

Magnum Fan-Outs

Installation and User Guide

Magnum Fan-Outs Installation and User Guide

Part #: 84-00004 (R5/95)

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Important: Magnum Fan-Outs contain no user serviceable parts. Attempted service by unauthorized personnel shall render any and all warranties null and void. If problems are experienced with the Magnum Fan -Out 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.

Notice of Revisions

This User Guide documents two revisions to the Magnum 500 Series Fan-Outs since the release of the previous User Guide (R3/94), in March 1994:

- The auto-loopback feature the the 540 and 580 has been replaced with a manual up-link switch. Refer to Section 2.3 for details.
- The media options for the backbone interconnection port of the 540 and 580 have been dropped from the product line. Both units now have standard AUI configurations only.

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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, retailers and international distributors.

Stackable Hubs, SNMP Optional

24-Port 10BASE-T Hubs

12-Port 10BASE-T Hubs

Local Bridge with SNMP

High Performance Local Bridge, self-learning

The "X-line" of configurable **MiXed Media** products:

Stackable Concentrators, SNMP optional, 13-Ports

Mini-Concentrators, 7 Ports

Repeaters, 2-Ports

Repeater Port Modules (RPMs), 6 types for 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 one Port Module Slot

24-Port + AUI and one Port Module Slot

Also, H140 12-port models with AUI and/or BNC

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.

NEW 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 Models

2 and 4 Port Standard Models

Transceivers

Coax and Mini-Transceivers, All Types

May '95

1.0 SPECIFICATIONS

1.1. Technical Specifications

Performance

Data Rate: 10Mbps

Network Standards

Ethernet V 1.0/V2.0 IEEE 802.3: 10BASE-T, 10BASE5, 10BASE2, 10BASE-FL & FOIRL, and DTE

Maximum Segment Lengths

DTE (AUI Drop Cable)	- 50 m (164 ft)
UTP (10BASE-T, unshielded twisted pair)	- 100 m (328 ft)
STP (10BASE-T, shielded twisted pair)	- 150 m (492 ft)
ThinNet (10BASE2, BNC)	- 185 m (607 ft)
ThickNet (10BASE5)	- 500 m(1,640 ft)
Fiber optic, multi mode (FOIRL)	- 1 km (3,281 ft)
Fiber optic, multi mode (10BASE-FL)	- 2 km (6,562 ft)
Fiber optic, single mode (10BASE-FL)	- 10 km (32,810 ft)

Connectors:

DTE (for local nodes):	D-Sub 15-Pin male (with lock posts)
AUI (for backbone):	D-Sub 15-Pin female (with Slide Lock)

Switches:

SQE Enable:	per port, except none on Model 320
Up-link:	one for AUI (female) port, Models 540 and 580 only

Operating Environment:

Ambient Temperature:	32° to 120° F (0° to 50°C)
Storage Temperature:	-5° to 140°F (-20°to 60°C)
Ambient Relative Humidity:	10% to 95% (non-condensing)

Input Current:

Model 320:	130 ma typ., 150 ma max.
Models 340, 540, 580:	190 ma typ., 220 ma max.

Input Voltage:

8 - 16 v (all models)

1.1. Technical Specifications (continued)**Packaging:**

Enclosure: Rugged, high strength metal.

Dimensions:

320: 4.25 in x 3.0 in x 1.50 in (10.8 cm x 7.6 cm x 3.8 cm)

340: 6.75 in x 2.75 in x 1.75 in (17.1 cm x 7.0 cm x 4.4 cm)

540: 8.5 in x 5.75 in x 1.75 (21.6 cm x 14.6 cm x 4.4 cm)

580: 14.0 in x 5.75 in x 1.75 in (35.6 cm x 14.6 cm x 4.4 cm)

Weight:

320: 7.5 oz. (0.21 Kg)

340: 1.0 lb. (0.45 Kg)

540: 1.91 LB (0.86 Kg)

580: 2.8 lbs. (1.27 Kg)

Cooling method: Convection.

Power Supply (optional on Model 580 only):

Source: DC Power Jack, external wall mount

Model 580 -d - PS: 115 vac, 60 Hz, 9 watts

Model 580 -i - PS: 230 vac, 50 Hz, 9 watts

Safety Approvals:

UL Listed (UL478), CSA certified,

IEC, TUV approved

Emissions:

Meets FCC Part 15, Class A Limits, VDE

Warranty:

Three Years, return to factory

Made in USA

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

1.2 Ordering Information

Magnum Fan-Outs

MODEL	User Ports	Backbone Ports
	DTE (AUI male)	AUI (female)
Magnum 320	2	1
Magnum 340	4	1
Magnum 540-A	4	1
Magnum 580-A	8	1

Optional Power Supply (Model 580 only)

580 - d - PS	115 vac, 60 Hz, 9 watts, external wall mount
580 - i - PS	230 vac, 50 Hz, 9 watts, external wall mount

2.0 INTRODUCTION

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 Fan-Out Unit
- 1 Installation and User Guide (this document)
- 1 Product Registration Card

Remove the Magnum Fan-Out 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 the party from whom you purchased the product. If the unit needs to be returned, please use the original shipping container if possible. Refer to Section 5, Troubleshooting, for specific return procedures.

2.2 Product Description

Magnum Fan-Out connectivity products provide a convenient and cost effective way of increasing the number of available AUI ports on an Ethernet network from a single backbone connection. The family of Magnum Fan-Outs includes the model 300 and 500 series. The 300 series comes in a small package, is typically wall-mounted, and supports two- and four-port configurations. The larger 500 series supports four- and eight-port configurations and is packaged for use as a table top unit or in wiring closets.

Each Fan-Out unit also features a set of LEDs to simplify installation and diagnostic operations. All media connectors and LEDs are positioned on the front of the unit for ease of access. Because Magnum Fan-outs derive power from the network connection, they do not require a separate power supply unit and therefore avoid the costs associated with power supply units.

The family of Magnum Fan-Outs is listed below:

Magnum Fan-Outs		
	300 Series	500 Series
2 port	Magnum 320	
4 port	Magnum 340	Magnum 540
8 port		Magnum 580

2.2.1 Magnum 300 Series: Magnum 320 & 340

The 300 series includes the Magnum 320 and 340. The Magnum 320 is a two port fan-out equipped with a single AUI (female, slide lock) backbone interconnect port

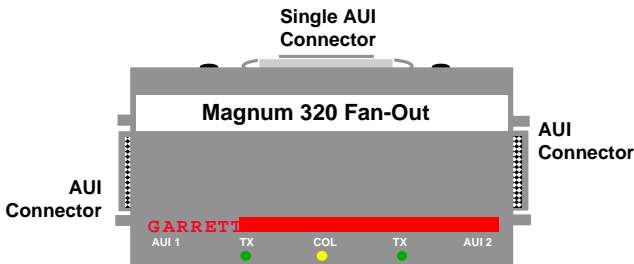


Figure 2.2.1a: Front View - Magnum 320 Fan-Out

and two AUI (DTE, male, lock posts) user ports. Magnum 320s contain three LEDs; a transmit (TX) for both (2) user AUI connectors and a single collision LED. No SQE switch is available.

The Magnum 340 offers a single AUI (female, slide lock) backbone interconnect port and four AUI (DTE, male, lock posts) user ports. The activity of each AUI user port is monitored by receive (RX), collision (COL), transmit (TX), power (PWR), jabber (JAB) and SQE LEDs. Additionally, the Magnum 340 is equipped with an individual SQE enable/disable switch setting for each AUI user port.

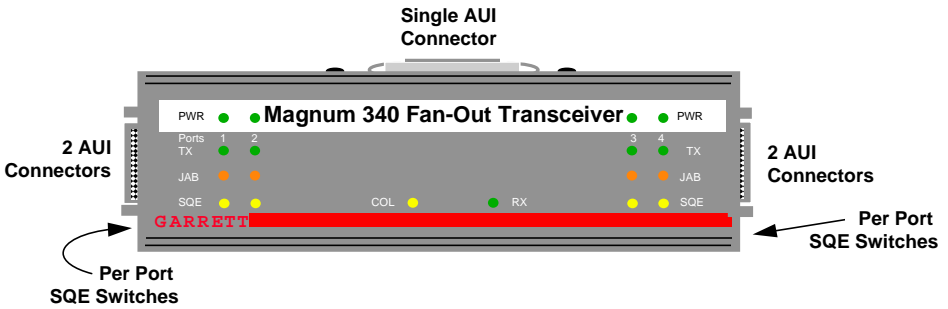


Figure 2.2.1b: Front View - Magnum 340 Fan-Out

2.2.2 Magnum 500 Series: Magnum 540 & 580

The Magnum 500 series offers the ability to operate connected into a larger network, or in a freestanding network configuration. Equipped with a manual up-link switch located in the rear, it is not necessary for them to be connected to the backbone. Instead, a standalone Ethernet network is easily setup in the absence of a backbone. Additionally, when a Magnum 540 or 580 is connected to a network backbone and the network should go down, the up-link switch may be switched to “local” to allow those stations attached to the Magnum 540 or 580 to remain operational with local access to local network facilities. (Refer to Section 2.3 for details on the up-link switch.)

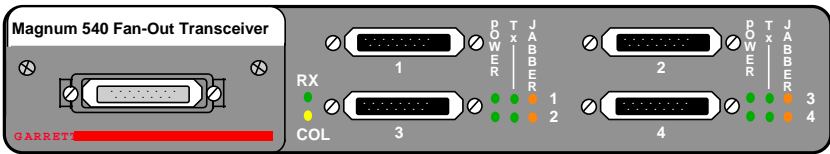


Figure 2.2.2: Front View - Magnum 540-A

The Magnum 540 is a four port fan-out equipped with a single backbone interconnect port and four AUI (DTE, male, lock posts) user ports. Magnum 540s are designed with five LEDs to monitor data traffic and power. Specific LEDs include; receive (RX), collision (COL), transmit (TX), power (PWR), and jabber (JAB). Individual SQE switches allow per-port SQE enable/disable configurability to match network connectivity requirements.

The Magnum 580 offers the same functionality as the 540, but has eight AUI (DTE, male, lock posts) user ports, and optionally may use an external power supply to augment the power normally supplied through the AUI user ports from attached devices.

2.3 Manual Up-link Switch (Models 540-A and 580-A Only)

Magnum 540-A and 580-A Fan-outs are equipped with a rear-mounted up-link switch that allows the user to connect and disconnect the Fan-Out nodes from the network backbone. The up-link switch is normally set to “Remote” as a default position.

2.3.1 Remote Operation (with a backbone connected)

The 500 series of Magnum Fan-Outs are typically used to create additional AUI ports from a single backbone tap (or from a mini-transceiver to other media). This is done by setting the up-link switch of the Fan-Out unit to the “Remote” position (down). In this mode of operation, nodes connected to the Fan-Out can communicate with any other local node, as well as with any node connected to the backbone segment.

2.3.2 Local Operation (Direct Connect or Standalone)

The Magnum 500 series Fan-Outs may also be used in conditions where there is no backbone, or the backbone is inoperative. This is accomplished by setting the up-link switch to the “Local” position (up). In this situation, the nodes attached to the Magnum Fan-Out form a standalone LAN, and communicate directly among themselves. This may be useful in cases where a small local AUI-type network is desired, or in a larger network setting when the network backbone is temporarily inoperative or is unusually busy and outside network resources are not needed locally.

2.4 Features and Benefits

■ Maximize Network Access within Tap Limitations

A single backbone connection allows up to eight AUI-type users to have access to the Ethernet network. Magnum Fan-Outs provide connections for multiple devices via AUI drop cables without introducing a repeater signal delay and without increasing the repeater hop-count.

■ Meets IEEE 802.3 Network Standards

Magnum Fan-Outs provide connectivity with standard 10BASE5 (ThickNet) networks and AUI drop cables.

■ LEDs Simplify Network Installation and Maintenance

Magnum Fan-Outs are equipped with a full complement of LEDs to provide status about basic network activity.

■ Up-Link Switch (Magnum 540 and 580)

When set to “Local”, allows direct connection for a small workgroup of users to operate in a local standalone configuration, and permits a small workgroup to maintain local connectivity in the event of a backbone connection failure. When set to “Remote”, allows the user nodes to participate in the larger network connected to the backbone port.

■ Installation Versatility

Magnum Fan-Outs are physically small in size, and are simple and easy to install in most any location. No AC power supply is required (but is optional on the Model 580).

2.5 Applications

Magnum Fan-Outs provide application. Magnum Fan-Outs will generally be used to support small workgroups of users and devices, either from a single connection to the network or in a stand-alone configuration. Where the application calls for the a standalone configuration (see Figure 2.5a), the Magnum 540-A or 580-A support up to four or eight local AUI ports. The up-link switch (set to “Local” position) allows the Magnum 500 Series to support environments without a backbone connection.

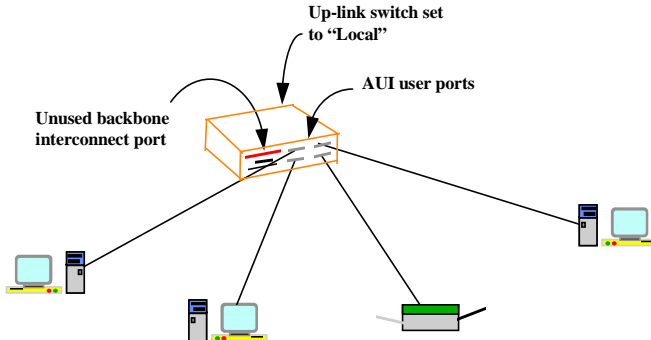


Figure 2.5a: Magnum 540-A Operates in Standalone Configuration

A Magnum Fan-Out is often used to consolidate network support devices at a single physical location. As shown in Figure 2.5b, a Magnum 580-A is used to connect a router, network management station, server and printer, plus provide handy test ports.

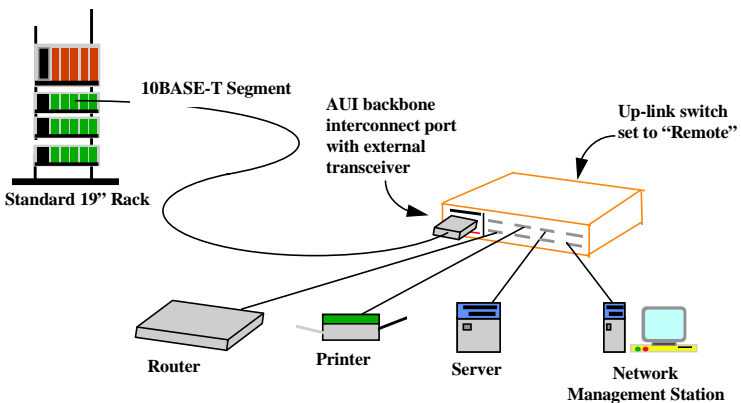


Figure 2.5b: Magnum 580-A Consolidates Network Support Devices

3.0 Installation

3.1 Locating the Magnum Fan-Out

Installation of Magnum Fan-Outs is dependent on the physical layout of the network and the area to be served. Place the unit in a location that will accommodate easy and equal access to planned network devices. Locate the Fan-out so that all AUI cables attached to their corresponding Ethernet devices are of a nominal length; the deciding factor is adherence to Ethernet specifications for aggregate AUI cable length. The compact, lightweight design of the Fan-Out unit allows it to be installed on a shelf or table-top area, or on top of a filing cabinet. One can also wall-mount the 300 Series.

3.2 Powering the Magnum Fan-Out

Magnum Fan-Outs derive power from the attached user devices via the AUI drop cable into the DTE (male) ports, and therefore do not require external power supplies. This allows maximum installation flexibility depending on the physical constraints of the network environment.

For proper operation of Magnum Fan-Outs, it is necessary to have one or more devices connected that can supply power in the full amount of 500ma as specified in the Ethernet standard. Additionally, if a mini-transceiver device is attached to the Fan-Out's backbone port to convert to another media, the Fan-Out must supply power to it and must have a strong power source for itself as well. Attaching only one local device or attaching devices with weak power (such as some portable PCs) may not permit the Magnum Fan-Out to function properly.

Note: For Model 580s, when only one or two AUI ports are connected to local devices to supply power to the Fan-Out, the power drain through the AUI port may be maximum for the attached device. In these cases, the optional Power Supply should be used.

3.3 Maximum Transmission Distances

The following information is provided to assist with the proper location and placement of network devices attached to the Fan-Out. The maximum transmission distance between an Ethernet network coax transceiver tapped into a backbone cable and any device linked to that transceiver varies depending on the media type.

Network Standard	Maximum Segment Length (w/o Repeater)
AUI (DTE) drop cable	50 m (164 ft)
10BASE5 (ThickNet cable)	500 m (1,640 ft)
10BASE2 (ThinNet cable)	185 m (606 ft)
10BASE-T (basic twisted pair, UTP)	100 m (328 ft)
FOIRL (multi-mode fiber)	1000 m (3,281 ft)
10BASE-FL (multi-mode fiber)	2000 m (6,562 ft)
Single mode fiber	10,000 m (32,810 ft)

3.4 Calculating Overall Segment Distance

When installing the Magnum Fan-Out, it is important to consider the combined overall segment length between the repeater and the farthest station. The overall segment length is calculated by adding together the cable lengths on either side of the Fan-Out. Figure 3.4 illustrates a Magnum 580-A with an external transceiver connected to a network hub (a repeater). The user station is connected to the fan-out with an AUI segment and is the farthest station from the segment source at the hub.

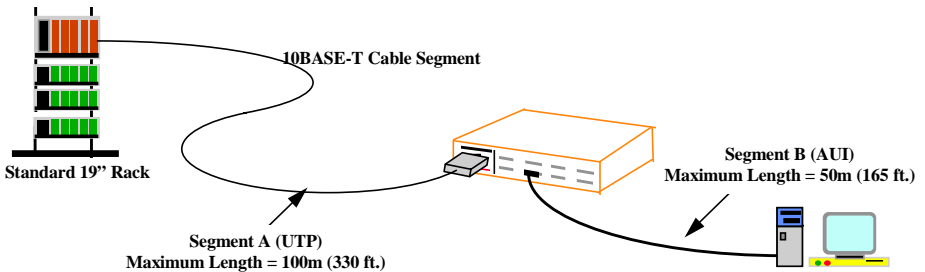


Figure 3.4: Segment Distance: User Device to Segment Source (Repeater)

Segment length on one side of the Fan-Out is measured as a percentage of the maximum allowable standard media distance for a given media type. The segment length on the other side of the Fan-Out is measured as a percentage of the maximum allowable standard media distance for that particular media type.

Using Figure 3.4 as an example, the length of the UTP wiring is 72m (216 ft). As a percentage of the maximum allowable distance, this UTP cable segment represents

72%. The length of the AUI segment is 11m (36 ft). As a percentage of the maximum allowable distance for AUI drop cable, this AUI cable segment represents 22%.

The two percentages are added together. The total should be less than or equal to 100% for a valid overall combined media run to maintain maximum network performance.

Total Media Distance Formula:

$$X\% + Y\% \leq 100\%$$

Cable Segment A = X, the distance on the backbone side of the Magnum Fan-Out divided by the Standard Maximum Media Distance for that media type.

Cable Segment B = Y, the length on the user station side of the Magnum Fan-Out divided by the Standard Maximum Media Distance for that media type.

In this particular example, the total media distance is equal to 94% of the total allowable distance for the types of media being used, and therefore this represents a valid media-distance configuration for use with a Magnum Fan-Out.

Note: This Media Distance Formula is particularly helpful in determining whether a Magnum Repeater should be used to support extended segments. If the formula yields a total distance over 100%, a repeater is needed.

3.5 Media Connections for AUI Drop Cable Segments (All Models)

Measure all AUI drop cable lengths before you proceed with the installation. Ensure that all cables to be used will reach the devices being installed. Follow the five steps below to connect a Magnum Fan-Out in your network using AUI drop cables.

1. Allow for the most direct path between the existing Ethernet network coax transceiver and the Fan-Out unit; avoid excessive bending and crimping of the AUI drop cable.
2. Attach the female end of the AUI cable to the 15-pin D-subminiature male connector on your existing Ethernet network coax transceiver.

3. Attach the male end of the AUI cable to the 15-pin D-subminiature female connector located either on top (Models 320 and 340), or on the left-front panel (Models 540 and 580) of the Magnum Fan-Out unit.
4. If the connectors contain a slide-locking device, the connector clip must be properly engaged or locked.
5. Attach individual separate Ethernet devices (workstations, print servers, routers, etc.) to the available 15-pin D-sub male DTE connectors on the fan-out unit using Ethernet compliant AUI cables. (Attach the female end of AUI cables to the Fan-Out male connectors; use the male end of each cable to connect to the network interfaces on the devices that are being installed.) Make sure that the AUI cables do not pull on the Fan-Out. If possible, support each AUI cable approximately six to eight inches from the Fan-Out. Use tie-wraps to strap the AUI cable to the network backbone cable or whatever is convenient in the installation area. This method will prevent unnecessary strain on the AUI connectors and the Fan-Out unit.

Table 1: Pin Assignments for an AUI Connector

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.

4.0 OPERATION

This section details the various operational features of Magnum Fan-Outs including a description of the LEDs.

4.1 Polarity Requirements, AUI ports

Magnum Fan-Outs requires that all host units attached to it must supply the same polarity power. The polarity supplied by the hosts must be all positive or all negative.

Note: Do not mix polarity among hosts.

The majority of computers on the market today , including workstations and PC's, use positive polarity voltage. If there is a question about the device being connected to the network, run a voltage test on the output plug of the network interface card installed in the device. Use the polarity information below to determine positive or negative polarity.

Positive Polarity: Pin 13 (to shell) +11v to +13 v; Pin 6 (to shell) +/- 0.5v

Negative Polarity: Pin 13 (to shell) +/- 0.5v; Pin 6 (to shell) -11v to -16 v

4.2 LED Description and Operation

Each Magnum Fan-Out is equipped with a set of front panel LEDs to allow for a quick visual assessment of the operational condition of the unit and the network.

4.2.1 Magnum 300 Series

Magnum 320

<u>LED</u>	<u>Description</u>
TX	One each for DTE (AUI male) user ports (1 & 2); illuminates GREEN when data is transmitted by the attached station.
COL	Illuminates YELLOW briefly to indicate a collision has occurred.

4.2.1 LED Description and Operation (continued)

Magnum 340

<u>LED</u>	<u>Description</u>
PWR	One each for DTE (AUI male) ports (1, 2, 3, 4); illuminates GREEN to indicate that the unit is receiving power.
TX	One each for DTE (AUI male) ports (1, 2, 3, 4); illuminates GREEN when data is transmitted by the attached station.
JAB	One each for DTE (AUI male) ports (1, 2, 3, 4); illuminates AMBER to indicate a jabber condition has occurred.
SQE	One each for DTE (AUI male) ports (1, 2, 3, 4); illuminates YELLOW to indicate SQE is enabled.
COL	Illuminates YELLOW briefly to indicate a collision has occurred.
RX	Illuminates GREEN to indicate data is being received.
<u>Switch Setting</u>	
SQE	Enables or Disables SQE for each DTE port (1, 2, 3, or 4).

4.2.2 Magnum 500 Series

<u>LED</u>	<u>Description</u>
RX	Illuminates GREEN to indicate data is being received.
COL	Illuminates YELLOW momentarily to indicate a collision has occurred.
PWR	One each for DTE (AUI male) ports; illuminates GREEN to indicate that the unit is receiving power.
TX	One each for DTE (AUI male) ports; illuminates GREEN when data is transmitted by the attached station.
JAB	One each for DTE (AUI male) ports; illuminates AMBER to indicate a jabber condition has occurred.
<u>Switch Setting</u>	
SQE	Enables or Disables SQE for each DTE (AUI male) port.
Up-Link	Enables or Disables the remote connection though the AUI Backbone Interconnect Port.

4.3 Power Requirements

Magnum Fan-Outs normally take power from the attached devices through the DTE (AUI male) user ports. An external power supply is optional on the 580 models. See Section 3.2, "Powering the Magnum Fan-Outs", for additional information.

5.0 TROUBLESHOOTING

All Magnum Ethernet products are designed to provide reliable and consistently high performance in all network environments. The installation of Magnum Fan-Outs is a simple procedure (see Section 3.0, Installation); operation is completely transparent and is described in Section 4.0, OPERATION.

Should problems develop during installation or operation, this section is intended to help locate, identify and correct these types of problems. Please follow the suggestions listed below prior to contacting your supplier. However, if you are unsure of the procedures described in this section, or if the Magnum Fan-Out product is not performing as expected, do not attempt to repair the unit; instead contact your supplier for assistance or contact Garrett Communications Customer Support.

5.1 Before Calling for Assistance

1. If difficulty is encountered when installing or operating the unit, refer back to the Installation Section of this manual. Also check to make sure that the various components of the network are interoperable.
2. Check the cables and connectors to ensure that they have been properly connected and the cables/wires have not been crimped or in some way impaired during installation.
3. Make sure that power is properly supplied to the fan-out unit via the AUI cables to attached devices. Use the PWR LEDs to verify each port is receiving proper power.
4. If the problem is isolated to a network device other than the Magnum Fan-Out product, it is recommended that the problem device is replaced with a known good device. Verify whether or not the problem is corrected.
5. If the problem continues after completing Step 4 above, contact your supplier from whom you purchased the product for assistance, or Garrett Communications Customer Support.

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, call Garrett Communications Customer Service at (510) 438-9071 during business hours in California. When calling, please have the following information readily available:

Name and phone number of your contact person.

Name of your company / institution

Your shipping address

Product name

Serial Number

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 Return 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
47823 Westinghouse Drive
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.