point Topology* on page 2-2)
- peer-to-peer—where all nodes in a network communicate directly with one another (see section *Peer-to-Peer Topology* on page 2-2)
- centralized (star)—where the node at the center of the network acts as a switching device for communication between remote nodes (see section *Centralized (Star) Topology* on page 2-3)

## FRONT PANEL



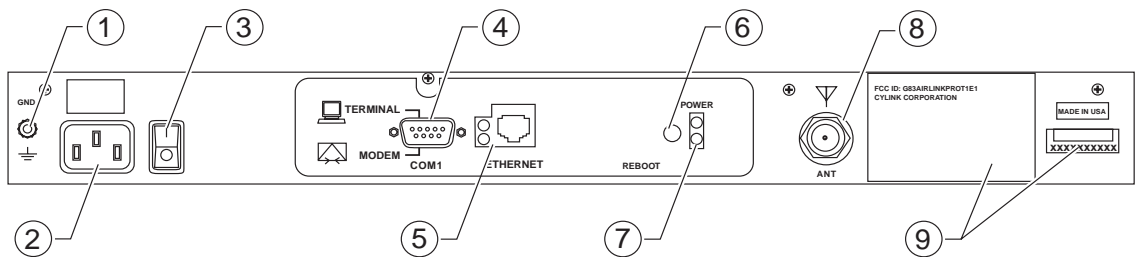
**Figure 1-2 DataMetro II Front Panel**

The DataMetro II front panel (see Figure 1-2) provides the following components:

- ① **RECEIVE SIGNAL QUALITY**—7-element LED bar that illuminates *green* to indicate the quality of the receive signal; sequential illumination of each LED indicates that the initialization self-test is in progress; no illumination of the LEDs indicates that successful completion of the self-test

- ② DIP SWITCHES—twelve up/down (ON/OFF) toggle switches for initial RF configuration (under removable metal plate)
- ③ SYNC—illuminates *green* when the radio receives a packet frame header
- ④ POWER—LED that illuminates *yellow* when radio power is ON

## REAR PANEL



**Figure 1-3 DataMetro II Rear Panel**

The DataMetro II rear panel (see Figure 1-3) provides the following indicators, connectors, and other components:

- ① GND—grounding stud
- ② PWR—connector for AC power cord
- ③ I/O—AC power ON/OFF rocker switch
- ④ RS-232—port for direct connection to a terminal or external telephone modem
- ⑤ RJ-45—connector for Ethernet connection (10baseT)
- ⑥ REBOOT—button for rebooting the computer
- ⑦ POWER—LED that illuminates *yellow* when the power to the unit is ON
- ⑧ ANT—connector for the antenna
- ⑨ labels—regulatory labels

## PRODUCT FEATURES

The P-Com DataMetro wireless router interconnects computer LANs at geographically dispersed offices, warehouses, and other sites. Using robust spread spectrum technology that resists noise and interference, the wireless remote access router can be

deployed quickly, since no license is required in many countries. Where wired WAN solutions are costly or not available, the Data Metro provides a solution to support geographically dispersed enterprises and network service providers.

#### FEATURES AND BENEFITS

| Features                                                                 | Benefits                                                                                                                                                     |
|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Wireless solution                                                        | Works where wired connectivity is not available or practical; one-time capital expense; no ongoing service charges, cost competitive with wired-WAN services |
| Router functionality; network layer IP/IPX routing                       | Interconnects networks at dispersed sites over a wide area; maintains independent networks on the WAN                                                        |
| 2.4 GHz spread spectrum transmission; 320 kbps and 1280 kbps data rates  | Robust, reliable, secure; resists noise and interference; unlicensed operation in most countries                                                             |
| Wired WAN-like data throughput; approaches T1 performance                | Faster performance than POTS, X.25, ISDN                                                                                                                     |
| Range to 50 km (30 miles) per hop; supports multiple hops                | Covers metropolitan, suburban, rural, and isolated areas                                                                                                     |
| User-selectable physical topologies (star, peer-to-peer, point-to-point) | Flexibility in WAN design                                                                                                                                    |
| Ethernet and antenna ports                                               | Fully self-contained wireless router                                                                                                                         |
| DIP switches for initial RF setup                                        | Field-ready for configuration download through Windows-based Site Manager application                                                                        |
| RJ-45 connector                                                          | For Ethernet 10baseT                                                                                                                                         |
| RS-232 connector                                                         | For direct connection to PC terminal or remote connection to Site Manager over public telephone network                                                      |
| Internal computing engine                                                | Fully self-contained                                                                                                                                         |
| End-to-end SNMP support                                                  | Monitor network and radio performance remotely                                                                                                               |
| Selectable PN codes and channel frequencies                              | Effective spectrum management                                                                                                                                |
| Selectable transmitter output power                                      | From 0 dBm to 28 dBm                                                                                                                                         |
| Remote test utilities                                                    | Full management and control of network                                                                                                                       |
| Support for TCP/IP, Novell IPX                                           | Provides flexibility                                                                                                                                         |
| Support for RIP v1/v2 IP, RIP IPX                                        | Provides complete network management                                                                                                                         |
| Support for SNMP, TFTP and BOOTP/DHCP protocols                          | Password protection for application level protocols                                                                                                          |
| Unique Ethernet interface MAC address and cluster ID                     | Provides Wireless Media Access Security                                                                                                                      |

## WIRELESS NETWORK DESIGN

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The term *network topology* refers to the logical layout of a network. It defines how the network elements will communicate with each other, how the information will be transmitted, and how the information will be routed through the network.

### PACKET-BASED NETWORKS

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Packet-based networks are most suitable for data that come in bursts, such as networks that involve large-scale data transmissions for multiple users at the same time. There is a guaranteed minimum throughput for a packet-based network, but the actual throughput realized by a packet-based network node will depend on

- the number of users in the network, and
- how much traffic is being generated by each node at any given time.

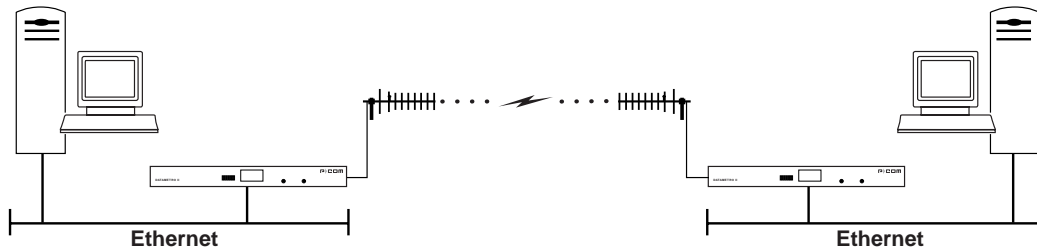
The advantage of a packet-based network is that multiple transmissions can travel along the network at the same time, using whatever path is appropriate to the routing from the source to the destination.

The most significant characteristic of packet-based networks is the wireless interface access protocols they use, such as CSMA/CA (Carrier Sense Multiple Access/Collision Avoidance), which can result in more efficient use of the aggregate bandwidth by dynamically allocating throughput to nodes based on demand.

P-Com DataMetro II supports Point-to-Point, Peer-to-Peer, and Centralized (Star) packet-based network topologies. Each topology has its own optimized wireless protocol.

## POINT-TO-POINT TOPOLOGY

In a packet-based point-to-point topology, two nodes are linked directly. The most common application for this topology would be the interconnection of two LANs. In Figure 2-1, the LANs are connected via a pair of DataMetro II routers.



*Figure 2-1 Point-to-Point Topology*

The range and interference immunity that can be achieved with packet-based point-to-point topology is maximized by the use of highly directional antennas on both sides of the link.

DataMetro II applies native modification of the CSMA/CA protocol for the point-to-point topology. Each node sends its frame immediately after receiving a frame, in which case the delay value is equal to zero. The node that sent the frame will wait for a reply. If there is no reply, it will send the next frame using the standard CSMA/CA protocol.

## PEER-TO-PEER TOPOLOGY

In peer-to-peer topology (unique to packet-based networks), there are three or more nodes, any one of which can communicate directly with any other node. Since each node has direct access to every other node, the time delay for transferring data between nodes is the least for this type of topology, unless WAN traffic is very high. However, this also implies that each node must have a clear communication path to every other node, that is, there must be clear line of sight.

An example of a three node peer-to-peer topology is shown in Figure 2-2 on page 2-3.



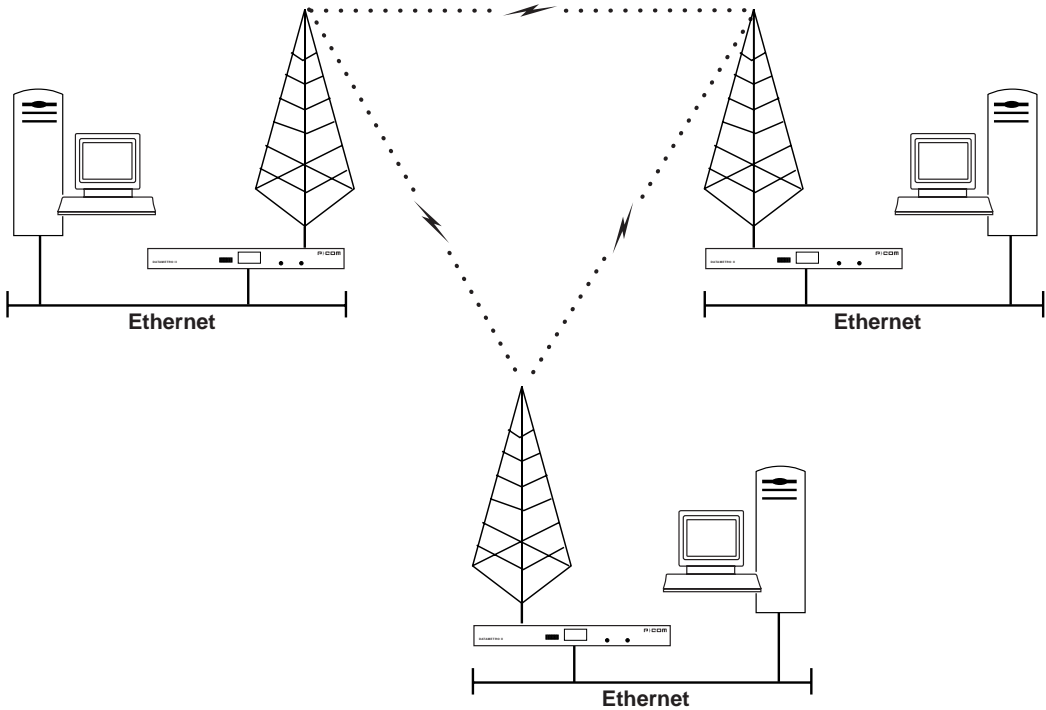


Figure 2-2 Peer-to-Peer Topology

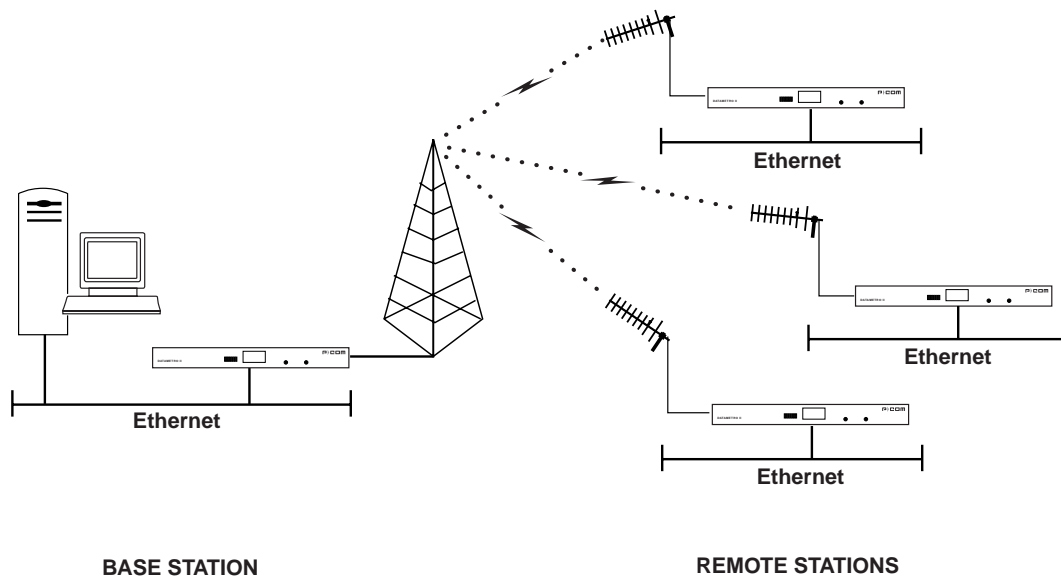
In peer-to-peer topology, since all nodes need to talk to each other, the range is dependent on the type of antennas used and the local terrain. Longer ranges can be achieved by using directional antennas with power splitters to connect to all sites.

CENTRALIZED (STAR) TOPOLOGY

In a Star topology, there is one radio at a central location designated as a Base Station or Star Base, and several remotes designated as Remote Stations or Star Remotes. The Star Base acts as a switching device. The Star Remotes communicate with each other through the Star Base.

A DataMetro II wireless network with centralized topology can connect up to 127 wireless nodes. The MAC protocol used is a combination of random and polling MAC protocols, with positive Data Link acknowledgment that improves the reliability of frame delivery.

Figure 2-3 on page 2-4 shows DataMetro II wireless router nodes in a star topology.



**Figure 2-3 Star Topology**

A directional antenna can be used for the central site if all of the nodes fall in the main lobe of the antenna pattern. Since the remote sites need only communicate with the central site, directional, high gain antennas can be used.

The range of a Star topology network can be increased if the remote nodes are all located within a confined sector from the central site. Communication between two remote sites must be relayed through the central node.

Medium access contention on the Star Base is resolved by the specific Star Base MAC protocol. The Star Remote sends the data frame only when it gets permission from the Star Base. Each frame regularly transmitted by the Star Base contains the PID (polling ID) of the wireless cluster node. If a polled Star Remote has a frame to transmit, it explicitly sends the frame to the Star Base. The Star Base relays this frame to the Star Remotes indicated by the DID (destination ID) of the original frame. A polled Star Remote does not reply on the PID if it has no frame to transmit.

## HARDWARE INSTALLATION

---

At each wireless node, the P-Com DataMetro II radio connects to a LAN, where it functions as a wireless remote access router, connecting the LAN into the wireless WAN (wide area network).

Each radio is shipped in a carton that contains:

- one P-Com DataMetro II wireless router
- 0 dbi test antenna
- AC power cord
- mounting brackets and hardware for optional rack mounting
- *Site Manager* application diskettes
- *P-Com DataMetro II Installation Guide*
- *P-Com DataMetro II Administrator's Guide*

### WIRELESS ROUTER INSTALLATION

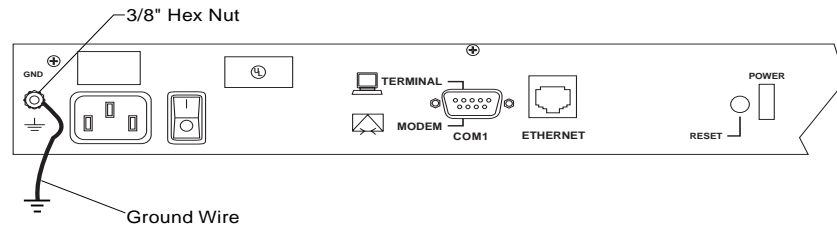
---

Once you have set basic configuration parameters for the DataMetro II unit, you can install the router in the network. You provide power for the radio by connecting the AC power cord. Before making any cable connections, however, you need to ground the unit.

### GROUND CONNECTION

To ground the DataMetro II radio:

- 1 Loosen the **GND** nut on the back of the radio.
- 2 Attach a #12 AWG minimum wire from the grounding stud to a safe ground. See Figure 3-1.



**Figure 3-1 Attaching the Ground Wire to the Radio**



The P-Com DataMetro II radio should be grounded at the ground nut on the back of the radio before you connect any other cables to the radio. After the radio is grounded, make sure that any other equipment that you connect to the radio is also properly grounded.

## LAN CONNECTION

To connect the DataMetro II radio to the LAN:

- 1 Plug one end of an RJ-45 cable into the RJ-45 Ethernet port on the back of the radio.
- 2 Plug the other end of the RJ-45 cable into the RJ-45 port on the Ethernet Hub.

### NOTE

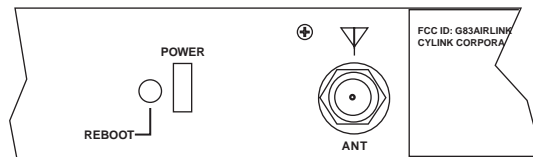


If you are connecting the radio directly to a PC, use a cross-over cable, plug one end into the RJ-45 port on the radio and the other end into the RJ-45 port of the Ethernet card.

## ANTENNA CONNECTION

The type of antenna you use should be a semi-parabolic or solid parabolic directional antenna. You can purchase the antenna from P-Com or its distributors.

The indoor antenna connects to the rear of the DataMetro II unit through the N-type connector labeled ANT on the back of the radio. See Figure 3-2. The outdoor antenna is connected through coaxial cable.



**Figure 3-2 ANT Connector**

To connect an indoor antenna to the DataMetro II radio:

- 1 Plug the antenna connector firmly into the N-type antenna connector on the back of the unit.
- 2 Hand-tighten the connector shell onto the jack connector collar.

- 3 Verify that the connector is fixed firmly in place.

To connect an outdoor antenna to the DataMetro II radio:

- 1 Plug the coaxial antenna cable into the N-type antenna connector on the back of the unit.
- 2 Hand-tighten the connector shell onto the jack connector collar.
- 3 Verify that the cable is fixed firmly in place.

**NOTE**



If the antenna coaxial cable is too stiff to bend easily, add a flexible pigtail coaxial cable with a coax barrel (available from P-Com).

## POWER CONNECTION

To connect power to the DataMetro II radio:

- 1 Plug the AC power cord into the 3-pin connector on the back of the radio. See Figure 3-6 on page 3-8
- 2 Plug the AC power cord into a grounded electrical outlet.

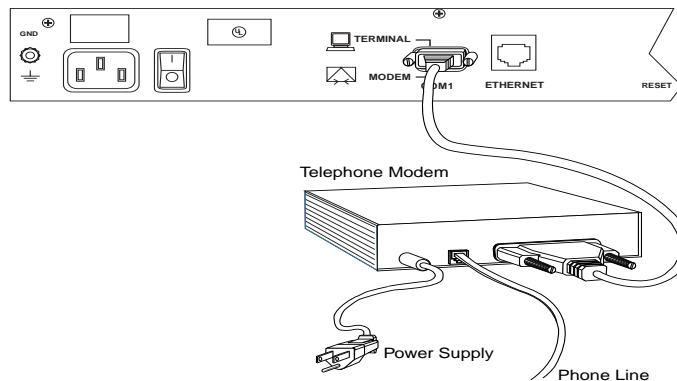


To avoid electrical shock or power loss, ensure that the power cord is securely connected to the unit. Do not use a 3-pole to 2-pole adapter with the plug. Verify that the outlet you intend to use is properly installed and grounded; the outlet used must comply with the local electrical code for your country.

- 3 Turn the AC power switch to ON. See Figure 3-6 on page 3-8.

## TELEPHONE MODEM CONNECTION

You can configure the P-Com DataMetro II wireless router remotely by using a telephone modem and the public telephone network. The DataMetro II provides an RS-232 port on the back for the modem connection. See Figure 3-3.



**Figure 3-3 Telephone Modem Connection**

Telephone modems should be Hayes compatible modems, 9600 bps or faster. Refer to the modem documentation for the specific baud rate, and for other modem configuration parameters.

To connect the telephone modem to the DataMetro II:

- Connect the telephone modem to the **RS-232** port on the back of the DataMetro II. See Figure 3-3 on page 3-3.

Use a standard RS-232 modem cable, with a female DB-9 connector at the radio end and an appropriate connector at the modem end.

To connect the telephone modem to the terminal:

- 1 Connect the computer or terminal to the telephone modem using a standard RS-232 modem cable.
- 2 Connect the telephone modem to the phone line using an appropriate cable.

## BASIC CONFIGURATION SETUP

.....

Before you use a Data Metro II radio on the WAN, P-Com recommends that you set up a basic radio configuration to make sure the full WAN installation will proceed smoothly.

The basic configuration requires

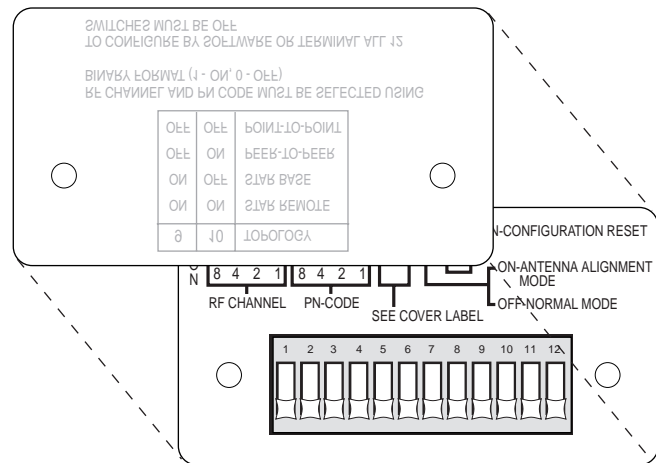
- **RF channel**—all units in the WAN must use the same RF channel. Separate WANs in the same geographic area may need to use different channels. The DataMetro II Model 1280 provides nine channels; the Model 320 provides 14 channels.
- **PN code**—all units in the WAN must use the same PN code. Different PN code sequences reduce interchannel and co-channel interference between networks. The DataMetro II provides eight PN codes.
- **topology**—the Data Metro II provides these topologies: peer-to-peer, point-to-point, centralized (star base and star remote)
- **reboot**—to install the basic configuration

You can set up a basic radio configuration through one of three methods:

- through twelve DIP switch positions
- through a terminal command line interface
- through the Site Manager software application

## DIP SWITCHES

The P-Com Data Metro II radio can be configured through a block of twelve OFF/ON switches (DIP switches) located on the front of the radio behind the switch plate. See Figure 3-4.



**Figure 3-4 DIP Switches**

- To set the switch to the ON position, push the switch up toward the top of the radio.
- To set the switch to the OFF position, push the switch down toward the bottom of the radio.

To set up a basic radio configuration using the DIP switches:

- 1 Remove the radio from the shipping carton.
- 2 Place the radio on a flat surface so that the front of the radio is easy to reach.
- 3 Remove the switch plate from the front of the radio.
- 4 Set the DIP switches for the RF channel, the PN code, and the topology. Refer to Tables 3-1 through 3-3.

- Set the RF channel switches according to Table 3-1. Note that Channels 10 through 14 are available only for the Model 320.

**Table 3-1 RF Channel Switch Positions**

| Channel | Switch |     |     |     |
|---------|--------|-----|-----|-----|
|         | 1      | 2   | 3   | 4   |
| 1       | OFF    | OFF | OFF | ON  |
| 2       | OFF    | OFF | ON  | OFF |
| 3       | OFF    | OFF | ON  | ON  |
| 4       | OFF    | ON  | OFF | OFF |
| 5       | OFF    | ON  | OFF | ON  |
| 6       | OFF    | ON  | ON  | OFF |
| 7       | OFF    | ON  | ON  | ON  |
| 8       | ON     | OFF | OFF | OFF |
| 9       | ON     | OFF | OFF | ON  |
| 10      | ON     | OFF | ON  | OFF |
| 11      | ON     | OFF | ON  | ON  |
| 12      | ON     | ON  | OFF | OFF |
| 13      | ON     | ON  | OFF | ON  |
| 14      | ON     | ON  | ON  | OFF |

 Model  
1280  
and  
Model  
320

 Model  
320  
only

- Set the PN code according to Table 3-2.

**Table 3-2 PN Code Switch Positions**

| PN Code | Switch |     |     |     |
|---------|--------|-----|-----|-----|
|         | 5      | 6   | 7   | 8   |
| 1       | OFF    | OFF | OFF | ON  |
| 2       | OFF    | OFF | ON  | OFF |
| 3       | OFF    | OFF | ON  | ON  |
| 4       | OFF    | ON  | OFF | OFF |
| 5       | OFF    | ON  | OFF | ON  |
| 6       | OFF    | ON  | ON  | OFF |
| 7       | OFF    | ON  | ON  | ON  |
| 8       | ON     | OFF | OFF | OFF |



- Set the topology according to Table 3-3.

**Table 3-3 Topology Switch Positions**

| Topology       | Switch |     |
|----------------|--------|-----|
|                | 9      | 10  |
| Star Remote    | ON     | ON  |
| Star Base      | ON     | OFF |
| Peer-to-Peer   | OFF    | ON  |
| Point-to-Point | OFF    | OFF |

- 5 Set Switch 11—Antenna Alignment to OFF.
- 6 Set Switch 12—Reset Configuration to OFF.

**NOTE**



When you move the DataMetro II unit from one network to another, you will need to reset the moved unit's configuration by setting switch 12 to ON.

## COMMAND LINE INTERFACE

The P-Com Data Metro II radio can be configured through a command line interface running on a terminal (or a PC running a terminal emulation program).

Before connecting the terminal to the radio, configure the terminal with the following settings:

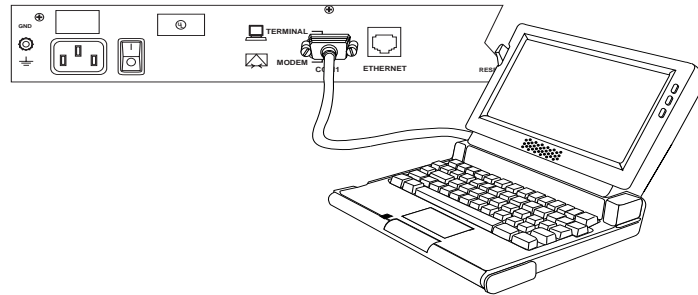
- Baud rate = 9600
- Data bits = 8
- Parity = None
- Stop bits = 1
- Flow control = Hardware

If you are using a PC or laptop computer, refer to the operating system documentation for instructions on how to configure and run the terminal emulation program.

To set up the radio:

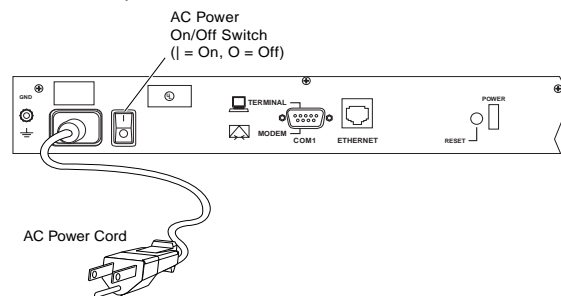
- 1 Remove the radio from the shipping carton.
- 2 Remove the switch plate from the front of the radio. See Figure 3-4 on page 3-5.
- 3 Make sure ALL the DIP switches on the front of the radio are in the OFF position. This is the manufacturing default.
  - To set the switch to the OFF position, push the switch down toward the bottom of the radio.
- 4 Connect the terminal or PC to the DB-9 RS-232 connector on the back of the radio. See Figure 3-5 on page 3-8.

- Use a cross-over (null modem) cable with a DB-9 male connector on one end to connect to the radio, and an appropriate connector at the computer end.



**Figure 3-5** *Connecting the Terminal or PC*

- 5 Turn on the terminal or computer and start the terminal session.
- 6 Connect power to the DataMetro II unit. See Figure 3-6



**Figure 3-6** *Connecting the Power Cord*

- Plug the AC power cord into the 3-pin connector on the back of the radio.
- Plug the 3-prong end of the AC power cord into a grounded electrical outlet.



*To avoid electrical shock or power loss, ensure that the power cord is securely connected to the unit. Do not use a 3-pole to 2-pole adapter with the plug. Verify that the outlet you intend to use is properly installed and grounded; the outlet used must comply with the local electrical code for your country.*

- Turn the AC power switch to ON. See Figure 3-6.

**After power-on the unit will run a power-on-self-test (POST). This test takes about 40 seconds to complete. Successful completion of the POST causes the 7-bank LEDs on the front of the radio to flicker before going to a steady state.**

**If you have successfully connected to the radio, the terminal will display the `DataMetro>` prompt and an initial message.**

To configure basic radio configuration parameters:

1 Configure the radio.

- Set the topology. At the prompt, type **TPLG <n>**

where <n> = 1 - Star Remote, 2 - Star Base, 3 - Peer-to-Peer, or  
4 - Point-to-Point

- Set the RF channel. At the prompt, type **RF <n>**

where <n> = 1 through 9 for Model 1280; 1 through 14 for Model 320

- Set the PN code. At the prompt, type **PNS <n>**

where <n> = 1 through 8

2 OPTIONAL: Check your settings. At the prompt, type **INFO**. The terminal will display information similar to the following\*:

DataMetro II Setup Configuration:

Ethernet MAC Address: XXXXXXXXXXXXX

Topology: Star Remote (was selected) Point-to-Point (now selected)

RF Channel: 1 (was selected) 5 (now selected)

PN Code: 8 (was selected) 1 (now selected)

IP Address:

3 Confirm your settings by resetting the configuration.

- On the back of the radio, push the **REBOOT** button.
- At the prompt, type **INFO**. This displays the configuration you set in Step 1:

DataMetro II Setup Configuration:

Ethernet MAC Address: XXXXXXXXXXXXX

Topology: Point-to-Point

RF Channel: 5

PN Code: 1

IP Address:

## SITE MANAGER APPLICATION

The P-Com Data Metro II radio can be configured through a Windows-based software application call Site Manager.

Site Manager runs on an external computer connected remotely to the DataMetro II unit over the LAN through the Ethernet port, or over the public telephone network through the RS-232 port.

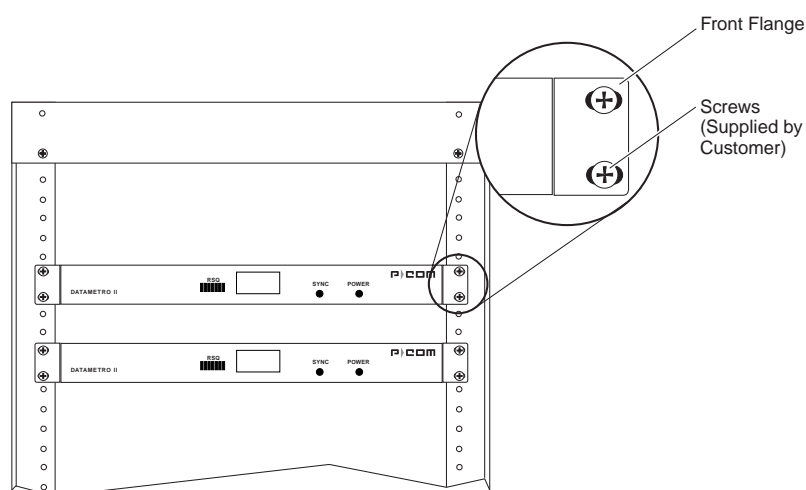
Site Manager is generally used by the network administrator for both basic configuration of a DataMetro II unit as well as advanced configuration of a wireless cluster of units. If you want

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\*In the example, XXXXXXXXXXXXX is factory set and is unique to each radio. This MAC address cannot be changed.

to set up the basic configuration using Site Manager, see the *Administrator's Reference*. It will tell you how to install the application, and how to use it.

## RACK MOUNTING



**Figure 4-1 Rack Mounted Radios**

The P-Com DataMetro II radio can be mounted in a standard 19 inch or 23 inch equipment rack using brackets and hardware provided with the radio. See Figure 4-1.

The rack mounting brackets can be installed on the radio chassis in one of three positions: front, center, or rear, depending on how you want the chassis positioned in the rack.

For a 19 inch rack, the short bracket flanges face the front of the radio. See Figure 4-2 on page 4-2. For a 23 inch rack, the longer bracket flanges face the front of the radio. See Figure 4-3 on page 4-3.



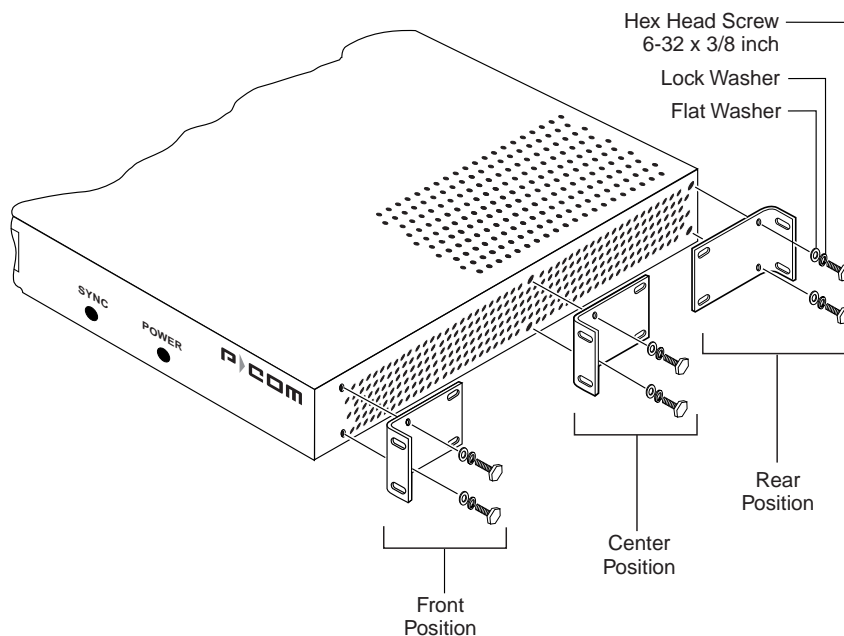
*When installing the radio in a rack with other equipment, you must provide 1.75 inches of space above, below, and on each side of the radio to allow for proper ventilation.*

To mount the radio in a rack, you need:

- two rack-mount brackets (supplied)
- screws and washers to attach the brackets to the radio (supplied)
- 1/4 inch hex nut driver or wrench
- screwdriver

## 19 INCH RACK MOUNT

Refer to Figure 4-2 when mounting the radio in a 19 inch equipment rack.



**Figure 4-2 Brackets for 19 inch Rack Mount**

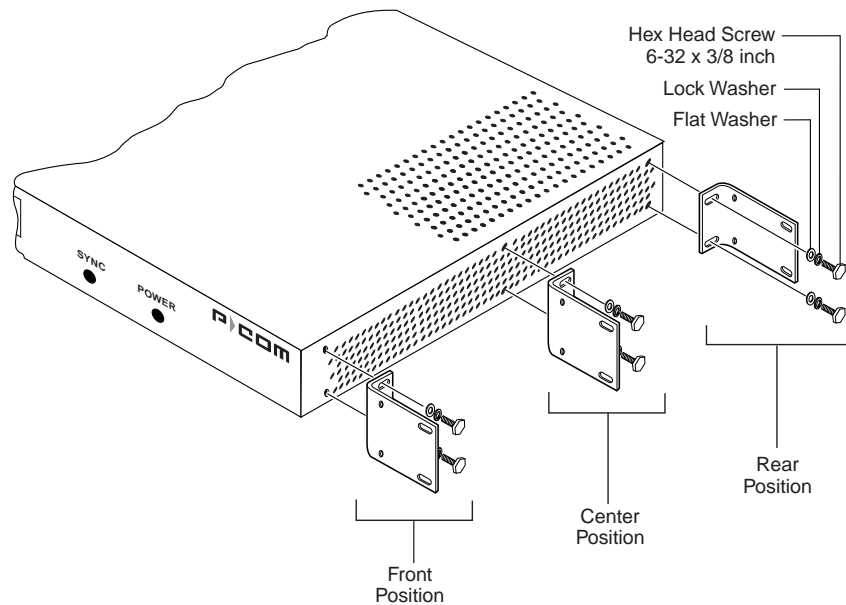
To mount the radio in a 19 inch rack:

- 1 Choose the front, center, or rear rack mount position for the radio.
- 2 Place a bracket on the chassis in the chosen position so that the bracket holes line up with the threaded inserts on the side of the chassis, and the short flange faces the front of the radio for the front or center position mount, or the back of the radio for the rear position mount.
- 3 Attach the bracket to the chassis.
  - Use two of the screws, lock washers, and flat washers supplied with the radio.

- 4 Repeat Step 2 and Step 3 to attach another bracket on the opposite side of the chassis.
  - 5 Attach the bracketed chassis to the rack posts. Refer to Figure 4-1 on page 4-1.
- Align the front flanges of the brackets with the screw holes on the rack posts.
  - Hand-tighten the mounting screws to hold the radio and brackets in place on the rack posts.
  - Use a screwdriver to firmly attach the radio to the rack posts.

## 23 INCH RACK MOUNT

Refer to Figure 4-3 when mounting the radio in a 23 inch equipment rack.



**Figure 4-3 Brackets for 23 inch Rack Mount**

To mount the radio in a 23 inch rack:

- 1 Choose the front, center, or rear rack mount position for the radio.
  - 2 Place a bracket on the chassis in the chosen position so that the bracket holes line up with the threaded inserts on the side of the chassis, and the short flange faces the front of the radio for the front or center position mount, or the back of the radio for the rear position mount.
  - 3 Attach the bracket to the chassis.
- Use two of the screws, lock washers, and flat washers supplied with the radio.

- 4 Repeat Step 2 and Step 3 to attach another bracket on the opposite side of the chassis.
- 5 Attach the bracketed chassis to the rack posts. Refer to Figure 4-1 on page 4-1.
  - Align the front flanges of the brackets with the screw holes on the rack posts.
  - Hand-tighten the mounting screws to hold the radio and brackets in place on the rack posts.
  - Use a screwdriver to firmly attach the radio to the rack posts.



## SPECIFICATIONS

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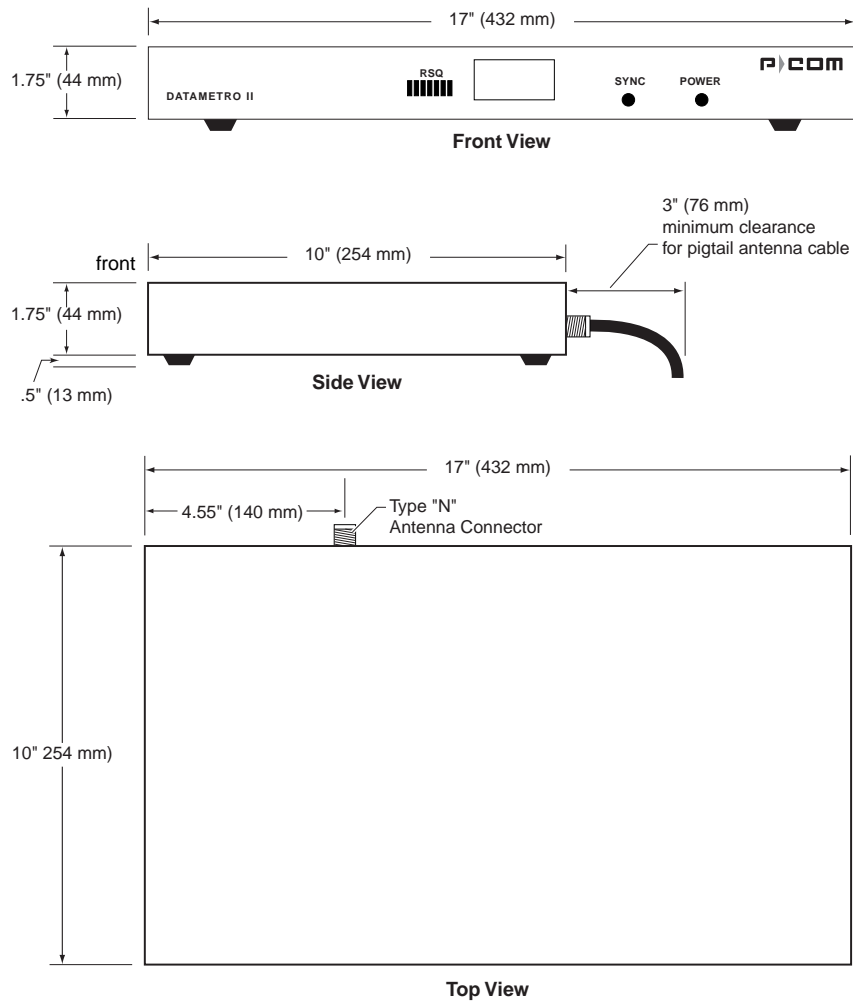
### YEAR 2000 COMPLIANCE

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Wireless radios manufactured by P-Com, Inc. have been tested and found to be Year 2000 compliant. The test script and test results are filed with the product verification records and can be made available on request. P-Com, Inc. design procedures require all future updates or new product offerings to meet Year 2000 compliance and to be verified by testing.

A compliant product accurately processes date data from, into and between the 20th and 21st centuries, the years 1999 and 2000, and leap year calculations, when used in accordance with its product documentation, and provided all other products used in combination with the product properly exchange data with it.

**GENERAL SPECIFICATIONS**



**Figure A-1 Radio Dimensions**

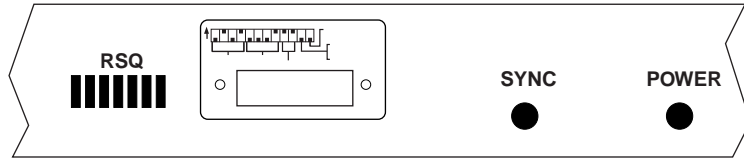
**Table A-1 Mechanical Specifications**

| Parameter  | Specification                                                                         |
|------------|---------------------------------------------------------------------------------------|
| Dimensions | Width: 17 inches (432 mm)<br>Height: 1.75 inches (44 mm)<br>Depth: 10 inches (254 mm) |
| Weight     | 10.3 pounds (4.7 kilograms)                                                           |

**Table A-2 Environment Specifications**

| Parameter             | Specification                                                                                                                                                                                                                                        |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating Temperature | 0°C to 50°C (32°F to 122°F)                                                                                                                                                                                                                          |
| Storage Temperature   | -40°C to 66°C (-40°F to 150°F)                                                                                                                                                                                                                       |
| Operating Humidity    | 10% to 95% RH non-condensing                                                                                                                                                                                                                         |
| Storage Humidity      |                                                                                                                                                                                                                                                      |
| Elevation             | 200 feet (61 meters) below sea level to 13000 feet (3943 meters) above sea level                                                                                                                                                                     |
| Shock                 | Transportation/Handling Shock: Drop Test per NATA Project 2A<br>Operation Shock: Bellcore TR-TSY-000487, Section 5.1.4.9, Subsection IIA (Drop Tests for Unpacked Housing Weighing 50 lb or less)                                                    |
| Vibration             | Transportation Vibration: ASTM D 4728 Random Vibration Testing Truck/Air Spectrum (1G, 5-200 Hz), according to the general requirements of ASTM D 4728<br>Operational Vibration: Bellcore TR-TSY-000487, Section 5.1.4.11 (Vibration Test-Low Level) |

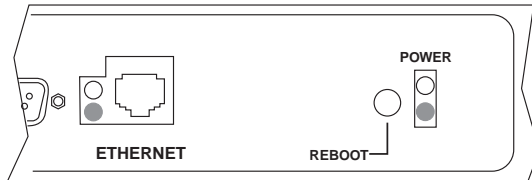
## LED INDICATORS



**Figure A-2 Front Panel Indicators**

**Table A-3 Front Panel Indicators**

| Name  | Color  | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| POWER | Yellow | ON = power to the radio is on                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| SYNC  | Green  | ON = radio receiving data frame header                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| RSQ   | Green  | Steady illumination of LEDs indicates the strongest/highest quality of the receive signal.<br>Sequential illumination of all 7 LEDs indicates radio initialization self-test is in progress.<br>Blinking of all 7 LEDs in addition to audible alarm indicates Configuration Reset DIP switch is ON and that the radio initial configuration and manufacturing image are selected for next restart.<br>Blinking of the 1st of the 7 LEDs in addition to audible alarm indicates the wrong RF channel is set on the DIP switches.<br>Blinking of the 2nd of the 7 LEDs in addition to audible alarm indicates the wrong PN code is set on the DIP switches.<br>Blinking of the 3rd of the 7 LEDs in addition to audible alarm indicates that digital board initialization has failed.<br>OFF while SYNC LED is illuminated indicates that the radio is not configured. |

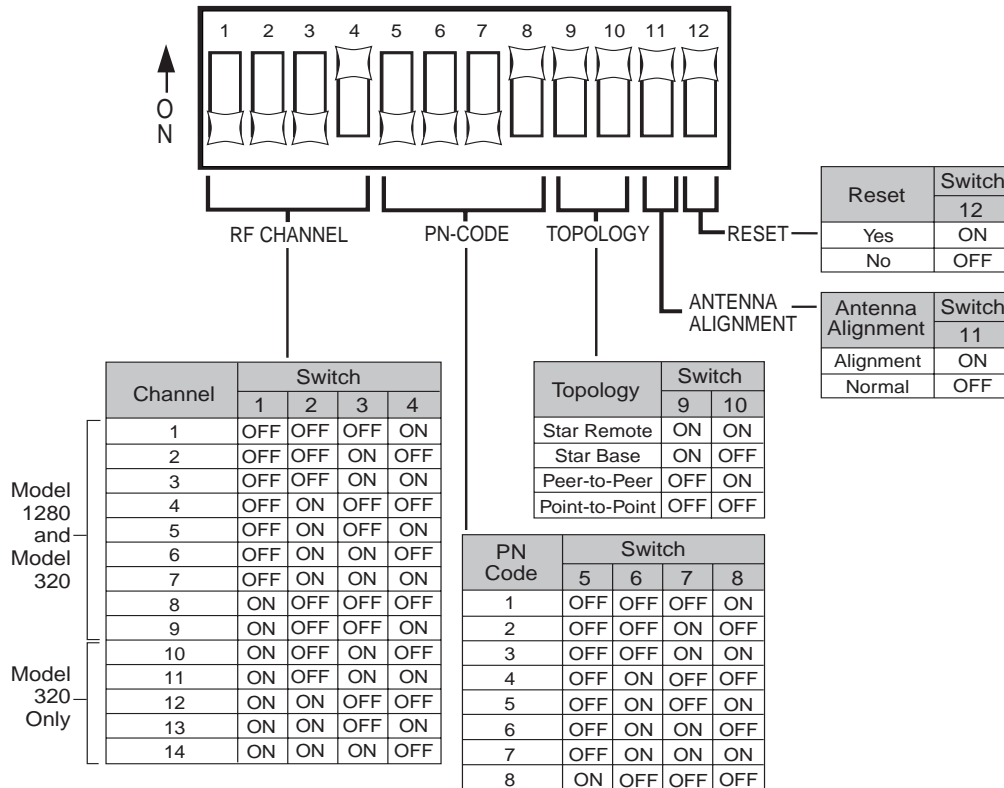


**Figure A-3 Rear Panel Indicators**

**Table A-4 Rear Panel Indicators**

| Name     | Color           | Function                                                 |
|----------|-----------------|----------------------------------------------------------|
| ETHERNET | Yellow<br>Green | ON = no Ethernet activity<br>ON = radio is linked to LAN |
| POWER    | Yellow<br>Green | ON = radio power is ON<br>non-functional                 |

**DIP SWITCHES**



**Figure A-4 DIP Switch Positions**

**NOTE** All DIP switches must be in the OFF position when using the Command Line Interface or Site Manager application to configure a radio.

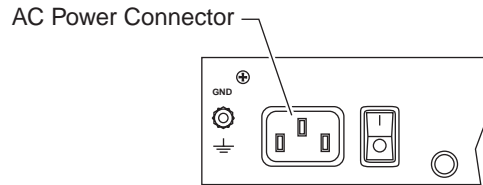


## EXTERNAL CONNECTORS

### AC POWER CONNECTOR

**Connector Location:** Rear Panel

**Connector Type:** 3-pin Male



**Figure A-5 AC Power Connector**

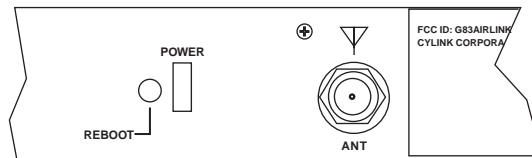
**Table A-5 Power Specifications**

| Parameter                 | Specification                |
|---------------------------|------------------------------|
| AC Input Voltage          | 90 VAC to 240 VAC            |
| AC Input Frequency        | 47 Hz to 63 Hz               |
| AC Input Current          | 1A to 3.5A                   |
| Maximum Power Consumption | 32.25 Watts, AC Power Supply |

### ANTENNA CONNECTOR

**Connector Location:** Rear Panel

**Connector Type:** N-Type Female

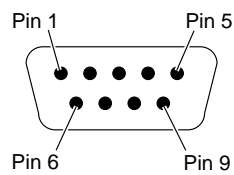


**Figure A-6 Antenna Connector**

### BACKUP/TERMINAL CONNECTOR

**Connector Location:** Rear Panel

**Connector Type:** RS-232, DB 9-pin Male



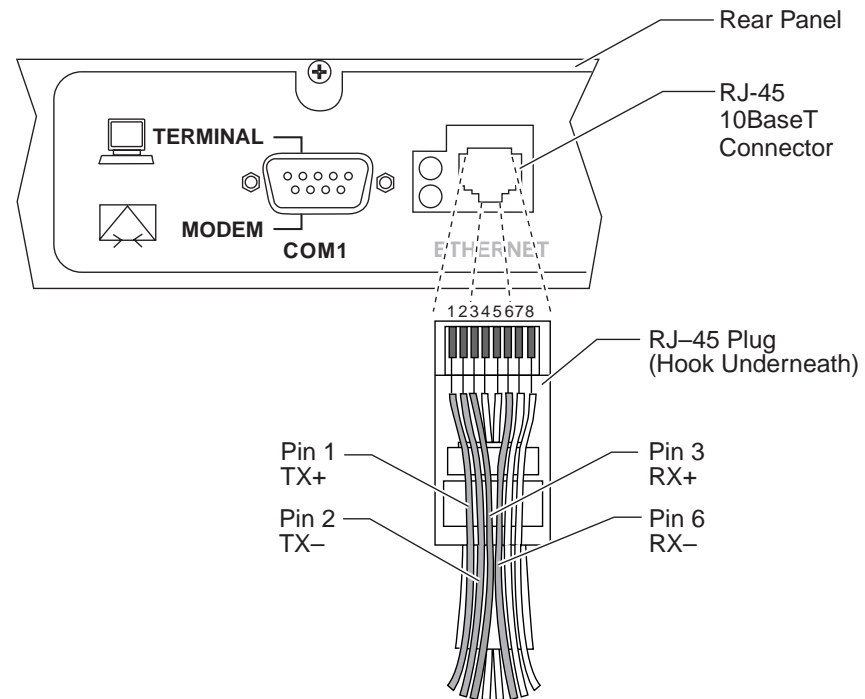
**Figure A-7 RS-232 Backup/Terminal Connector**

**Table A-6 RS-232 Port Pin Assignments**

| Pin | Circuit | Description                 | Function       |
|-----|---------|-----------------------------|----------------|
| 1   | 100     | Received line signal detect | from terminal  |
| 2   | 104     | Received data               | from terminal  |
| 3   | 103     | Transmitted data            | from radio     |
| 4   | 108/2   | Data terminal ready         | from radio     |
| 5   | 102     | Signal common               | circuit ground |
| 6   | 107     | Device ready                | from terminal  |
| 7   | 105     | Request to send             | from radio     |
| 8   | 106     | Clear to send               | from radio     |
| 9   |         | not used                    |                |

## ETHERNET CONNECTOR

**Connector Location:** Rear Panel  
**Connector Type:** RJ-45 Jack



**Figure A-8 Ethernet Jack**

**NOTE**

Any pin not shown in Figure A-8 is not connected, i.e., pin 4, pin 5, pin 7, pin 8.



## RADIO SPECIFICATIONS

**Table A-7 Radio Specifications**

| Parameter                          | Specification                               |
|------------------------------------|---------------------------------------------|
| Frequency Range                    | 2400 GHz to 2483.5 GHz                      |
| Radio Technology                   | Spread Spectrum using Direct Sequence       |
| PN Sequence Length                 | 32 bits                                     |
| Modulation Technique               | BPSK                                        |
| Channel Bandwidth                  | Model 1280: 41.0 MHz<br>Model 320: 10.2 MHz |
| Sync Word Length                   | 32 bits                                     |
| Processing Gain                    | 12 dB                                       |
| Radio Protocol                     | TDMA (Time Division Multiple Access)        |
| Frequency Stability                | ±5 ppm                                      |
| System Gain                        | Model 1280: 115 dB<br>Model 320: 121 dB     |
| Number of non-overlapping channels | Model 1280: 2<br>Model 320: 7               |

**Table A-8 Transmitter Specifications**

| Parameter            | Specification                                                                       |
|----------------------|-------------------------------------------------------------------------------------|
| Load Impedance       | 50 ohms                                                                             |
| Power Output         | 0 dBm to 28 dBm                                                                     |
| Accuracy             | ±1 dB overall RF channel<br>±3 dB @ 0 dBm<br>±1 dB from 0°C to 50°C (32°F to 122°F) |
| Output Level Control | 28 settings, 1 dBm increments                                                       |
| RF Port Protection   | None                                                                                |

**Table A-9 Receiver Specifications**

| Parameter              | Specification                                                               |
|------------------------|-----------------------------------------------------------------------------|
| Sensitivity            | Model 1280: -86 dBm @ $10E^{-6}$ BER<br>Model 320: -92 dBm @ $10E^{-6}$ BER |
| Noise Figure           | 5 dB (RF LNA only)                                                          |
| Input Impedance        | 50 ohms                                                                     |
| RF Input Protection    | None                                                                        |
| Maximum RF Input Power | -10 dBm                                                                     |
| Dynamic Range          | 80 dB                                                                       |

CENTER FREQUENCIES  
.....*Table A-10 RF Channel Center Frequencies*

| Center Frequency (MHz) | Model 320 RF Channel | Center Frequency (MHz) | Model 1280 RF Channel |
|------------------------|----------------------|------------------------|-----------------------|
| 2407.068               | 1                    | 2421.452               | 1                     |
| 2412.268               | 2                    | 2426.454               | 2                     |
| 2417.465               | 3                    | 2431.458               | 3                     |
| 2422.665               | 4                    | 2436.461               | 4                     |
| 2427.863               | 5                    | 2441.464               | 5                     |
| 2433.063               | 6                    | 2446.466               | 6                     |
| 2438.261               | 7                    | 2451.470               | 7                     |
| 2443.461               | 8                    | 2456.473               | 8                     |
| 2448.658               | 9                    | 2461.476               | 9                     |
| 2453.858               | 10                   |                        |                       |
| 2459.056               | 11                   |                        |                       |
| 2464.256               | 12                   |                        |                       |
| 2469.456               | 13                   |                        |                       |
| 2474.653               | 14                   |                        |                       |



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