GarrettCom®

Industrial Networking at Its Best™

Magnum P62-Series

(P62F and managed mP62 models)

Hardened Ethernet Switches

Installation and User Guide

$5.00 USD

Magnum™ P62-Series

(P62F and managed mP62 models)

Hardened Ethernet Switches

Installation and User Guide

Part #: 84-00092Z, (Rev J 05/05)

Trademarks

Ethernet is a trademark of Xerox Corporation

NEBS is a trademark of Telcordia Technologies

UL is a registered trademark of Underwriters Laboratories

GarrettCom, Magnum, **Personal Switch, S-Ring Redundancy Manager (patent pending)** and **Link-Loss-Learn (patent pending)** are trademarks and **Personal Hub** is a registered trademark of GarrettCom, Inc.

Important: The Magnum P62-Series Hardened Ethernet Switches contain no user serviceable parts. Attempted service by unauthorized personnel shall render all warranties null and void. If problems are experienced with a Magnum P62-Series Hardened Switch product, consult Section 5, Troubleshooting, of this User Guide.

Printed in the United States of America.

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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 users at their 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

GarrettCom, Inc. offers the Magnum line of Ethernet LAN connectivity products with industry-standard functionality. Magnum products are heavy duty, feature fiber-built-in ports, and have AC and DC power options to make them suitable for a variety of Industrial and Carrier Class applications.

6K25 Managed Fiber Switches, Gigabit, 100 and 10 Mbps, fiber and copper ports, mix- and match. Features SFF fiber for up to 25 fiber ports in a 1U unit. Configurable.

4K-Series Switches, 100 and 10 Mbps copper ports with optional 100Mb fiber ports, regular and Reverse rack-mount models, AC and DC power options, heavy duty specs.

Quad-Series Fiber Switches, 100 & 10Mbps, fiber and copper ports, mixed-speed and mixed-media types, full switching performance, AC and DC power options.

P62-Series "Outdoor" Ethernet Switches, for temperature uncontrolled applications, 6 10/100 and 2 100Mb fiber ports, managed and unmanaged models, all fiber types.

Mixed-Media Fiber Hub, 16-port Stackable,10/100 auto-sensing, AC and DC power

Dual Speed 8-port and 16-port Stackables, 10/100 auto-sensing. AC and DC power

cPCI *Blade* 12-port 10/100 "hub-on-a-card" for Compact PCI chassis rear I/O

ITS *Blade* 8-port 10/100 "switch-on-a-card" for Model 2070 Traffic Controller Chassis

Stackable Hubs, SNMP Optional

10Mb series and 100Mb series, both w/ optional port modules, AC and DC power

Personal Switches, 10/100Mb

8 port dual speed, Auto-negotiable with fiber option

Personal Hubs, 100Mb or 10/100Mb

8-port, with two switched ports (1 fiber built in)

Personal Hubs, 10Mb series

8-port + AUI, stackable to 5 high, + optional BNC of fiber port
8 or 9-port and 4 or 5-Port Personal Hubs, w/ man. up-link sw**.**

Media Converters, 10Mb and 100Mb series, for offices and Hardened models for industrial applications. All media combinations, incl. fiber ST, SC, mm., single mode

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

Stackable Concentrators, SNMP optional, 13-Ports

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

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

Transceivers, 10Mb series Mini-Transceivers and Coax Models **May, 05**

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REVISIONS

Rev J 05/07: Minor updates to power substation notes and logo change
Rev J 05/05: minor updates, Auto-cross(MDIX) on RJ-45 ports, DIN-Rail mounting wording
Rev I 11/03 Console port pin assignments added
Rev H 08/03 The DC Power input range is corrected, from 20-70VDC to 20-60VDC
Rev G 03/03 : This revision adds the DIN-RAIL mounting options & UL requirement for DC .
Rev F 11/02 : This revision adds the Managed mP62 models.
Rev E 06/02 : Changed Altitude spec, and added Mechanical mounting drawing in 3.1.2.
Rev D 01 / 02: This revision changes the installation proc. and operating Temp. range.
Rev C 11/01: This revision includes the magnum P62F-NOF, and metal mounting.
Rev B 08/01: This revision includes the update of additional power source
Rev A 04/01: This revision is the initial release of the P62F Hardened Switches user manual.

1.0 SPECIFICATIONS

1.1 Technical Specifications

Ports Performance

Fiber, and when an auto-negotiating port is operating at 100Mbps:
Data Rate: 100Mbps
When an RJ-45 auto-negotiating port is operating at 10 Mbps:
Data Rate: 10 Mbps
For mP62 models, RJ-45 ports are S/W controlled for speed and F/H duplex, crossover (MDI – MDIX) is automatically handled

Network Standards

100Mb: Ethernet IEEE 802.3u, 100BASE-TX, 100BASE-FX
10 Mb: Ethernet IEEE 802.3, 10BASE-T
Auto-sensing for speed: IEEE 802.3u; 802.3x flow control
For managed mP62 models, IEEE 802.1p QoS and 802.1d Spanning Tree
For mP62 management software, see Section 2.2.3

Packet-Processing Between Domains is non-blocking

Filtering and Forwarding Rate from 100Mbps ports: 148,800 pps max
Filtering and Forwarding Rate from 10 Mbps ports: 14,880 pps max.
Processing type: Store and Forward
Auto-learning: 4K address table (16K on P62F), shared for all ports
Packet buffers: 256KB, dynamically shared on all domains
Latency (not including packet time): 100 to 10 Mbps: 5µs
10 to 100Mbps: 5µs

Path Delay Value: 50 BT on all ports

Maximum Ethernet Segment (or Domain) Lengths

10BASE-T (Unshielded twisted pair)	- 100 m (328 ft)
100BASE-TX (CAT 5 UTP)	- 100 m (328 ft)
100BASE-FX, full-duplex: (multi-mode)	- 2.0 km (6,562 ft)
100BASE-FX, full-duplex: (single-mode)	- 20.0 km (65,620 ft)
100BASE-FX, full-duplex: (single-mode, long)	- 40.0 km (131,240 ft)

Operating Environment

Ambient Temperature: -40°F to 170°F for mP62 (160°F for P62F)
(-40°C to 75°C for mP62, 70°C for P62F))
Cold start down to -20°C
Storage Temperature: -40° to 185°F (-40°C to 85°C)
Ambient Relative Humidity: 5% to 95% (non-condensing)
Altitude: -200 to 50,00 ft. (-60 to 15,000m)
"Plenum rated" for above-the-ceiling installation in office areas
IEC 529 rated IP51 (holds out dust, vertical water)
Operating Shock and Vibration: Meets Bellcore GR-63-CORE
Conformal coating (tropical humidity protection) optional, request quote

Power Supply (Internal) 24VDC and -48VDC Power Supply

Power Input Voltage: 20 to 60 VDC (auto-ranging), "-, GND, +"
Power Consumption: 10 watts typical.
DC-DC Converter Rating: 5VDC, 2Amps

Power Supply (Ext.) 125VDC & 250VDC, (PSX-T) for P62-Series -5V only

Power Input Voltage: 100 to 275 VDC (nominal rating of 125, 250VDC)
Power Consumption: 15 watts typical.
DC-DC Converter Rating: 5VDC, 3Amps

Power Supply (External) AC Power Supply (PSX-A) for P62F-5V and mP62-5V

AC Power Connector: IEC-type, male recessed at rear of Power Supply chassis
Input Voltage: 85 to 264 VAC (auto-ranging)
Input Frequency: 47 to 63 Hz (auto-ranging)
Power Consumption: 15 watts typical
Power Supply Rating: 3Amps at 5VDC

Network Cable Connectors -6 RJ-45 shielded female ports and 2 fiber port

100Mbps: Category 5 UTP/STP, fiber (50/125, 62.5/125 mm, or single-mode at 9/125 micron)
10 Mbps: Category 3, 4, 5 UTP (Note: auto-sensing does not sense cable type)

Full-duplex / Half -duplex on copper (RJ-45) switched Ports # 2 to 7

All the RJ-45 ports support Full / Half duplex and 10/100 speed, each independently auto-negotiating on P62F models; S/W controlled on mP62 models.

Fiber Ports # 1 and 8

The switched fiber ports # 1 & 8 are fixed at full-duplex only, 100Mb speed.

Mechanical

Enclosure: Rugged 18-gauge high-strength steel case. Metal mounting plate included. Suitable for stand-alone, shelf, pedestal or wall mounting. The case also serves as a heat sink. The metal mounting base is included, 13-guage steel. (Without the base, the box size is only 7" high). Mounting holes in the base plate are a rectangle that measures 3.35" x 7.92" (8.5 x 20.1 cm) center to center.
See Section 3.1.2 for additional mounting details.
Dimensions (wall mounted): 1.70 in D x 5.75 in W x 8.8 in H
(4.3 cm x 14.6 cm x 22.4 cm)
Weight: 3.5 lb. (1.6 kg.)
Cooling method: Convection, with case operating as a heat sink.
Note: Internal thermal materials and techniques (patent pending) conduct heat from the electronic elements inside to the steel case which acts as a heat sink. Internal chip temperatures are only about 10°C above case ambient at steady state operation

LED Indicators

PWR: Steady ON when power applied
SPEED: (when LINK is ON): ON = 100Mbps; OFF = 10 Mbps
LINK/ACT: Steady ON for LINK with no traffic, blinking indicates port is transmitting / receiving.
F/H (RJ-45 ports only): ON = full-duplex, OFF = half-duplex

MTBF (Bellcore method)

Over 10 years MTBF. Email **sales@GarrettCom.com** for details

Agency Approvals

UL Listed (UL 60950), cUL, CB, CE Low Volt. Dir. & Electro-Magnetic Comp.
IEEE P1613 Class 2 Environmental Standard for Electric Power Subs.
See also **Note for Power Substations** in Section 2.2.5 and 3.2.1
Emissions: meets FCC Part 15, Class A, and ETSI

Warranty: Three years, return to factory Made in USA

1.2 Ordering Information

Magnum P62-Series, 10/100 Ethernet Switch

Magnum P62F-AC-2MSC: P62F-AC Ethernet Switch with six 10/100 RJ-45 and two 100Mb FDX fiber multi-mode SC-type ports. Has 16KB address table and 1.0 MB packet buffers. AC power input, 85-160vac 47-63Hz worldwide auto-ranging via PSX-A power source Extended Temp (a separate unit). Steel case used as a heat sink, designed for use in environmentally challenged locations such as "outdoors" with extended temperatures.

Magnum P62F-AC-1MISSC: Same as P62F-AC-2MSC, except one fiber port is 20km single-mode SC. (includes PSX-A unit)

Magnum P62F-AC-2SSC: Same as P62F-AC-2MSC, except both fiber ports are 20km single-mode SC. (includes PSX-A unit)

Magnum P62F-AC-NOF: P62F-DC Ethernet Switch, six 10/100 RJ-45 and no fiber ports. Has 16KB address table and 1.0MB packet buffers. AC power input 85-260vac 47-63Hz worldwide auto-ranging, via PSX-A Power Source Extended Temp (a separate unit). Steel case used as a heat sink, designed for use in environmentally auto-ranging. Steel case used as a heat sink, designed for use in environmentally challenged locations such as "outdoors" with extended temperatures.

Magnum P62F-2MSC: 8-port Ethernet Switch with two 100Mbps full-duplex switched fiber ports (multi-mode SC-type connector), and six half- or full-duplex switched RJ-45 10/100 auto-negotiating ports. Includes store-and-forward switching that filters and forwards data moving between the ports. The internal switch has 16K nodes address table and 1MB packet buffers. DC power input,20-60VDC auto-ranging. Steel case acts as a heat sink. Rated for extended temperature.

Magnum P62F-1M1SSC: Same as P62F-2MSC, but with one multi-mode SC-type and one 20Km single mode SC fiber connectors.

Magnum P62F-2SSC: Same as P62F but with two 20Km sgl-mode SC-type fiber ports

Magnum P62F-NOF: P62F-DC Ethernet Switch, six 10/100 RJ-45 and no fiber ports. Has 16KB address table and 1.0MB packet buffers. DC power input, 18-60VDC auto-ranging. Steel case used as a heat sink, designed for use in environmentally challenged locations such as "outdoors" with extended temperatures.

Parts

Magnum P62F-5V-2MSC: Same as P62F-2MSC, except with 5VDC input using military-type-screw-lock connector.

Magnum P62F-5V-1M1SSC: Same as P62F-1,1SSC, except with 5VDC input using military-type-screw-lock connector.

Magnum P62F-5V-2SSC: Same as P62F-2SSC, except with 5VDC input using military-type-screw-lock connector.

Magnum P62F-5V-NOF: Same as P62F-NOF, except with 5VFC input via PSX-A using military-type screw lock connectors.

Magnum PSX-5V-CBL (spare): 2-ft power cord with military type screw-lock connector, spare for PSX to P62F-5V power cord.

Magnum PSX-A: P62F-5V Power Source for Extended Temperature, nominal AC input 115-240vac at 47-63HZ auto-ranging, 15 watts, 5VDC output at 3Amps. Steel case used as a heat sink. Extended temperature rated. Output power cord has military-style screw-lock plug. Mounts as a separate unit adjacent to a Magnum Model P62F-5V Switch.

Magnum PSX-T: Same as PSX-A , except 125VDC to 250VDC input, terminal lugs for "+", "-", and GND

Managed P62-Series (mP62) Hardened Switches

Magnum mP62-AC-2MSC: mP62-AC Managed Switch with six10/100 RJ-45 and two 100Mb FDX fiber multi-mode SC-type ports. Software includes menu-driven user interface for ease of use, SNMP, QoS, Telnet, Security, STP, VLAN, BootP/DHCP. Has 4Knodes address table and 256K packet buffers. AC power input, 85-260vac 47-63Hz worldwide auto-ranging, via PSX-A Power Source Extended Temp (a separate unit). Steel case used a s a heat sink, designed for use in environmentally challenged location such as "outdoors" with extended temperatures.

Magnum mP62-AC -1MISSC: Same as mP62-AC-2MSC, except one fiber port is 20km single-mode SC. (includes PSX-A)

Magnum mP62-AC -2SSC: Same as mP62-AC-2MSC, except both fiber ports are 20km single-mode SC. (includes PSX-A)

Magnum mP62-AC -NOF: mP62 –AC Ethernet Switch w/ six 10/100 RJ-45s, no fiber ports

Magnum mP62-2MSC: mP62-DC Ethernet Switch, six 10/100 RJ-45 and two 100Mb FDX fiber multi-mode SC-type ports. Software and buffers same as mP62-AC-2MSC. Dc power input,20-60VDC auto-ranging

Magnum mP62-1MISSC: Same as mP62-2MSC, except one fiber port is 20km single-mode SC. (No PSX unit required)

Magnum mP62-2SSC: Same as mP62-2MSC, except both fiber ports are 20km single-mode SC. (No PSX unit required)

Parts

Magnum mP62-5V-2MSC*: Same as mP62-2MSC, except with 5VDC input using military-type screw-lock connector

Magnum mP62-5V –1M1SSC*: Same as mP62-1M1SSC, except w/ 5VDC input using military-type screw-lock connector

Magnum mP62-5V –2SSC*: Same as mP62-2SSC, except w/ 5VDC input using military-type screw-lock connector

Magnum mP62-5V-NOF: Same as mP62-NOF, except w/ 5VDC input using military-type screw-lock connector

Magnum PSX-5V-CBL (spare): 2ft. power cord with military –type screw-lock connector, spare for PSX to mP62-5V power cord.

MST Conversion: Special Item, convert one standard P62-2MSC w/two MSC fiber ports to two MST fiber ports.

***PSX unit or equal required to supply 5VDC input. For more information, see the PSX datasheet.

Magnum P62 models with other fiber connector types and combinations available, request quote.

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

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 that 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 P62-Series Hardened Switch (P62F-xxx or mP62-xxx)

1 Installation and User Guide

1 Product Registration Card

(Optional, if AC power)

1 PSX-A Power Source Extended Temp. unit

1 6 ft. long AC Power chord (for PSX-A Unit only)

(Optional, PSX-T, 125 or 250VDC)

1 PSX-T Power Source Extended Temp. unit

Remove the Magnum P62-Series Hardened Switch 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 GarrettCom, Inc. as soon as possible.

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

2.2 Product Description

The Magnum P62-Series Ethernet "Outdoor" Switches are designed to operate in extended temperature applications and are suitable for use in environments with inhospitable high / low temperatures. Magnum P62-Series Hardened switches provide two built-in 100Mb full-duplex switched fiber ports so that several units can be daisy-chained. These fiber ports are coupled with the convenience of six switched 10/100Mb copper (RJ45) ports for easy connectivity to local nodes and devices. All these features come in one compact rugged unit.

The Magnum P62-Series hardened Switches are available in a wide variety of options, including our *Managed (mP62..)* version. The Managed mP62 can be easily deployed in an existing and mixed vendor Ethernet network because of its features and capability. The Managed (mP62) equipped with *MNS-mP* software supports managed edge-switch functions including *Menu-driven User Interface for ease of use, SNMP, QoS, Telnet, Password Security, Port Settings Control, Spanning Tree Protocol, Port-based VLAN, BootP / DHCP etc.*.

The two built-in fiber ports are designed with full-duplex 100Mbps switched capability. The six copper (RJ-45) ports come with full / half-duplex-10/100-auto-negotiating ability. The Magnum P62-Series Hardened Switches provide the switching speed and the reliability to smoothly support multiple workgroups at 100Mbps or 10Mbps speed. The optional fiber ports are normally configured and tested with Magnum P62 units in the factory and come available in multi-mode and single-mode SC-type fiber connectors. For special fiber port types, request quote.

Designed specifically to operate in *un*controlled temperature applications, the hardened Magnum P62's high strength steel case functions as a heat sink to draw away the heat from the internal electronics and dissipate it. The efficient design of P62-Series high strength steel cases can easily handle the extreme heat of **75°C (170°F) mP62** or **70°C (160°F) P62F** and extreme cold of **-40°C (-40°F)**. when properly installed (see Sec. 3.0).

Applications for Magnum P62-Series Hardened Switches include roadside traffic data collection and control stations, unheated and or high temperatures locations, above-ceiling (plenum) spaces (see sect.3.3.1 for details) and ceiling mounts in commercial buildings, industrial boiler rooms, mines and quarries, irrigation and pipeline facilities, on-board ships, cell towers, data communication huts and pedestals, aeronautical installations and military sites.

A Magnum P62-Series hardened Switch is easy to install and use. Addresses of attached nodes are automatically learned and maintained, adapting the switching services to network changes and expansions. Top-mounted LEDs provide extra advantage for the user to observe the status information of each port. The Magnum P62-Series Hardened Switches generate high

performance plug-and-play operation in a rugged package. The high-strength steel enclosure gives extra protection.

Each P62-Series Hardened Switch is non-blocking on all ports and has large packet buffers and a 4K-node address table for advanced performance. A Magnum P62-Series Switch, with store-and-forward switching ability, filters all faulty packets to minimize traffic congestion.

2.2.1 Magnum P62-Series chassis w/fiber SC (m.m. or s.m) connectors

Magnum P62F-5V **Magnum P62F**

The Magnum P62-Series chassis houses one main PC board. The front side of the chassis has a half dozen RJ-45 twisted-pair ports and two 100Mbps full-duplex fiber ports (one on each side of the RJ-45 ports) as shown in the adjacent picture. The fiber ports operate in full-duplex mode only to provide higher bandwidth and longer distances on fiber. All the LEDs are mounted on the top cover to conveniently indicate operating status of all ports.

There is a power on (PWR) indicator and a SELF TEST (self-test at power up in progress or failed) for the unit. For each RJ-45 (ports # 2 -7), there are Link and Activity (LK/ACT) LEDs indicating traffic, 10/100 (ON for 100Mbps) LEDs indicating speed, and full/half (F/H) duplex indicators. The fiber ports (#1 and 8), have (LK/ACT) indicators only.

The rugged design of the case using high-strength rugged 18-gauge steel enables this product to withstand environments with inhospitable high / low temperatures, and makes it suitable for “outdoors” temperatures, road-side pedestals, control rooms and military use.

For DC-powered models, the DC power plug connector or “jack” is in the left front of the chassis. The DC Magnum P62-Series Model is typically used for power input of 24VDC or –48VDC only. The DC input power supports a wide range, from 20-60 VDC auto-ranging. DC power input is featured for high reliability and convenience in out-of-the-way locations.

The Magnum P62-5V models are available with an External Power Source (Optional) for power input of universal AC power using the Magnum PSX-A unit. The 125/250 VDC model (PSX-T) input power supports a range of 100-275VDC and comes with input safety shield, fuses, and is diode-protected against accidental reverse polarity connection.

The AC Power Source, PSX-A, is equipped with a worldwide range of 85-264vac, 47-63Hz and is auto-ranging with 5VDC 3Amp Power output. For both models, the military style screw-lock plug provides a secure connection.

See Section 3.3 for detail description of the PSX-A and PSX-T external power sources.

2.2.2 Managed mP62 chassis with fiber SC (m.m. or single-mode) ports

Magnum mP62-5V

mP62-5V with the PSX-A = AC model

The Managed mP62 model is equipped with industry standard network management and utility software operating features to make this Switch suitable to deploy in mission-critical applications and in harsh environments. It also has internal components rated at 85`C so that it can operate at higher (75`C) ambient temperatures than the P62F models.

The MNS-mP software supports managed edge-switch functions including menu-driven user interface, SNMP, QoS, VLAN, STP, Port settings control, Password security, and BootP / DHCP etc. The virtual LAN supports the Port based VLAN only and is easily setup on the managed MP62 Switch to provide a secure and highly efficient network to its users. The MENU driven MNS-mP CLI software is user friendly and easily operated by the network user to configure the network as per their needs. The neat appearance of the MENU driven MNS-mP is specially developed to have its function configured easily by the users.

The serial (Console) port is provided on the right front of the Managed mP62 Switch to use the Console Management Interface(CMI) to manage all functions of the switch.

In addition, the Link-Loss-Learn™ feature (patent pending) in mP62's allows rapid operating recovery from a link loss. The Link-Loss-Learn feature of the Magnum mP62 Ethernet Switch addresses issues that can occur when mP62's are used in redundant network configurations, such as when Spanning Tree Protocol (STP) is in use. With the Link-Loss-Learn feature, Magnum mP62s are better able to handle some fault recovery situations, and they may improve network reliability and provide faster fault recovery accordingly. Thus the immediate re-learning of the addresses of the attached devices results in fast re-routing of traffic in mP62s. See **http://www.garrettcom.com/mp62.htm** for additional information and application information. Without a redundant network topology, the Link-Loss-Learn feature is of no known benefit and should be turned off.

Developed using unique thermal techniques (patent pending), mP62's operate smoothly to a max of 75°C, which is 5°C more than the P62F product ratings of 70°C. Equipped with high thermal dissipation features (patent pending), power supply flexibility, management (MNS-mP software) capability, and a convection-cooled sealed case, the mP62s are ideal for power utility plants, substations, roadside traffic control stations, unheated or high temperature industrial plant locations, commercial building above-the-ceiling locations, data communications huts and pedestals, and military field operation sites. When mounted in the field, an mP62 is typically fastened vertically to a wall or pedestal, with cables connected at the bottom to provide protection of the connectors from dirt and dust. The managed mP62 Switch's package is IEC 529 rated IP51 and, while not waterproof, it can be placed in NEMA 4 boxes, IP65 enclosures and similar waterproof enclosures to provide an all-weather outdoor solution.

The AC/DC Power Supply options for the Managed mP62 Hardened Switches are the same as for the other P62F models. For detailed descriptions of Power Supply options, see Section 3.3.

2.2.3 Managed Network Software (MNS-mP) for Magnum mP62

Magnum mP62's come with licensed MNS-mP software, which allows a user to configure the Magnum mP62 as a Managed Hardened Switch and activate the Software features. For additional information about MNS-mP, see the Magnum mP62's Software User guide in pdf

format, a separate document normally accessed via the web-browser, ftp://ftp.garrettcom.com/ or FTP client program by ftp.GarrettCom.com using

user : mpuser

password : mpuser

All the MNS-mP Software related information and *NEW* releases related to MNS-mP Software and Hardware for mP62's can be accessed and download from Garrettcom's FTP site.

Or please visit **www.GarrettCom.com/techsupport/index.htm#software**

and look for Magnum mP62's MNS-mP software support information.

Users can also email: support@GarrettCom.com for further information.

2.2.4 Connecting the Console Terminal to Magnum mP62 (Management)

Use a DB-9 "null modem" cable to connect the Magnum mP62 Console Port (the RS-232 port on the mP62 Switch) to your PC, so that your PC becomes the mP62's Console Terminal.

Note: The DB-9 cable is not included with the mP62 unit package.

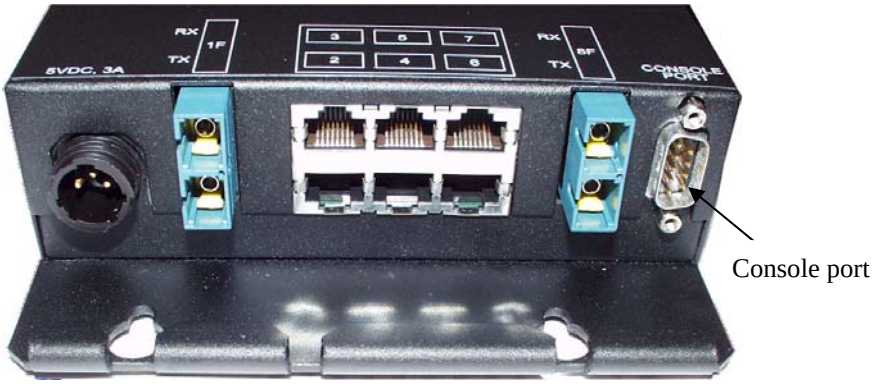
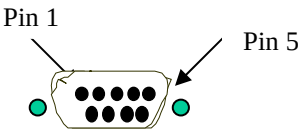


Fig. 2.2.4 Front View of Magnum mP62, Console port is located on the extreme right of the Hardened Switch

Note: For a detailed description of Managed Network Software (MNS-mP) and Magnum mP62 Hardened Switch configurations for Network Management, please refer to the Magnum mP62 Software Manual available on GarrettCom's FTP site. Information about MNS-mP software is also available in Section 2.2.1 (above) of this manual.

2.2.5 RS-232 (DB-9) Console Com. port pin assignments.



DB-9 (Console port connector)

Pin	Signal	Description
1	**CD**	**Carrier detect (not used)**
2	**RXD**	**Receive Data (input)**
3	**TXD**	**Transmit Data (output)**
4	**open**	**not used**
5	**GND**	**Signal Ground**
6-9	**open**	**not used**

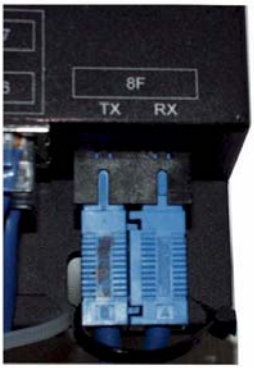
The above provided information enables a managed station(a PC or Console terminal) to connect directly to the switch using a straight through cable.(Note: The Null-Modem (DB-9) cable is optional and can be order from the factory, along with the unit

NOTE for Power Substations: *In support of the IEEE 1613 Class 2 standard, GCI advises that, for substation applications, the serial RJ-45console ports are intended for temporary connectivity to other equipment such as PCs. Since the console port connection is temporary, it is excluded from IEEE 1613 packet-loss testing per the 1613 standard-defined test procedure.*

2.3 Fiber port, SC Connectors

The Fast Ethernet fiber switched ports on the Magnum P62-Series operate at fixed 100Mb speed and full-duplex mode for the best performance. The P62's fiber ports are factory-built as either a multi-mode or single-mode SC connector. A yellow label on the fiber port

connector will indicate if it is single-mode. Otherwise it is a multi-mode port. Each 100Mbps fiber port performs as a switched port and as a traffic domain, providing a high bandwidth backbone connection that supports long (up to 20km single-mode, or 40km special "long-reach") fiber cable distances for installation versatility. A fiber port of a P62F is shown here,



On Magnum P62-Series units, there are three LED's for each of the RJ-45 switched ports. The F/H indicates full-duplex when ON or half-duplex when OFF. The (LK/ACT) LED is steady ON to indicate LINK, and blinking to indicate transmitting / receiving. The 10/100 LED is ON for 100Mbps and OFF for 10 Mbps (when LINK is made). For fiber ports, the LEDs are the same except there is no F/H LED because 10Mb is not possible.

There must be a device connected to the Magnum P62-Series unit via a cable. A proper link (LK light) must be made between both devices at each end of the cable in order for each LINK LED to provide a valid indication of operating conditions.

2.4 Frame Buffering and Latency

The Magnum P62-Series Hardened Switch is a store-and-forward switch. Each frame (or packet) is loaded into the Switch's memory and inspected before forwarding can occur. This technique ensures that all forwarded frames are of a valid length and have the correct CRC, (i.e., are good packets). This eliminates the propagation of bad packets, enabling all of the available bandwidth to be used for valid information.

While other switching technologies such as "cut-through" or "express" impose minimal frame latency, they will also permit bad frames to propagate out to the Ethernet segments connected. The "cut-through" technique permits collision fragment frames, which are a result of late collisions, to be forwarded to add to the network traffic. Since there is no way to filter frames with a bad CRC (the entire frame must be present in order for CRC to be calculated), the result of indiscriminate cut-through forwarding is greater traffic congestion, especially at peak activity. Since collisions and bad packets are more likely when traffic is heavy, the result of store-and-forward operation is that more bandwidth is available for good packets when the traffic load is greatest.

To minimize the possibility of dropping frames on congested ports, each Magnum P62-Series Hardened Switch dynamically allocates buffer space from an 1MB memory pool, ensuring that heavily used ports receive very large buffer space for packet storage. (Many other switches

have their packet buffer storage space divided evenly across all ports, resulting in a small, fixed number of packets to be stored per port. When the port buffer fills up, dropped packets result.) This dynamic buffer allocation provides the capability for the maximum resources of the Magnum P62-Series unit to be applied to all traffic loads, even when the traffic activity is unbalanced across the ports. Since the traffic on an operating network is constantly varying in packet density per port and in aggregate density, the Magnum P62-Series Hardened Switches are constantly adapting internally to provide maximum network performance with the least dropped packets.

When the P62-Series Switch detects that its free buffer queue space is low, the Switch sends industry standard (full-duplex only) PAUSE packets out to the devices sending packets to cause "flow control". This tells the sending devices to temporarily stop sending traffic, which allows a traffic catch-up to occur without dropping packets. Then, normal packet buffering and processing resumes. This flow-control sequence occurs in a small fraction of a second and is transparent to an observer. See Section 4.6 for additional details.

Another feature implemented in Magnum P62-Series Hardened Ethernet Switches is a collision-based flow-control mechanism (when operating at half-duplex only). When the Switch detects that its free buffer queue space is low, the Hardened Switch prevents more frames from entering by forcing a collision signal on all receiving RJ-45 half-duplex ports in order to stop incoming traffic.

The latency (the time the frame spends in the Hardened Switch before it is sent along or forwarded to its destination) of the P62-Series Hardened Ethernet Switch varies with the port-speed types, and the length of the frame is a variable here, as it is with all store-and-forward switches. For 10 Mb-to-10 Mb or 10 Mb-to-100Mb or 100Mb-to-10 Mb forwarding, the latency is 15 microseconds plus the packet time at 10Mb. For 100Mb-to-100Mb forwarding, the latency is 5 microseconds plus the packet time at 100Mb.

2.5 Features and Benefits

- **100Mb switching services for high performance Ethernet LANs**

  Magnum P62-Series Switches provide Fast Ethernet switching on all ports. They perform high speed filter/forward operations on the traffic, giving each port's segment a full 100Mb (or possibly 10 Mb for RJ-45 ports) of bandwidth.

- **Two "future-proof" fiber ports with SC connectors**

  Built-in fiber ports may be ordered with 100Mb full-duplex multi-mode SC, single-mode SC, and (special order) SSCL-type connectors. The fiber ports are set to full-duplex mode. No Media Converters needed.

- **All RJ-45 ports are auto-negotiating, support 10/100 full / half duplex**

  The auto-negotiating RJ-45 ports on P62-Series, with 10 or 100Mb speed and full / half-duplex mode selected by Ethernet standard IEEE 802.3u

- **Top-mounted LEDs for convenient viewing**

  The LEDs that indicate operating status are on the top of the unit for easy viewing in any situation. As the units are normally vertical for wall- or pedestal-mounting, top-surface viewing is most convenient.

- **Installation is "Plug n Play", operation is transparent to software**

  The Magnum P62-Series forward packets from each domain that are needed on the other domains. Internal address tables are self-learning, enabling users to change port connections or 10/100 domains without affecting operations.

- **Thermal design enables P62S to be used in temp. *un*controlled applications.**

  The P62's advanced thermal technique enclosed in rugged 18-gauge high steel used as a heat sink, is designed specifically for uncontrolled applications.

- **24VDC and -48VDC (Int.) & 125V/250VDC (ext.) through PSX-T**

  The P62-Series switch is designed to support 20-60 VDC auto-ranging power input (int.) as well as 125V/250VDC through external PSX-T. DC power is highly reliable and convenient in out-of-the-way locations.

- **Managed mP62's with MNS(mP) software for Managed network**

  The *New* managed mp62 armed with management functions including SNMP, QoS, STP, Port based VLAN, Port settings, Password security, BootP / DHCP etc

- **MTBF over 10+ years, per Bellcore calculation method**

  Email **sales@garrettcom.com** for MTBF detail.

2.6 Applications

The P62-Series is designed specifically for harsh temperature environments and brings future-proof fiber and widely-used copper connectivity to out-of-the-way sites.

Example 1. Magnum P62F In this example, a Magnum P62F Hardened Switch performs roadside real time traffic data collection and transmits it to a remote control station over fiber. Since multiple traffic control sites are long distances apart, they are all connected in series to each other and to the central station. Some local users (using RJ-45 ports) may operate at 100Mbps, and some users and utility devices may run at 10 Mbps. A Magnum P62-Series Hardened Switch serves this requirement economically and efficiently. The six full- and half-duplex switched ports make the required setup simple for collection of traffic data. The uncontrolled "outdoor" temperature feature and high reliability of the P62F make it suited to the site.

The two 100Mbps full-duplex fiber ports easily fulfill the long distance connection and provide high bandwidth for fast movement of data. The advance design of sealed P62F takes care of it cooling method. The mechanical design of the Magnum P62F also enables it to be easily placed in a NEMA 4 enclosure to provide an all-weather outdoor solution.

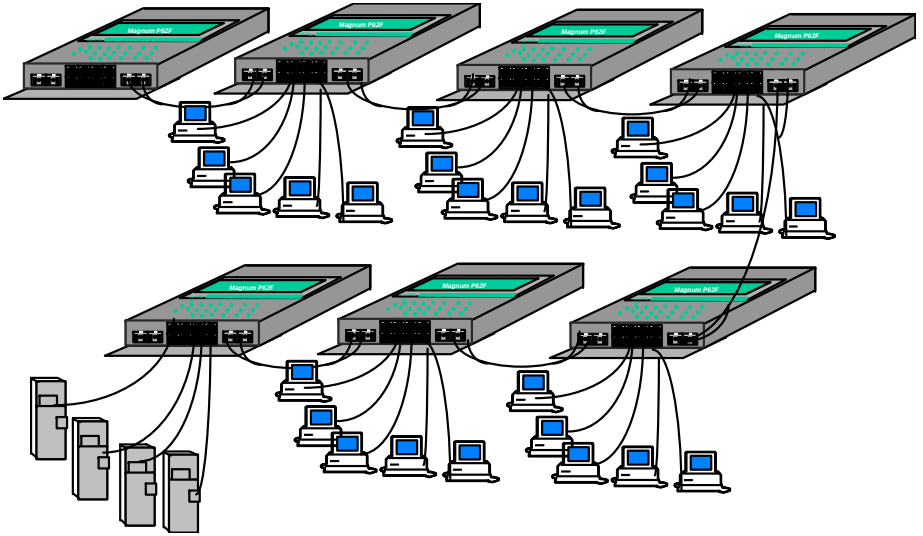


Figure 2.6.1: A P62F connects combinations of 10 Mbps and100Mbps network devices and provides a Fast Ethernet fiber backbone for access to the central control station

Example 2.

The Magnum P62F fits very well in high temperature locations (control rooms) experiencing a need to scale its LAN quickly and cost effectively. With its half / full duplex switching capability, the P62F provides a very economical high bandwidth solution at each copper-cable user-access point. The 10/100 dual-speed functions to support a mixed environment of 10 Mbps and 100Mbps users and devices. The switching capability on all ports provides bandwidth for high performance. The ruggedness of the P62F steel case and the high reliability of the design (over 10+ years of MTBF) complements the temperature controlled packaging to provide an exceptional Ethernet product.

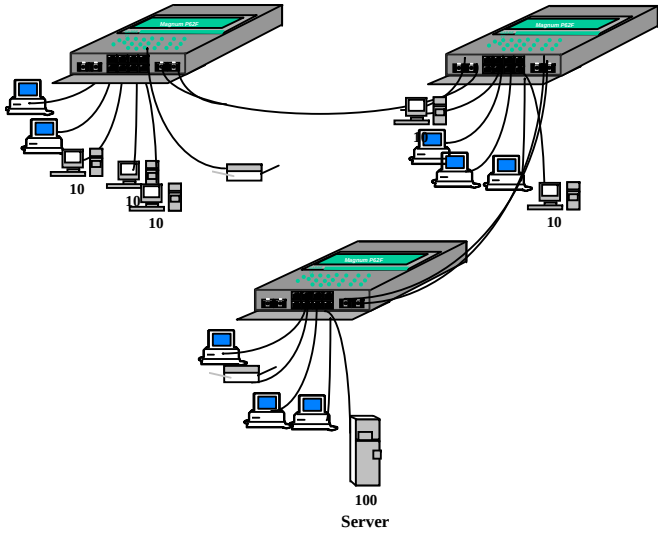


Figure 2.6.2: Three P62F connects together to provide 10 Mbps and100Mbps network with Fast Ethernet backbone.

In this example, the extended temperature rated P62F takes care of the LAN connectivity requirement in a harsh temperature environment, mounted above the ceiling in the building. The non-conductive fiber cabling inter-connects these switches through their fiber ports, providing a protected Ethernet network facility as part of the building infrastructure. The steel enclosure and 20-60VDC power input qualifies the Magnum P62F to provide a dependable solution for any temperature un-controlled location environments. The rugged enclosure with cable strain feature gives extra protection and security to the cabling to hold the copper and fiber cable more securely with the Switch ports.

Example 3. Magnum mP62

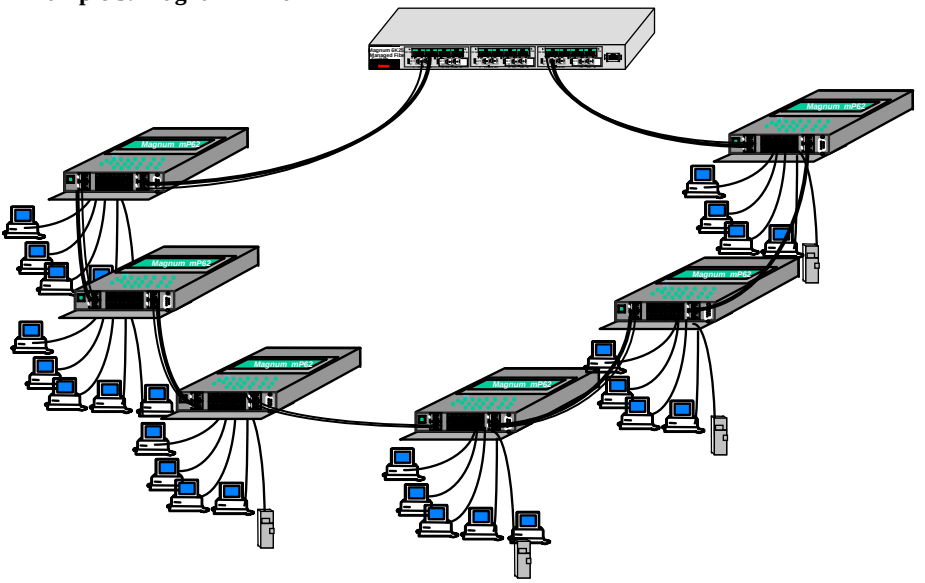


Fig .2.6.3 The Magnum Managed mP62 in a ring topology application

In an *un*controlled temperature environment where the data mining needs to be securely collect in a repository connected to the same Ethernet network, its best to develop a redundant network path in a ring topology so that all the important data mining should not be interrupted by any faulty disconnect of any cabling. The area covered for this ring Topology network is 12Km.

The managed mp62 loaded with MNS-mP software with its two fiber ports can be easily deployed in a ring topology application to fulfill the network requirement. The Managed mp62 equipped with STP, VLAN, QoS etc features provide a very economical and efficient solution to this requirement. The advanced ***Link-Loss-Learn*** feature will provide a very secure and effective solution in this particular kind of environment. The advanced Link-Loss-Learn feature along with Spanning Tree Protocol efficiently control the ring topology environment with faster fault recovery and thus will improve the network reliability.

The managed mp62 Hardened Switch is specially designed to operate in *un*controllable temperature applications and its wide variety of AC/DC options also qualify this hardened Switch to deploy in harsh applications.

3.0 INSTALLATION

This chapter provides instructions for installing Magnum P62-Series units.

3.1 Locating Magnum P62F-Series 10/100Mb Ethernet Switches

The location of a Magnum P62-Series Hardened Switch is dependent upon the physical layout of the network. The rugged 18-gauge sheet steel case that acts as a heat sink will normally protect the P62-Series from accidental damage in any application setting. Install P62F models so that the metal case of the unit is in contact with a metal surface (such as a pedestal in the earth or an equipment enclosure box) which does not exceed the ambient rating of the unit. Install mP62 models mounted vertically, attached to any wood or metal surface or in free air.

Designed primarily for specific applications such as roadside traffic data collection and control stations, unheated and or high temperatures locations, above-the-ceiling mounts in commercial buildings, industrial boiler rooms, mines and quarries, irrigation and pipeline facilities, on-board ships, cell towers, data communication huts and pedestals, aeronautical installations and military sites, the Magnum P62s support DC power input for high reliability and AC power for convenience in out-of-the way locations. Locate the P62-Series unit near any AC power (or any 20-60VDC three-wire (+, GND, -) power source for DC models) that is within the range of the unit. When installing the unit, be sure to maintain an open view of the top surface to visually monitor the status LEDs.

3.1.1 Mounting position and materials

The Magnum P62-Series Hardened Switch should be securely mounted in a vertical position with appropriate screws. Rubber “feet” (if any) that would insulate the case from metal-to-metal contact with the mounting surface should be removed. The full temperature rating of the P62F unit cannot be achieved if it is not properly mounted on metal.

The Magnum P62-Series Hardened switches are quite heavy (3.5 lbs, 1.6 Kg) because of its 18-gauge high-strength steel case enclosure. Because of its weight, it is very important to select a sturdy place and carefully attach it to metal surface. Attaching P62F’s to a metal surface is necessary to allow the thermal heat transfer from the case, achieving rated ambient temperature specifications. The mP62’s can be mounted on any material.

3.1.2 Mounting dimensions

Each Magnum P62-Series Hardened Switch is normally mounted with screws in a vertical (cables at the bottom) position. The base plate of the unit has screw holes cut out, two top and two bottom. The spacing for the mounting screws is a rectangle 3.35” x 7.92” (8.5cm x

20.1cm) center-to-center. Four user-supplied screws, ¼" max diameter, attach the P62'S base plate to the vertical mounting surface. The PSX Power Source mounting is similar. The mechanical drawings in Figures 1 & 2 below provide the mounting holes measurement information for the PSX unit (mounted on top, if present) and for the Magnum P62-Series unit.

Fig. 1

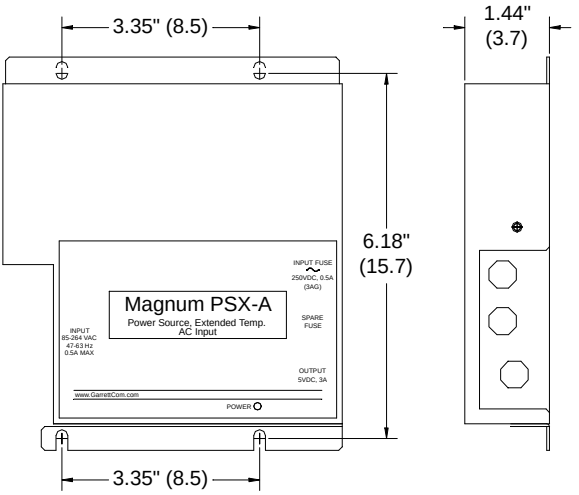
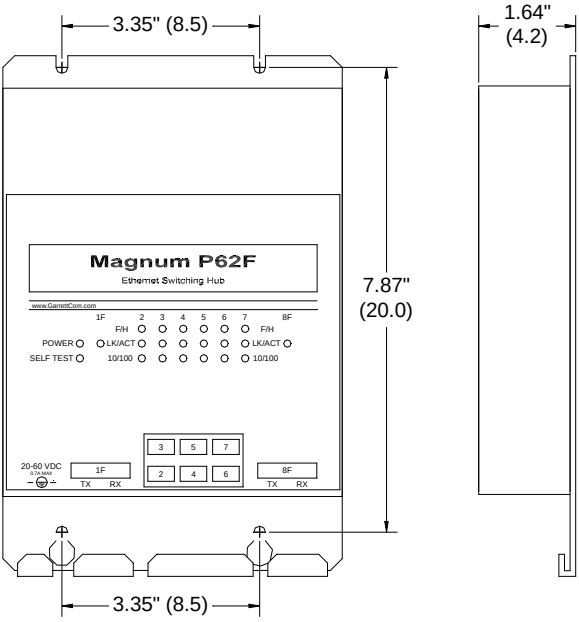


Fig. 2



Mounting Hole Dimensions, inches & (cm)

3.2 Connecting Ethernet Media, and Special Strain-relief feature

Note – see also "Cable Strain Relief Feature, Section 3.4.

The Magnum P62-Series Ethernet Switches (P62F model illustrated here) can be connected to the following three media types: 100BASE-TX, 10BASE-T and 100BASE-FX. CAT 5 cables should be used when making 100BASE-TX connections. When the ports are used as 10BASE-T ports, CAT 3 may be used. In either case, the maximum distance for unshielded twisted pair cabling is 100 meters (328 ft). For fiber port 100BASE-FX multi-mode, 50/125 or 62.5/125 microns cabling can be used, whereas for single-mode, 9/125 microns cabling should be used. Fiber cabling supports much longer cable distances and higher bandwidth than copper wiring.

Media	IEEE Standard	Connector
Twisted Pair (CAT 3 or 5)	10BASE-T	RJ-45
Twisted Pair (CAT 5)	100BASE-TX	RJ-45
Fiber (Multi-mode)	100BASE-FX	SC
Fiber (Single-mode)	100BASE-FX	SC

NOTE 1. : *It is recommended that high quality CAT. 5 cables (which work for both 10 Mbps and 100Mbps) be used whenever possible in order to provide flexibility in a mixed-speed network, since P80-series switch ports are auto-sensing for either 10 and 100Mbps. Note that the auto-sensing function does not sense the cable type.*

3.2.1 Connect Twist Pair (RJ-45, CAT 3 or CAT 5, Unshielded or Shield)

The following procedure describes how to connect a 10BASE-T or 100BASE-TX twisted pair segment to the RJ-45 port. The procedure is the same for both unshielded and shielded twisted pair cables.

1. Using standard twisted pair media, insert either end of the cable with a RJ-45 plug into the RJ-45 connector of the port. Note that, even though the connector is shielded, either unshielded or shielded cables and wiring may be used.
2. Connect the other end of the cable to the corresponding device.
3. Use the LINK LED to ensure proper connectivity by noting that the LED will be illuminated when the unit is powered and proper connection is established. If this does not help, ensure that the cable is connected properly and that the device on the other end is powered and is not defective.
4. For Port # 1 or 1SW, if the LINK LED is not illuminated, move the switch which has a cross-over or up-link for linking to another hub or Switch.

NOTE: for Power Substations: *In support of the IEEE 1613 Class 2 standard, GCI advises that, for substation applications, the RJ-45 ports are intended for connectivity to other communication equipment such as routers or telecommunication multiplexers installed in close proximity (i.e., less than 2 meters or 6.5ft) to the (m)P62(F). It is not recommended to use these ports in substation applications to interface to field devices across distances which could produce kigh (greater than 2500V) levels of ground potential rise (GPR) during line-to-ground fault conditions. The (m)P62(F) passes the 1613specifications for zero packet loss with fiber ports & with RJ45 ports used as indicated here.*

3.2.2 Connecting Fiber Optic SC-type, "Snap-In"

The following procedure applies to installations using SC-type fiber connectors. This procedure applies to ports using multi-mode SC fiber connectors.

1. Before connecting the fiber optic cable, remove the protective dust cap / plug from the end of the fiber connectors, exposing the ports opening. Save the dust cover / plug for future use, in case the fiber cable needs to be unplugged for service.
2. Wipe clean the ends of the dual connectors with a soft cloth or lint-free lens tissue dampened in alcohol. Make certain the connectors are clean before connecting. Then, insert the square male connector into the SC female jack of the Fiber port connector until it clicks and secures.

   Note: ***One strand of the duplex fiber optic cable may be coded using color bands at regular intervals; you should use the color-coded strand on the associated ports at each end of the fiber optic cable segment.***
3. Connect the Transmit (TX) port on the Magnum Fiber port to the Receive (RX) port of the remote device. Begin with the color-coded strand of the cable for this first TX-to-RX connection. Note – the two male square-end SC cable strands may be fastened together to plug as a unit.
4. Connect the Receive (RX) port to the Transmit (TX) port of the remote device. Use the non-color coded fiber strand for this.
5. The LINK LED for the fiber connector will illuminate when a proper connection has been established at both ends (and when power is ON in the unit). If LINK is not lit after cable connection, the normal cause is improper cable polarity. Swap the fiber cables at the fiber connector to remedy this situation.

3.2.3 Connecting Fiber Optic ST-type, "Snap-In" (Optional)

The following procedure applies to installations using ST-type fiber connectors, i.e., using

multi-mode ST.

When connecting fiber media to ST connectors, simply twist on the two round male connectors into the ST female jacks of the Fiber connector until it clicks and secures.

3.2.4 Connecting Single-Mode Fiber Optic

When using single-mode fiber cable, be sure to use single-mode fiber port connectors. Single-mode fiber cable has a smaller diameter than multi-mode fiber cable (9/125 microns for single-mode, 50/125 or 62.5/125 microns for multi-mode where xx/xx are the diameters of the core and the core plus the cladding respectively). Single-mode fiber allows full bandwidth at longer distances, about 20Km with the single-mode SC.

The same procedures as for multi-mode fiber apply to single-mode fiber connectors. Follow the steps listed in Section 3.2.2 above.

3.2.5 Power Budget Calculations for P62-Series Fiber Media

Receiver Sensitivity and Transmitter Power are the parameters necessary to compute the power budget. To calculate the power budget of different fiber media installations using Magnum products, the following equations should be used:

OPB (Optical Power Budget) = P_T(min) - P_R(min)

where P_T = Transmitter Output Power, and P_R = Receiver Sensitivity

Worst case OPB = OPB - 1dB(for LED aging) - 1dB(for insertion loss)

Worst case distance = {Worst case OPB, in dB} / [Cable Loss, in dB/Km]

where the "Cable Loss" for 62.5/125 and 50/125μm (m.m.) is 2.8 dB/km,
and the "Cable Loss" for 100/140 (Multi-mode) is 3.3 dB/km,
and the "Cable Loss" for 9/125 (Single-mode) is 0.5 dB/km

The following data has been collected from component manufacturer's (HP's and Siemens') web sites and catalogs to provide guidance to network designers and installers.

Fiber Port Module	Speed, Std.	Mode	Std. km fdx (hdx)	Wave-length nm	Cable Size μm	X'mitr Output P_T, dB	R'cvr Sens. P_R,dB	Worst OPB, dB	Worst* distance Km, fdx	typical OPB, dB	typical* distance Km, fdx
P62-xMSC	**100Mb FX**	Multi-mode	2 (0.4)	1300	62.5/125	-20	-31	9.0	2.5	14	5
					50/125	-23.5	-31	5.5	2.0	12	4
P62-xSSC	**100Mb FX**	Single-mode	20 (0.4)	1300	9/125	-15	-31	14	28	17.5	35
"Long Reach"	**100Mb FX**	Single-mode	40 (0.4)	1300	9/125	-5	-34	27	54	32.5	65

***Note:** The use of either multi-mode or single-mode fiber to operate at 100Mbps speed over long distances (i.e., over approx. 400 meters) can be achieved **only** if the following factors are both applied:*

- *The 100Mb fiber segment must operate in full-duplex (FDX) mode, and*
- *The worst-case OPB of the fiber link must be greater than the fiber cable's passive Attenuation.*

(Attenuation = Cable loss + LED aging loss + Insertion loss + safety factor)

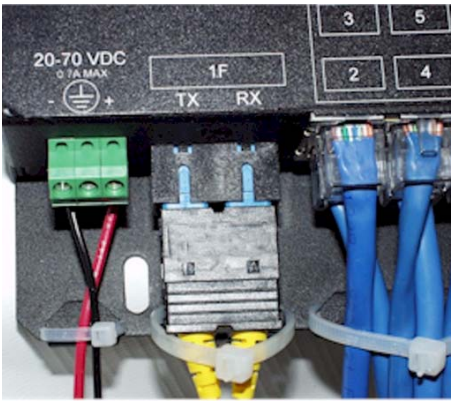
3.2.6 Connections to NICs which support Auto-Negotiation, RJ-45 ports

The copper ports of Magnum P62-Series Hardened Switches will function properly with NICs (Network Interface Cards) which support Auto-Negotiation, and the Fast Link Pulse (FLP) coding for the 100BASE-TX signaling system. When connecting a NIC to a P62, it may be necessary to reload the NIC drivers on the user device if the NIC has been communicating with a protocol other than 100BASE-TX (such as 10BASE-T). When 100Mb speed is agreed and in use, the 10/100 LED is steady ON. It is OFF if there is no traffic or if 10 Mbps traffic.

3.3 Powering the Magnum P62-Series Hardened Switch

3.3.1 Power P62F and mP62 models, for –48V and 24V DC pwr input

Each Magnum Model P62-Series Hardened Switch requires a DC power source, from 20-60VDC. The wide range of power input qualifies this product for use both in 24VDC as well as -48VDC environments. The 24VDC or -48VDC power input provides an Ethernet networking product utilizing a special type of power supply with a proven high-reliability record.



DC Power Terminals: "+", "**–**", internally floating
GND: Terminal for "earth" or ground wire connection to the P62 chassis
Input Voltage: 20 to 60 VDC
Input current: 0.7 amp max.

Power Consumption: 10 watts typical

P62 -48V, 24VDC INSTALLATION

This section describes the proper connection of the -48VDC leads (or 24VDC leads) to the DC power terminal block on the Magnum P62 Switch (as shown in Figure above)

The DC terminal block on the Magnum P62-Series Hardened Switch is located on the left front of the unit and is equipped with three (3) screw-down lead posts. The power terminals are identified as positive (+) and negative (-), and they are floating inside the unit so that either may be grounded by the user if desired. The chassis is "earth" or ground (GND).

The connection procedure is straightforward. Simply insert the DC leads to the Switch's power terminals, positive (+) and negative (-) screws. The use of Ground (GND) is optional; it connects to the Switch chassis. Ensure that each lead is securely tightened.

NOTE: Always use a voltmeter to measure the voltage of the incoming power supply and figure out the +ve potential lead or -ve potential lead. The more +ve potential lead will connect to the post labeled "+ve" and the rest to the "-ve". The GND can be hooked up at the last.

When power is applied, the green PWR LED will illuminate.

UL Requirements

The following must be adhered to in order to conform to UL requirements:

1. *Minimum 18 AWG cable for connection to a Centralized DC power source.*
2. *Minimum 14 AWG cable for connection to earthing wiring.*
3. *Use only with Listed 10 A circuit breaker provided in building installation.*
4. *"Complies with FDA radiation performance standards, 21 CFR subchapter J." or equivalent.*
5. *Fastening torque of the lugs on the terminal block: 9 inch pound max.*

a) *Centralized DC Power Source cable securement, use at least four cable ties to secure the cable to the rack at least 4 inches apart with the first one located within 6 inches of the terminal block.*

3.3.2 Power the P62-5V models w/Ext AC Power Supply (PSX-A)

The rugged Magnum P62-5V Hardened Switch, mainly used in "outdoor" Ethernet applications at extended temperatures, also supports universal AC power input from 85-275 vac 50-60Hz through a separate Power Source unit, the PSX-A. The wide range of AC power input qualifies this product for use worldwide, in almost any temperature environment. The AC power source (PSX-A) provides a rugged power supply enclosed in a metal case that also acts as a heat sink, enabling extended application temperatures to be accommodated. The PSX-A also includes surge protection to withstand AC power input upsets, such as might result from nearby lightening strikes. Shock and vibration characteristics enable use in transportation applications such as road-side boxes for traffic control. The DC power output cord comes with a military-style screw-lock female plug for secure attachment to the P62-5V Switch.

Input Voltage: 85-264 VAC, 47-63HZ, Auto-ranging
AC Power Connector: IEC-type, male recessed
Wiring Pin out (P62F-5V) Power Adaptor:
Pin 1 → +ve voltage (white wire in the cable)
Pin 2 → -ve voltage (black wire in the cable)
Pin 3 → chassis ground (green wire in the cable)

Pin 4 → not used

Power Output : 5VDC, 3Amps max

Input Fuse for overload and short protection: 3AG type, 0.5 Amp; spare is included

Power Capacity: 15 watts output, 70% min efficiency

Surge Protection: over 150 joules, with clamping at 800V 50A min.

Operating Shock and Vibration: meets Bellcore GR-63-CORE Sections 4.4.1 and 4.4.3

NOTE : For best results at high-temperature, fasten the metal case of the PSX-A unit to be in contact with a vertical surface (such as pedestal) that has good heat conducting properties. Remove rubber "feet", if present, to enhance metal-to-metal contact and provide the best heat transfer away from the PSX-A unit.

3.3.3 Power the P62-5V w/DC Pwr Supply (PSX-T) at 125/250 VDC

The rugged Magnum P62-5V Hardened Switch also supports 125V/250 VDC power through a separate Power Source unit, the PSX-T. The wide range of AC power input qualifies this product for use worldwide, in almost any temperature environment. The 125/250 VDC power source (PSX-T) provides a rugged power supply enclosed in a metal case that also acts as a heat sink, enabling extended temperatures to be accommodated. The PSX-T also includes reverse-polarity protection to prevent damage in case the unit is accidentally hooked up backwards. The DC power output cord comes with a military-style screw-lock female plug for secure attachment to the P62-5V Hardened Switch.

DC Power Terminals: "+", "**–**", internally floating **GND** terminal for "earth" or ground wire connection to the PSX-T chassis
Input Voltage: 100 to 275VDC
Power Output : 5VDC, 3Amps
Input Fuse: 3AG type, 0.5 Amp; spare is included
Power Capacity: 15 watts output, 70% min efficiency
Operating Shock and Vibration: meets Bellcore GR-63-CORE Sections 4.4.1 and 4.4.3

PSX-T INSTALLATION

This section describes the proper connection of the -125V/250 VDC leads to the –125/250 VDC power terminal block on the PSX-T Power Source (as shown in Figure above) The –125/250 VDC terminal block on the External PSX-T is located on the left side of the unit and is equipped with three (3) screw-down lead posts, covered by a removable safety shield or cover. The power terminals are identified as positive (+) and negative (-), and they are floating inside the unit so that either may be grounded by the user. The chassis is "earth" or ground (GND).

The connection procedure is straightforward. Simply insert the DC leads to the PSX-T's power terminals, positive (+) and negative (-) screws. The use of Ground (GND) is optional; it

connects to the PSX-T chassis. Ensure that each lead is securely tightened, then replace safety shield. When power is applied, the green PWR LED will illuminate

NOTE (1): Always use a voltmeter to measure the voltage of the incoming power supply and figure out the +ve potential lead or -ve potential lead. The more +ve potential lead will connect to the post labeled "+ve" and the rest to the "-ve".
The GND can be hooked up at the last.
NOTE (2): For best results at high-temperature, fasten the metal case of the PSX unit to be in contact with a vertical surface (such as pedestal) that has good heat conducting properties. Remove rubber "feet", if present, to enhance metal-to-metal contact and provide the best heat transfer away from the PSX unit.

UL Requirements

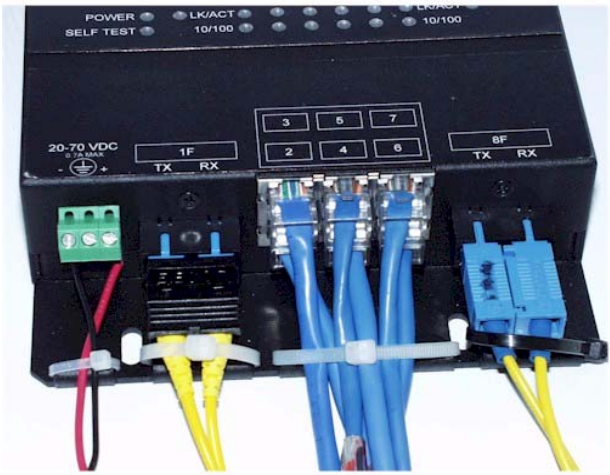
The following must be adhered to in order to conform to UL requirements:

6. *Minimum 18 AWG cable for connection to a Centralized DC power source.*
7. *Minimum 14 AWG cable for connection to earthing wiring.*
8. *Use only with Listed 10 A circuit breaker provided in building installation.*
9. *"Complies with FDA radiation performance standards, 21 CFR subchapter J." or equivalent.*
10. *Fastening torque of the lugs on the terminal block: 9 inch pound max.*

Centralized DC Power Source cable securement, use at least four cable ties to secure the cable to the rack at least 4 inches apart with the first one located within 6 inches of the terminal block.

3.4 Cable Strain Relief Feature on all P62-Series models

The Magnum P62-Series Hardened Switches are designed to use in extended temperature environments, which qualifying them to be used in roadside traffic data collection and control stations, above-the-ceiling locations in commercial buildings, etc. They are usually mounted vertically so that the cables hang out the bottom. There is a cable strain relief feature provided as part of the package design



The Magnum P62-Series Hardened Switches have a tie wrap holder as part of the base plate of the unit for cable strain relief. The strain-relief feature is applicable to power cables as well as to Ethernet cables, both twisted-pair copper and fiber. Cable tie-wraps can secure the cables and can be

attached to the base plate HOOK provided at the bottom-front of the unit. In the event that the attached cable is pulled, the tie-wrap cable strain relief feature protects the cable connection from coming loose. This feature provides a more reliable and robust installation and operation.

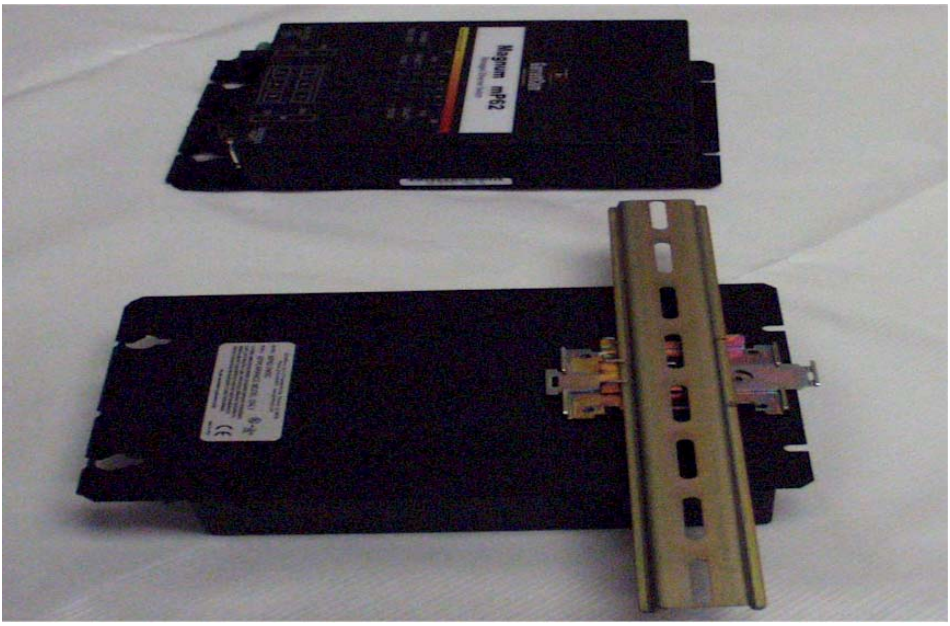
The figure above of a P62F model illustrates the strain-relief feature, using tie-wraps.

3.5 DIN-Rail mounting option for P62-Series

The Magnum P62-Series Ethernet "Outdoor" Switches are designed to operate in extended temperature applications and are suitable for use in environments with inhospitable high / low temperatures. In order to mount the P62-Series on a flat panel or wall, see Section 3.1.2 above. In order to mount the P62-Series on a DIN-RAIL track, order the optional bracket Model # DIN-RAIL-P62 and use the DIN-Rail mounting bracket procedure as illustrated in the picture below. See also the GarrettCom web site at **http://garrettcom.com/dinrail.htm**.

Because of the hardened steel enclosure of the P62–Series, it is heavy (3.5 lb. or 1.6 kg.) and it needs a robust DIN-Rail bracket and proper care while mounting. The Model # DIN-RAIL-P62 mounting bracket has a latch for clip-on attachment and will grasp the DIN RAIL track strongly. If you are using the External AC Power Supply Model PSX, order one of the Model # DIN-RAIL-P62 mounting brackets for it also, and mount it on the DIN-Rail beside of the P62-Series base unit. Because the P62-Series are closed boxes, dist and dirt in the area are OK.

The DIN-Rail option allows the P62-Series to easily mount on a DIN-Rail track on a wall or in a metal enclosure for Industrial or extended temperature applications. The DIN-Rail kits are optional and need to be ordered as separate items, e.g Model # DIN-RAIL-P62.



4.0 OPERATION

This section describes the function and operation of the Magnum P62-Series Switches.

4.1 Dual-Speed Functionality, and Switching

The Magnum P62-Series Hardened Switch provide six 10/100 RJ-45 switched ports, and two 100Mb fiber ports. The architecture supports a dual speed switching environment, with two built-in full-duplex "future-proof" fiber ports. The six RJ-45 copper ports equipped with auto-negotiation capability.

The switched RJ-45 ports are full / half duplex and auto-sensing for speed. (See section 2.2). When the connected device is 10 Mbps, P62s obey all the rules of 10 Mbps Ethernet configurations. The 10 Mbps users share a 10 Mbps traffic domain, and can "communicate with" 100Mbps users as well as 100Mbps domain. Similarly, the 100Mbps traffic obeys the rules of 100Mbps Ethernet, and can communicate with 10Mb domain too.

All Magnum P62 units are plug-and-play devices. There is no software configuration to be done at installation or for maintenance. The Half / full duplex mode for the RJ-45 switched RJ-45 ports is user dependent and changes (by auto-negotiation) to full or half duplex as the unit attached with these ports. The internal functions of P62-Series Switch is described below.

Switching, Filtering and Forwarding

Each time a packet arrives on one of the switched ports, the decision is taken to either filter or to forward the packet. Packets whose source and destination addresses on the same port segment will be filtered, constraining them to one port and relieving the rest of the network from processing them. A packet whose destination address is on another port segment will be forwarded to the appropriate port, and will not be sent to the other ports where it is not needed. Packets needed for maintaining the operation of the network (such as occasional multi-cast packets) are forwarded to all ports.

The Magnum P62-Series Hardened Switch operate in the store-and-forward switching mode, which eliminates bad packets and enables peak performance to be achieved when there is heavy traffic on the network.

Switching, Address Learning

The Magnum P62-Series units have an address table capacity of 4K node addresses, and are suitable for use in large networks. They are self-learning, so that as nodes are added or removed or moved from one segment to another, the P62-Series automatically keeps up with node locations.

An address-aging algorithm causes least-used addresses to fall out in favor of new frequently-used addresses. To reset the address buffer, cycle power down-and-up.

4.2 Auto-negotiation and Speed-sensing

All six RJ-45 ports independently support auto-negotiation for speed in 10BASE-T and 100BASE-TX modes. Operation is according to the IEEE 802.3u standard.

When a RJ-45 cable connection is made, and each time a LINK is enabled, auto-negotiation takes place. The P62-Series advertises its capability for 10 or 100 Mbps speed, and the device at the other end of the cable should similarly advertise / respond and both sides will agree to the speed being used. Depending upon the device connected, this will result in agreement to operate at either 10 Mbps or 100Mbps speed.

When the '**LK/ACT'** LED is ON, steady ON indicates LINK with no traffic, blinking ON indicates the port is transmitting / receiving. The port has auto-negotiated for operation. (If a P62s RJ-45port is connected to a non-negotiating device, it will default to 10 Mbps speed and half-duplex mode, per the IEEE 802.3u standard).

4.3 LED's for P62-Series Hardened Switch

POWER: Illuminates GREEN, steady on when power applied.

SELF TEST: Indicates the self-test at power up was not successful.

F/H: ON = Full-Duplex and Link, OFF = Half-Duplex and / or no Link.

LK/ACT: Per port, steady ON for LINK with no traffic, blinking indicates port is transmitting and receiving.

10/100: Per port, ON = 100Mbps; OFF = 10 Mbps (when LINK is made).

4.4 Auto-Cross (MDIX) Auto-negotiation and Speed-sensing (on mp62 model only)

The RJ-45 ports on managed mp62 support auto-cross (MDI or MDIX) in the auto-negotiation mode according to the IEEE 802.3u standard. No crossover cables are needed when connecting the 10/100 copper port of mp62's to other unmanaged switches, legacy hubs, managed switches, media-converters etc. Please note that there can be conditions with managed switches where the switch manager fixes the port settings via software, and the result of the auto-negotiation is changed in the managed switch by the manager commands. In such cases, the 10/100 speed or the F/H mode may be affected, but auto-cross in themp62 Switches will still work. The auto-cross function can be disabled through software.

When an RJ-45 cable connection is made, and each time LINK is enabled, auto-negotiation takes place (except for legacy products, which do not have auto-negotiation and which go to the default state accordingly). The Magnum Switch advertises its capability for 10 or 100 Mbps speed and F/H duplex mode, and the device at the other end of the cable should similarly advertise / respond. Both sides will agree to the speed and mode to be used per the IEEE 802.3u standard. Depending upon the devices connected, this will result in agreement to operate at either 10 Mbps or 100Mbps speed, and full- or half-duplex mode.

5.0 TROUBLESHOOTING

All Magnum Ethernet products are designed to provide reliability and consistently high performance in all network environments. The installation Magnum P62-Series Hardened Switch is a straightforward procedure (see INSTALLATION, Section 3); the operation is also straightforward and is discussed in Section 4.

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 P62-Series Hardened Switch is not performing as expected, do not attempt to repair the unit; instead contact your supplier for assistance or contact GarrettCom 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 the applicable chapter 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. (About 90% of network downtime can be attributed to wiring and connector problems.)
3. Make sure that an AC power cord is properly attached to each Magnum P62-Series Hardened Switch unit. Be certain that each AC power cord is plugged into a functioning electrical outlet. Use the PWR LEDs to verify each unit is receiving power.
4. If the problem is isolated to a network device other than the Magnum P62-Series Hardened Switch product, it is recommended that the problem device is 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 Magnum P62-Series Hardened Switch and its associated cables are functioning properly.
5. If the problem continues after completing Step 4 above, contact your supplier of the Magnum P62-Series Hardened Switch unit or if unknown, contact GarrettCom, Inc. by fax, phone or email (*support@garrettcom.com*) 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 GarrettCom 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, please use this URL - https://rma.garrettcom.com/rma/rma_request_noaccount.php **to fill out the form. 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 (or Invoice Number)
Packing List Number (or Sales Order Number)
Date of installation
Failure symptoms, including a full description of the problem.

GarrettCom 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 GarrettCom, the unit will be returned as:

No Problem Found.

GarrettCom 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 GarrettCom, 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. GarrettCom is not responsible for your return shipping charges.
4. Ship the package to:

GarrettCom, Inc.

47823 Westinghouse Dr.

Fremont, CA 94539-7437

Attn.: Customer Service

APPENDIX A: WARRANTY INFORMATION

GarrettCom, Inc. 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 GarrettCom.

During this warranty period, GarrettCom 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 GarrettCom.

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

GarrettCom 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 GarrettCom within two weeks of your purchase.