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**Magnum
Personal Hubs**

Models H80B and H80P

Installation and User Guide

Magnum™
Personal Hub™
Models H80B and H80P
Installation and User Guide

Part #: 84-00037 (07/95)

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Important: Magnum Personal Hubs contain no user serviceable parts. Attempted service by unauthorized personnel shall render any and all warranties null and void. If problems are experienced with a Magnum Personal Hub, consult Section 5, Troubleshooting, of this User Guide.

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**Federal Communications Commission
Radio Frequency Interference Statement**

This equipment generates, uses and can radiate frequency energy and if not installed and used properly, that is in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

MAGNUM

ETHERNET CONNECTIVITY PRODUCTS

"DESIGNED AND MANUFACTURED IN THE USA"

Overview

Garrett Communications offers the Magnum line of Ethernet LAN physical layer connectivity products with industry-standard functionality. Magnum products are available worldwide through OEMs, integrators, representatives, and international distributors.

Stackable Hubs, SNMP Optional

24-Port 10BASE-T Hub

12-Port 10BASE-T Hubs

Local Bridge with SNMP

Local Bridge, full-featured, self-learning

The "X-line" of configurable MiXed Media products

Stackable Concentrators, SNMP optional, 13 ports

Mini-Concentrators, 7 ports

Workgroup Bridges, all media types

Two-Port Repeaters, internal power supply, all media types

Two-Port Repeaters, external power supply, all media types

Repeater Port Modules (RPMs), 6 types for all Ethernet media

Bridge Port Modules (BPMs), 4 types for segment isolation

Workgroup Hubs (the "ten" series)

8-port + AUI or Port Module option

16-port + AUI and Port Module slot

24-port + AUI and Port Module slot

Personal Hubs TM

9-port and 5-port Personal Hubs, with manual up-link switch

8-port and 4-port + AUI Personal Hubs, w/ man. up-link sw.

8-port + BNC Personal Hub, w/ manual up-link switch

Stackable 8-port +AUI and BNC or Fiber, w/ up-link switch

Media Converters

Two RJ-45 Models, with BNC or Fiber

Fan-Outs

4 and 8 Port Deluxe, 2 and 4 Port Standard Models

Transceivers

Coax and Mini-Transceivers, All Types

July '95

1.0 SPECIFICATIONS

1.1. Technical Specifications

Performance:

Data Rate: 10 Mbps

Partitioning: Enforced after 32 consecutive collisions.

Reconnect: Occurs after 512 bits error-free transmission.

Maximum Ethernet Segment Lengths:

10BASE-T (Unshielded twisted pair) - 100 m (328 ft)

10BASE-T (Shielded twisted pair)- 150 m (492 ft)

AUI Drop Cable - 50 m (164 ft)

10BASE2 ThinNet (BNC) - 185 m (607 ft)

Network Standards:

Ethernet V1.0/2.0 IEEE 802.3: 10BASE-T, 10BASE5.

(Magnum Personal Hubs are physical layer standard

Ethernet products, and operate in networks independently of all software.)

Operating Environment:

Ambient Temperature: 32°F to 122°F (0°C to 50°C)

Storage Temperature: -20°C to 60°C

Ambient Relative Humidity: 10% to 95% (non-condensing)

Power Supply (External) (H80B, optional for H80P):

Power Input: 95 - 125 vac at 60 Hz for "-d" Models,
200 - 250 vac at 50 Hz for "-i" Models, which
have IEC power cable connector in the external
power unit.

Power Consumption: 10 watts max

Connectors:

H80B: 8 front-mounted shielded RJ-45 (1 with up-link switch), 1 rear BNC with internal termination switch.

H80P: 8 front-mounted shielded RJ-45, 1 rear DTE (male AUI)

(Shielded 10BASE-T connectors accept either unshielded or shielded wiring lugs for standard twisted pair media wiring.)

The regular RJ-45 ports support the standard for hubs-to-users twisted pair wiring: pin 1 = receive+, 2 = receive-, 3 = transmit+, 6 = transmit-, other pins not used. The RJ-45 port with the MDI-X switch is normally the same, but when switched it supports the standard for up-links using twisted pair wiring, i.e., the transmit and the receive pairs are exchanged: pin 1 = transmit+, 2 = transmit-, 3 = receive+, 6 = receive-, other pins not used.

Switches:

Up-Link: MDI-X (Media Dependent Interface - Crossover) manual slide switch, converts RJ-45 port #8 from a regular (=) user segment port to a crossover (X) up-link port for on-off connection to a backbone or another cascaded hub.

Internal Termination (H80B only): Allows BNC connection without use of "T" connector. Right position -- internal termination, no "T" required. Left position -- external termination via "T" connector required.

Packaging:

Enclosure: Rugged, high strength steel enclosure.
Suitable for vertical or horizontal mounting
(supplied with metal mounting clips, screws,
and a Velcro[®] strip)
Recessed LEDs to avoid damage.

Dimensions:

H80B, H80P: 4.4in x 5.0in x 0.75in
(11.2cm x 12.7cm x 1.9cm)

Weight:

H80B and H80P: 1.0 lbs (455 gr);
Power Supply: 1.0 lbs (455 gr)

Cooling method:

Convection

Agency Approvals:

115v 60 Hz Power Supply is UL Listed, CSA certified.
230v 50 Hz Power Supply is same, also GS approved.
Emissions: Meets FCC Part 15 Class A

Warranty:

Three years (see also Appendix A) Made in USA

1.2 Ordering Information

Magnum Personal Hubs	
<u>MODEL</u>	<u>DESCRIPTION</u>
Magnum H80B-d	Personal Hub with eight standard RJ-45 ports, one with up-link switch, plus one BNC port with internal termination switch, external 115 vac 60 Hz power supply.
Magnum H80A-i	Same as H80B-d, but with external 230 vac 50 Hz power supply.
Magnum H80P	AUI powered Personal Hub with eight standard RJ-45 ports, one with up-link switch, plus one rear DTE (maleAUI) port.

Magnum Personal Hubs Spare Parts	
<u>MODEL</u>	<u>DESCRIPTION</u>
H80-d-ps	External 115 vac 60 Hz power supply.
H80-i-ps	External 230 vac 50 Hz power supply.

Garrett Communications reserves the right to change specifications, performance characteristics and/or model offerings without notice.

2.0 INTRODUCTION

This section describes the Magnum H80B and H80P Personal Hubs, including appearance, features and possible applications.

2.1 Inspecting the Package and Product

Examine the shipping container for obvious damage prior to installing this product; notify the carrier of any damage which you believe occurred during shipment or delivery. Inspect the contents of this package for any signs of damage and ensure that the items listed below are included.

This package should contain:

- 1 Magnum H80B or H80P Personal Hub
- 1 External Power Supply, either 115v 60 Hz or 230v 50 Hz (**H80B only**)
- 1 Velcro® Tape section, approximately 3 inches in length
- 1 User Guide
- 1 Product Registration Card

Remove the Magnum Personal Hub from the shipping container. Be sure to keep the shipping container should you need to ship the unit at a later date. To validate the product warranty please complete and return the enclosed Product Registration Card to Garrett Communications as soon as possible.

In the event there are items missing or damaged, contact your supplier. If you need to return the unit, try to use the original shipping container. Refer to Section 5, Troubleshooting, for specific return procedures.

2.2 Product Description

The Magnum H80B and H80P Personal Hubs are nine-port workplace hubs in a very compact package. They are simple to install and use in an office or lab environment, requiring no special rack cabinets or wiring closet apparatus. Personal Hubs are standard physical layer Ethernet products and operate independently of all software.

Personal Hubs fit easily into the workplace environment. They are versatile enough to be table-top or shelf-mounted. Alternatively, a Velcro® strip is included in the package so that the unit may easily be installed on a wall surface, or on the back or side of a desk or cabinet. All of the wiring connectors are in the same plane so that wiring space is neat and minimal. The external power supply unit (optional for the H80P) conveniently plugs into an AC wall receptacle or power strip.

The H80B and H80P Personal Hubs' RJ-45 ports support connection of up to eight workstations or other network devices over full length 10BASE-T cable segments. Personal Hubs operate in compliance with the IEEE 802.3 specification for repeater functionality to perform signal amplification, re-timing of data packets, and regeneration of preamble bits for each packet received.

Consistent with IEEE 802.3 specifications, Personal Hubs will detect collisions, extend collision fragments, and automatically partition and re-connect individual ports in order to keep problems on one segment from causing downtime elsewhere on the network.

Personal Hubs include LINK and RX LEDs, located on top of the unit above each RJ-45 port, and one LED for DC power located at the rear near the external power supply connection. For observing operational information from the LEDs, it is easy to associate the status LEDs for each of the ports with the appropriate port plug.

2.2.1 Magnum H80B Product Description

Magnum H80B Personal Hubs provide a simple and inexpensive solution for networking a personal multi-system office using 10BASE-T twisted pair cabling. They are perfect for sites that have ThinNet installed and need to wire additional office space for twisted pair.

Magnum H80Bs are also well suited for small- to-medium-size office or lab environments (up to eight persons) that need an independent Ethernet network. They operate as self-sufficient units

to provide ThinNet and 10BASE-T Ethernet connectivity for local users and devices. Small independent networks built using Personal Hubs are easily expanded by adding hubs of equal or greater capacity via cascaded connections using the Up-Link switched port feature. The BNC port of the H80B provides 10BASE2 backbone connectivity if required.

The H80B's small size makes it very useful for demonstration situations in conference rooms and in exhibitions where a temporary network or network expansion is needed. It is handy as a piece of test equipment that can be easily inserted into a network to provide a test port, and then removed after the testing is done. The H80B Personal Hub takes up minimal space, uses minimal power, and is rugged enough to be carried in a coat pocket for possible emergencies.

The external power supply unit supplied with the H80B is one of two types; one version for AC input power of 115 vac 60 Hz, and one version for 230 vac 50 Hz. The 115 vac version has a small transformer integral with a convenience power outlet plug. The 230 vac version has a small transformer integral with an IEC-type power plug for a user-supplied AC power cord with a convenience power outlet plug. Both types include a lightweight DC power cord for connection to the Personal Hub's power jack.

2.2.2 Magnum H80P Product Description

Magnum H80P Personal Hubs provide a simple and inexpensive solution for expanding a single AUI port into an eight port hub. Since the H80P receives power through its DTE (male AUI) port, it may be installed in virtually any location, without worrying about access to a power outlet. To the server, router or other device to which it is connected, the Magnum H80P appears as a standard transceiver. The rear DTE port of the unit allows for direct drop cable connection to any AUI port.

As an option, the H80P may be powered by an external power supply (see Spare Part Ordering information, Section 1.3). When used for redundancy, the external supply retains local connectivity in the event of a power outage on the AUI segment. In addition, the external power supply allows the H80P to function as a standalone unit.

***NOTE:** Since the Magnum H80P receives its power from the rear DTE port, this port must be connected to the AUI port of another Ethernet device to allow the H80P to operate, unless the optional external power supply is used.*

The H80P's small size makes it very useful for situations where a temporary twisted pair network is needed, and only AUI ports are available. It is handy as a piece of test equipment that can be easily inserted into an AUI backbone to provide a test port, and then removed after the testing is done. The H80P Personal Hub takes up minimal space, uses minimal power, and is rugged enough to be carried in a coat pocket for possible emergencies.

2.3 Features and Benefits

■ **Interconnect to an Existing Ethernet Network**

Personal Hubs provide a manual Up-Link switch that allows one RJ-45 port to be to connect into an existing Ethernet environment (such as the central hub for the building or area) via 10BASE-T wiring.

■ **Inter-operable with other Ethernet Devices**

Personal Hubs are completely inter-operable with other Ethernet-compliant network devices. Each is fully compliant with IEEE 802.3 specifications for 10 Mbps CSMA/CD operation. This allows Personal Hubs to be integrated within any standard Ethernet network and to operate with standard software.

■ **Installation Versatility**

Personal Hubs are simple and easy to install in most any office or lab location. The tiny package is very unobtrusive and is typically mounted with Velcro.

■ **Robust Network Operations**

Personal Hubs use the "star" network topology and have automatic per-port partitioning and re-connection. A fault on one segment is isolated from the rest of the network, avoiding most network downtime.

■ **LEDs Simplify Network Installation and Maintenance**

Personal Hubs are equipped with a full complement of LEDs to provide status about basic network activity. LINK LEDs for each port offer a simple way for operational connections of each 10BASE-T segment to be verified.

■ **Low cost, stand-alone 10BASE-T connectivity**

Operating in a stand-alone environment as a self-sufficient device, Personal Hubs offer a very low cost method of providing small workgroups access to a variety of Ethernet networking services such as file sharing, E-Mail, printer sharing, and other computer information.

■ **High Quality**

Personal Hubs have a rugged steel case and are compliant with rigid Class CE emission standards, making them suitable for commercial and home offices.

2.4 Applications

Magnum H80P and H80B Personal Hubs make expansion from one to multiple ports at an existing site easy, and do not require modification to typical building wiring.

Installation of the AUI powered H80P is a simple matter of connecting the rear DTE port to a standard AUI port (normally with an AUI drop cable), instantly creating eight twisted pair user ports from a single AUI port.

The Magnum H80B offers a simple means of creating a small workgroup network from a single BNC port. The installer simply connects the existing BNC tap to the BNC port of the H80B with a standard ThinNet (10BASE2) segment. By using the internal termination of the H80B, no "tee" connector is required (unless the segment must extend beyond the H80B unit). Then, power is connected by plugging the external power supply unit into an AC power receptacle, and plugging the DC power plug into the jack on the back of the Personal Hub. In minutes, eight twisted pair ports are available for other networked devices.

The H80B Personal Hub may also be used as a stand-alone network for a local multi-user system such as shown in the figure. The BNC port is used to support devices connected via ThinNet, while the RJ-45 ports support up to eight user devices connected via twisted pair. Full-length Ethernet segments are supported on all segments. In this application, the "Up-Link" switch is in the straight-through or = position so that the switchable up-link port is a user port, not an up-link to another hub.

3.0 Installation

This section describes the installation of Magnum H80B and H80P Personal Hubs, including mounting options and cable connections.

3.1 Magnum H80B Installation

The installation of a Magnum H80B Personal Hub is a very simple procedure. Locate an AC receptacle that is within six feet (2 meters) of the intended hub location and plug in the external power supply unit (provided as part of the unit). The small DC power cord from the power supply plugs into the matching rear power jack of the Personal Hub, and when power is applied the green "PWR" LED will be illuminated.

The external power supply unit supplied is one of two types; one version for AC input power of 115 vac 60 Hz, and one version for 230 vac 50 Hz. Examine the power supply to make sure the version you have is the right type for your AC power system. The 115 vac version has a small transformer integral with a convenience power outlet plug, and a lightweight DC power cord to the applicable power jack on the hub. The 230 vac version has a small transformer integral with an IEC-type power plug for a user-supplied AC power cord with a convenience power outlet plug. It also includes a lightweight DC power cord to the applicable power jack on the Personal Hub unit.

3.2 Magnum H80P Installation

Installation of the Magnum H80P Personal Hub is a simple procedure. Since the unit receives power from its rear DTE port, it can be located virtually anywhere. The H80P is typically connected to another Ethernet device through an AUI drop cable. For AUI connection instructions, refer to Section 3.5.2.

It is also possible to connect an external power supply (refer to Spare Part Ordering Information, Section 1.3, for model names). This is useful in cases where a redundant supply is desired or the topology of the network has changed and the DTE port is no longer being used. When using an external power supply, the unit will still receive its power from the AUI connection as long as the port is connected and supplying suitable power. Should a power outage occur on the AUI segment, the external power supply will continue to supply power, maintaining connectivity amongst local users. Refer to Section 3.1 for external power supply connection instructions.

3.3 Table-Top or Shelf Mounting

Personal Hubs are easily mounted on a table-top or shelf, and have four rubber feet to provide stability without scratching finished surfaces. A piece of Velcro may be used to add additional

stability if desired. When properly installed, the top-view LED status indicators will be in plain view and easy to read. Plug in two or more Ethernet cable segments, and your network is in operation.

The rugged steel case of the Personal Hub will protect it from accidental damage in an office or lab workplace setting. Keep an open area around the unit so that convection cooling can occur while the unit is in operation.

3.4 Wall (or Vertical Surface) Mounting

A piece of Velcro mounting tape is supplied with the unit, and may be used to mount a Personal Hub in a vertical position. Stick one side of the Velcro on the bottom of the hub between the rubber feet. Stick the other side of the Velcro to the desired vertical mounting location. This permits the compact Personal Hub to be mounted on a wall surface, on the side of a server unit cabinet, on the back of a desk, or in other similar convenient locations in the workplace where the associated cables are out of the way.

As an alternative to Velcro for vertical surface mounting, small brackets for mounting with screws may be used. These items are included in the package. The metal screws in each side of the Personal Hub's case may be used to attach the brackets. Use of the optional brackets permits the Personal Hub to be mounted in almost any desired orientation or position.

3.5 Ethernet Media Connections

Magnum H80Bs and H80P are equipped with eight shielded twisted pair ports and a BNC or DTE (male AUI) port. The following sections give instructions for installing each of these media types.

3.5.1 Twisted Pair Connections

1. Using standard 10BASE-T media, insert the male plug on one end of the network cable into one of the RJ-45 female ports on the Personal Hub. Even though the hub's plugs are of the shielded type, they will accept and operate properly with both shielded and unshielded type RJ-45 twisted pair wiring.

2. Connect the other end of each network segment to the applicable workstation or user device. The "LINK" LED will be lit for each port when the connection is made on both ends of the segment, and when the DC power is present at each end as well, i.e., when the segment circuit is established and is ready to use.

3. For the switched port up-link option, see Section 3.6.

3.5.2 AUI Connections (Model H80P only)

The Magnum H80P is equipped with a rear DTE (male AUI) port which serves a dual purpose of supplying power to the unit and providing backbone connectivity.

***NOTE:** Since the H80P derives its power from this port, this connection must be completed before the unit will function, unless an optional external power supply is being used..*

Before connecting the DTE port of the Magnum H80P, note that the maximum cable length of an AUI drop cable is 50m (165 ft).

The Magnum H80P DTE connector supports standard IEEE signals, summarized in Table 3.5.2.

Table 3.5.2: DTE Pin Assignments

Pin	Function	Pin	Function
1	Control In Circuit Shield	10	Data Out Circuit B
2	Control In Circuit A	11	Data Out Circuit Shield
3	Data Out Circuit A	12	Data In Circuit B
4	Data In Circuit Shield	13	Voltage Plus (+)
5	Data In Circuit A	14	Voltage Shield
6	Voltage Common	15	Control Out Circuit B
7	Control Out Circuit A	SHELL	Protective Ground
8	Control Out Circuit Shield (conductive shell)		
9	Control In Circuit B		

- NOTES:**
- 1) Voltage Plus (pin #13) and Voltage Common (pin # 6) use a single twisted pair in the AUI cable.
 - 2) Pins 4, 8, 11 and 14 may be connected to pin #1.

Using the above information and steps below as a guide, attach the 10BASE5 drop-cable directly to the DTE connector on the rear of the H80P.

1. Plug the female end of the cable into the male DTE connector on the H80P.
2. Engage the AUI connector slide lock (on the cable) to insure maximum connectivity.
3. Connect the opposite end of the cable into a network AUI port and engage the port's slide locks.

3.5.3 ThinNet 10BASE2 (BNC) Connections (H80B only)

Connect the ThinNet coax cable to the BNC connector on the Magnum H80B in the same manner as is done for any standard BNC connection. The BNC port of the H80B is specially equipped with an internal termination switch next to the BNC connector. This eliminates the need to use a "tee" connector when the BNC cable ends at the connection to the H80B. Some applications may require a "tee" connector, used as a tap, to allow the 10BASE2 coax segment to continue on past the H80B unit.

Internal Termination Switch Settings:

Right: Internal termination -- no "T" connector required.

Left: External "T" required.

3.6 Switchable Up-Link Feature

Each H80B and H80P Personal Hub is equipped with one MDI-X Up-Link crossover switch, connected to the right-most front RJ-45 port (port 8). This switch is used to select either a normal 10BASE-T connection to a user device (switch in the "==" position) or a 10BASE-T network up-link connection to another hub or concentrator (switch in the "X" position). A special crossover cable for up-links is not needed with Personal Hubs because of this built-in up-link switch feature.

When the switchable port is wired for up-link but the switch is set to the == position, the up-link segment is inoperative and full bandwidth is available locally.

3.7 Cascading Personal Hubs with the Up-Link Port

Personal Hubs may be cascaded in order to expand networks. For example, any Personal Hub may be cascaded via the switchable up-link port into any port of another hub. Since each Personal Hub provides full repeater functionality, cascaded units can operate together even though there may be a full segment of distance between them.

Based on the "four repeater rule" defined by Ethernet standards, there may normally be a maximum of four units in any one chain between any two users.

Magnum Personal Hubs may also be cascaded in networks with other Magnum Hubs (such as Magnum Workgroup Hubs and Magnum 3000 Stackable Hubs and Concentrators) as well as with Ethernet hubs from other manufacturers.

4.0 OPERATION

This section details the various operational features of Magnum Personal Hubs, including a description of the LED indicators. All Personal Hubs are fully compliant with the Ethernet Version 2/IEEE 802.3 Repeater Specification for CSMA/CD 10 Mbps operation and will function accordingly.

4.1 Functional Operation, Use of LED Indicators

Power On (PWR) LED: Illuminates GREEN to show functional DC power.

Link Status (LINK) LED (per port): Illuminates GREEN when there is proper connectivity on the port's 10BASE-T network segment. Each LINK LED will turn off independently in the event that connectivity is lost between the ends of that segment or a loss of power occurs in the segment at either end.

***Note:** When the switchable port is wired for up-link to another hub, the LINK LED will normally be on when the up-link switch is set to the X position. With the up-link switch off (= position), the LINK LED is off as the up-link is disabled. This permits local operation of the Personal Hub with full bandwidth.*

Receive Packets (RX) LED (per port): Illuminates GREEN intermittently to indicate that data is being received from the segment. This provides a visual indication of network activity for reassurance of normal operation, and is helpful in troubleshooting.

Partitioning and Re-connection: Personal Hubs will automatically partition any port where 32 consecutive collisions occur or after 6.5 ms of continuous transmissions. Network integrity is checked every 800 ms and segment re-connection occurs after one 512-bit packet is transmitted without an error.

Preamble Regeneration: Personal Hubs add bits to the preamble so that the output packet contains a minimum 64-bit preamble per the Ethernet standard.

Collisions: When carrier is detected simultaneously on multiple ports, a jam pattern is generated on each port to create a collision condition. When a collision signal from one port is detected, it generates a jam pattern to other ports.

Fragment Extension: Personal Hubs will automatically add bits to a received data packet of less than 96 bits (a "fragment") so that the forwarded packet is 96 bits long.

5.0 TROUBLESHOOTING

All Magnum Ethernet products are designed to provide reliability and consistently high performance in all network environments. The installation of Personal Hubs is a simple procedure (see Section 3.0, INSTALLATION); operation is very simple and is described in Section 4.0, OPERATION.

Should problems develop during installation or operation, this section should help to locate, identify and correct such problems. Please follow the suggestions listed below prior to contacting your supplier. However, if you are unsure of any procedure described in this section, or if the Magnum Personal Hub is not operating as expected, do not attempt to repair or alter the unit. Contact your supplier (or if unknown, contact Garrett Communications) for assistance.

5.1 Before Calling for Assistance

1. If difficulty is encountered when installing or operating the Personal Hub, refer back to Section 3.0, Installation and Section 4.0, Operation. Check to make sure that the various other components of the network are operable.
2. Check the cables and connectors to ensure that they are of the RJ-45 type (not RJ-11 “telephone” type), have been properly connected, and the cables/wires have not been crimped or in some way impaired during installation.
3. Make sure that the DC power cord is properly attached to the unit, and that the external power supply unit is plugged into a functioning electrical outlet. Use the PWR LEDs to verify the unit is receiving proper power.
4. If the problem is isolated to a network device other than the Magnum Personal Hub, it is recommended that the problem device be replaced with a known good device. Verify whether or not the problem is corrected. If not, go to Step 5 below. If the problem is corrected, the Personal Hub and its associated cables are functioning properly.
5. If the problem continues after completing Step 4 above, contact your supplier of the Personal Hub unit (or if unknown, contact Garrett Communications) by fax, phone or email for assistance.

5.2 When Calling for Assistance

Please be prepared to provide the following information.

1. A complete description of the problem, including the following points:
 - a. The nature and duration of the problem;
 - b. Situations when the problem occurs;
 - c. The components involved in the problem;
 - d. Any particular application that, when used, appears to create the problem;
2. An accurate list of Garrett Communications product model(s) involved, with serial number(s). Include the date(s) that you purchased the products from your supplier.
3. It is useful to include other network equipment models and related hardware, including personal computers, workstations, terminals and printers; plus, the various network media types being used.
4. A record of changes that have been made to your network configuration prior to the occurrence of the problem. Any changes to system administration procedures should all be noted in this record.

5.3 Return Material Authorization (RMA) Procedure

All returns for repair must be accompanied by a Return Material Authorization (RMA) number. To obtain an RMA number, contact Garrett Communications Customer Support at (510) 438-9071 (office hours: 8AM - 5PM Pacific Standard Time) or send email to support@garrettcom.com. Please have the following information available when calling:

- Name and phone number of your contact person.
- Name of your company / institution
- Your shipping address
- Product name
- Serial Number (or Invoice Number)
- Packing List Number (or Sales Order Number)
- Date of installation
- Failure symptoms, including a full description of the problem.

Garrett Communications will carefully test and evaluate all returned products, will repair products that are under warranty at no charge, and will return the warranty-repaired units to the sender with shipping charges prepaid (see Warranty Information, Appendix A, for complete details). However, if the problem or condition causing the return cannot be duplicated by Garrett Communications, the unit will be returned as:

No Problem Found.

Garrett Communications reserves the right to charge for the testing of non-defective units under warranty. Testing and repair of product that is not under warranty will result in a customer (user) charge.

5.4 Shipping and Packaging Information

Should you need to ship the unit back to Garrett Communications, please follow these instructions:

1. Package the unit carefully. It is recommended that you use the original container if available. Units should be wrapped in a "bubble-wrap" plastic sheet or bag for shipping protection. (You may retain all connectors and this Installation Guide.)

CAUTION

Do not pack the unit in Styrofoam "popcorn" type packing material. This material may cause electro-static shock damage to the unit.

2. Clearly mark the Return Material Authorization (RMA) number on the outside of the shipping container.
3. Garrett Communications is not responsible for your return shipping charges.
4. Ship the package to:

**Garrett Communications
213 Hammond Avenue
Fremont, CA 94539
Attn.: Customer Service**

APPENDIX A: Warranty Information

Garrett Communications warrants its products to be free from defects in materials and workmanship for a period of three (3) years from the date of shipment by Garrett Communications.

During this warranty period, Garrett Communications will repair or, at its option, replace components in the products that prove to be defective at no charge other than shipping and handling, provided that the product is returned pre-paid to Garrett Communications.

This warranty will not be effective if, in the opinion of Garrett Communications, the product has been damaged by misuse, misapplication, or as a result of service or modification other than by Garrett Communications.

Garrett Communications reserves the right to make a charge for handling and inspecting any product returned for warranty repair which turns out not to be faulty.

Please complete the warranty card as this acts as a product registration, and mail it to Garrett Communications within two weeks of your purchase.