

Hyperlink WaveLAN

Extended Range Wireless LAN Kit

Featuring Lucent Technologies WaveLAN Technology

Installation Manual

NOTE: The antenna system shall be installed ONLY by experienced antenna installers who are familiar with local building and safety codes, and wherever necessary have been licensed by appropriate government regulatory bodies. Failure to do so may void the Product Warranty, as well as expose the end-user to legal and/or financial liabilities. Hyperlink Technologies, its agents, resellers or distributors, are not liable for injury, damage, or violation of government regulations that may arise from failing to comply with the guidelines described in this document.

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Disclaimer: The diagrams used in this manual are for illustrative purposes only. They should not be confused with the PC card operating in standalone mode. When these diagrams are used the PC card transceiver will be installed in conjunction with the specific DC Injector/Lightning Protector, Amplifier, cables and antennas listed in this manual.

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USA- Federal Communications Commission (FCC)

Interference Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Information to the user

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the instructions, it may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the distance between the equipment and the receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Any changes or modifications of equipment not expressly approved by the manufacturer could void the user's authority to operate the equipment and the company's warranty.

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Caution: Exposure to Radio Frequency Radiation.

The radiated output power of this product is below the FCC radio exposure limits. Nevertheless, this product shall be used in such a manner that the potential for human contact during normal operation is minimized.

Antenna shall be mounted in such a manner as to minimize the potential for human contact during normal operation. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna shall not be less than 20 cm (8 inches) during normal operation.

Hyperlink Technologies is not responsible for any radio or television interference caused by unauthorized modification of this device or the substitution or attachment of connecting cables and equipment other than specified by Hyperlink Technologies. The correction of interference caused by such unauthorized modification, substitution or attachment will be the responsibility of the user.

Antenna Type	Specified Antenna Gain (dBi)	Maximum Output Power at Antenna Terminal (dBm)	Total EIRP (dBm)	Minimum RF Exposure Separation Distance (cm)
HG2408P	7.5	24	31.5	10.6
HG2408U	8.0	24	32.0	11.2
HG2412P	12.0	20	32.2	11.5
HG2415Y	14.5	20	34.7	15.3
HG2415U	15.0	20	35.2	16.2
HG2415G	15.0	20	35.2	16.2
HG2419G	19.0	17	36.0	17.8
HG2424G	23.5	11	35.1	16.0

WARNING: It is the responsibility of the professional installer to ensure that when using the outdoor antenna kits in the United States (or where the FCC rules apply), only these antenna configurations shown in the table above and which are described in this document are used. The use of any other than those listed is expressly forbidden in accordance to FCC rules CFR47 part 15.204.

Introduction

The Hyperlink Extended Range Wireless LAN Kit is a direct sequence spread spectrum wireless transceiver providing 11 Mbit/sec data rate to support wireless connections in an IEEE 802.3 LAN. Equipped with a Hyperlink Extended Range Amplified Antenna System, this product offers a high-performance long-range building-to-building wireless networking solution.

This kit incorporates Lucent Technologies WaveLAN technology. WaveLAN uses a state-of-the-art direct sequence spread spectrum technology to implement robust 11 Mbps transmission, and offers true "Plug and Play" installation.

System Features:

This system has the following features:

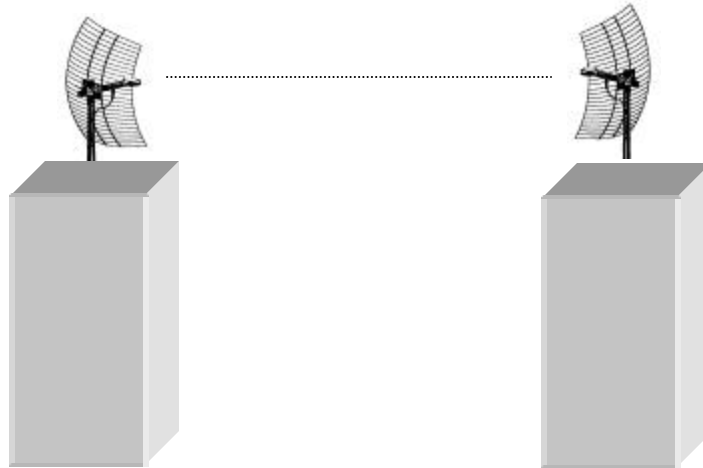
- IEEE 802.11 Compatibility.
- Wireless 11 Mbps data rate.
- State-of-the-art spread spectrum technology provides reliable, secure, long range, radio link operation.
- True "Plug and Play" installation for compatibility with all 802.3 and Ethernet II LAN devices, all operating systems and all protocol stacks.
- PCMCIA Form Factor
- User-selectable channels of operation.
- Remote mounted bi-directional amplifier to optimize transmit power and eliminate the effects of system cable losses.
- Limited 2 year Warranty.

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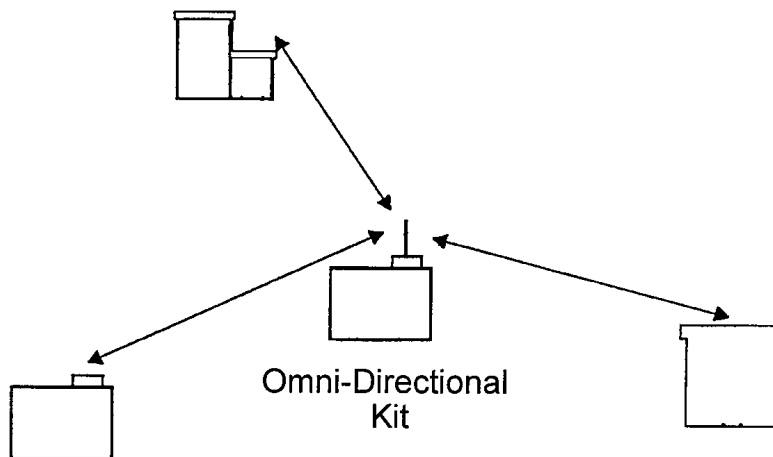
Types of Installations

The type of application will determine which type of kit to install:

Building-to-Building or Tower-to-Tower: Typically these installations will typically require directional Yagi, Panel or Grid Antenna kits.



Central Node in a Multipoint Network or Mobile Network: This type of installation typically requires an Omni Directional Kit at the central node for 360 degree coverage.



System Requirements

The WaveLAN/HyperGain™ Amplified Extended Range Bridge Kit provides a complete plug-and-play solution for linking buildings in an outdoor environment. The PC card included can be installed in any one of the following devices:

Lucent Orinoco Central or Remote Office Router Processor

KarlNet Central or Satellite Router Processor

Other compatible PC, Router, or Bridge Processor equipped with a PC Card slot

Besides one of the host processors above, all you need to add is suitable masts or towers and some basic site planning. Please read this manual in its entirety before beginning the installation.

Kit Contents:

Each Kit contains the following items:

- WaveLAN/Orinoco Turbo 11 Mbit IEEE 802.11 PC Card
- HyperAmp Remote Mounted Amplifier
- HyperGain Antenna (Omni, Yagi, Panel or Grid)
- HyperGain DC Power Injector/Lightning Protector
- 50 ft. Antenna Cable
- 0.5 meter Jumper Cable
- Mounting Hardware
- Manual

Tools Required:

- Assorted open-end or adjustable wrenches
- #12-10 AWG or similar wire (for grounding)
- Wire cutter / stripper
- Pliers

Other Required Equipment:

- Suitable mast or tower hardware

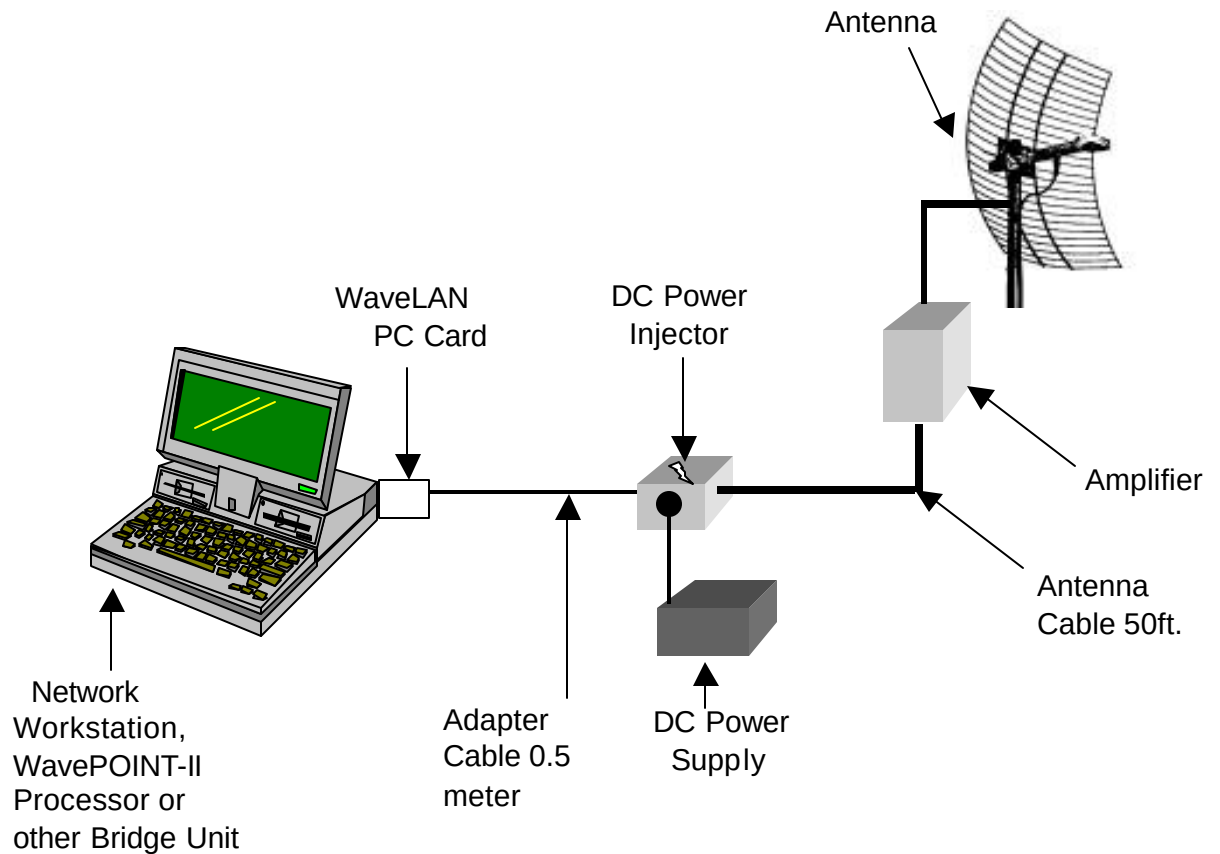
Other Helpful Equipment and Tools:

- Cellular telephones or Walkie-talkies
- Binoculars
- Compass
- Handheld GPS

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Overall System Configuration

The overall system configuration is shown below. Refer to this diagram while reading the section which follows, and during system installation.



ANTENNA SYSTEM CONNECTION

NOTE: THE ANTENNA SYSTEM SHALL BE INSTALLED ONLY BY EXPERIENCED ANTENNA INSTALLERS WHO ARE FAMILIAR WITH LOCAL BUILDING AND SAFETY CODES, AND WHEREVER NECESSARY HAVE BEEN LICENSED BY APPROPRIATE GOVERNMENT REGULATORY BODIES. FAILURE TO DO SO MAY VOID THE PRODUCT WARRANTY, AS WELL AS EXPOSE THE END-USER TO LEGAL AND/OR FINANCIAL LIABILITIES. HYPERLINK TECHNOLOGIES, ITS AGENTS, RESELLERS OR DISTRIBUTORS, ARE NOT LIABLE FOR INJURY, DAMAGE, OR VIOLATION OF GOVERNMENT REGULATIONS THAT MAY ARISE FROM FAILING TO COMPLY WITH THE GUIDELINES DESCRIBED IN THIS DOCUMENT.

Surveying the Antenna Site

Before beginning system installation, emphasis should be placed on system planning. It is important that no large obstructions exist near the antenna, such as retaining walls, chimneys, air-conditioning units or other antenna masts. These types of objects can have an impact on the antenna system performance.

Plan to mount the antenna as high as possible. You will need enough mast to elevate the antenna approximately 10-15 feet above the roof or above any obstruction that might be in the antenna's signal path.

You will need to identify the location where the antenna cable will be routed. If you run the antenna cable through the roof, a water-proof fitting will be required. Consult a building contractor or licensed electrician to help you with the routing if necessary. Take note of the length of the mast you will need and the type of mounting hardware required. The amplified antenna kit is shipped with U-Bolt mounting hardware which should be ideal for mounting the antenna and amplifier to most types of mast. Also, make plans on how you are going to talk to the person at the remote antenna while you are going through the antenna alignment procedure. For example, cellular phones or walkie-talkies can be used.

Preparing for System Installation

Warning: These antennas are designed to be mounted in open areas such as rooftops or building exterior walls. They are designed to be installed at least 6 feet away from areas occupied by people. During system operation, always keep the antenna at least 1 foot away from your head.

Warning: Before performing the following steps make certain that there are not any power lines within 50 ft. If the mast should fall, either while installing or during operation, contact with any power lines will be fatal or result in a fire.

The Antennas are designed to be mounted on an aluminum or steel mast with a diameter from 1-1/4 inches to 3 inches. A larger diameter mast would be suggested for a more durable installation. This system includes a 50 foot antenna cable.

In addition to the kit contents, you will need a ground wire and wire ties.

Installing the Amplifier Bracket for mast-mounting:



Install the right angle bracket as shown above using two (2) #10-24 screws and split lockwashers as shown. Note the orientation of the label relative to the 90 degree bend in the bracket. Proper positioning will ensure better visibility of the indicator LEDs when installed on the mast.

Connections and Features of the Amplifier

Receive Indicator LED:

This LED illuminates green in receive mode.

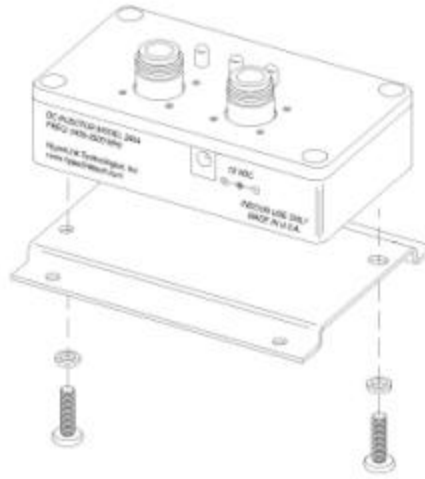
Power Indicator LED:

This LED illuminates red in transmit mode.

Radio Connection:

This connection attaches to the DC Power Injector via the antenna feed cable, and provides both signal and DC coupled power.

Installing the DC Injector Mounting Bracket:



Mounting and Cabling the Amplified Antenna System:

Note: Different model antenna kits have different mounting requirements and procedures. Refer to Appendix A in this manual for antenna mounting details.

1. Attach the mast mounting hardware to a solid structure on your building (e.g., the roof itself, concrete bulkhead, vent pipe).
2. Using the included mounting hardware, secure the antenna to the top section of the mast (see Appendix A for details) and similarly, install the amplifier directly beneath the antenna using the included V-bolts.
3. Attach one end of the 50 ft. cable to the connector labeled "TO DC INJECTOR" on the amplifier. Then connect the antenna to the connector labeled "TO ANTENNA" on the amplifier.
4. Apply sealant tape around the joined connectors to prevent corrosion from the weather. Wrap the entire connection, overlapping each layer slightly to ensure a weather-tight seal.
5. Ground the antenna by connecting a suitable ground cable between the antenna mounting bracket and the building ground.
6. Very carefully raise the mast and loosely secure it with the mast mounting hardware. Use the plastic wire ties to tie the antenna cable to the mast every six to twelve inches.
7. Aim the directional antenna in the direction of the building you will be linked to. The omni-directional antennas should be mounted vertically and do not need to be aimed as they radiate in a 360 degree pattern.
8. Tighten the mast mounting screws. Do not do anything that would make it difficult to change the position of the antenna. It may be necessary to reposition the antennas while aiming them.
9. Route the antenna cable along the roof to the point where it enters the building. From the inside, pull the cable through the hole and take up any excess slack.

10. The DC Power Injector and Power Supply must be installed indoors near the radio. The Injector unit can be wall-mounted using the included bracket if desired. Attach the end of the 50 ft. antenna cable to the "TO AMPLIFIER" connector on the DC Power Injector/Lightning Protector. Attach the 0.5 meter adapter cable between the DC Power Injector's "TO RADIO" connector and the WaveLAN card.
11. Attach a ground wire to the ground lug on the DC Power Injector/Lightning Protector and to a good building ground.
12. First, plug the 12 VDC power supply into the DC Power injector and then into the building's AC power. Never use a power supply other than the one shipped with the system as it may cause damage to the radio and/or amplifier. It is further recommended that the AC connections be made through a commercially available "surge" protector power strip.

Installing the PC Card

The method for installing the WaveLAN PC card depends upon the type of host processor used. Follow the basic hardware installation instructions which came with the host processor for installing PC cards.

When the PC card basic hardware installation is complete the card can be configured using the WaveLAN PC card configuration utilities software.

Channel Settings

The Hyperlink Extended Range WaveLAN System is approved for operation in seven (7) different operating frequency channels. These seven channels are a subset of the eleven standard IEEE 802.11 channels.

NOTE: This equipment is not authorized for and may not be operated on IEEE channels 1, 2, 10, and 11. If you wish to interoperate with other IEEE 802.11 WaveLAN-compatible equipment be sure to set that equipment to one of the seven channels (A-G) shown in the table below:

Channel	Corresponding IEEE 802.11 Channel	Channel Center Frequency
NOT USED	1	2412
NOT USED	2	2417
A	3	2422
B	4	2427
C	5	2432
D	6	2437
E	7	2442
F	8	2447
G	9	2452
NOT USED	10	2457
NOT USED	11	2462

Once the channel selection has been made proceed with Basic System Checks and Antenna Alignment procedures which follow.

Basic System Operational Checks

Using the system's diagnostic LEDs, some basic system checks can now be performed. When power is applied to the DC Injector the POWER and RECEIVE indicators should illuminate green. In addition, the POWER/RECEIVE indicator will illuminate green on the remote amplifier unit.

When the system is transmitting and receiving data the TRANSMIT to RECEIVE indicator LEDs flash on and off. The POWER LED remains constant.

Note that the LED indicators may be difficult to recognize in bright sunlight.

WaveLAN Antenna Alignment Diagnostics

While many short-haul links can be installed simply by performing a visual antenna alignment, in order to ensure that optimal antenna alignment is achieved it is recommended that the installer run the WaveLAN link diagnostic software. This is part of the WaveManager Client software which is included on the drivers disk. If you are not already familiar with the diagnostic utilities please refer to the WaveManager Client instructions for details.

Once optimal alignment has been achieved be sure to secure all cables, connections and mounting hardware.

Specifications

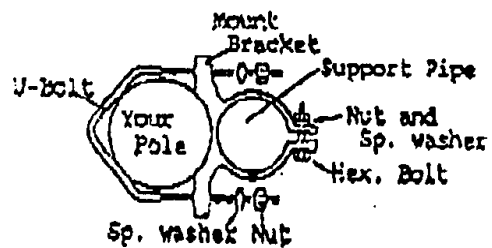
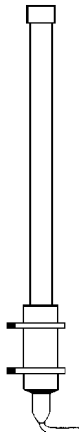
Frequency Range:	2400-2483.5 MHz ISM band
Operating Channel Center Frequencies	2422, 2427, 2432, 2437 2442, 2447, 2452
Modulation Type:	Direct Sequence Spread Spectrum
Communication Method:	Half Duplex
Channel Access Method:	CSMA/CA
Type of Interface:	PCMCIA
Operating Temperature:	0 ~ +40 C
Storage Temperature:	-20 ~ +60 C
Humidity:	0% ~ 90%

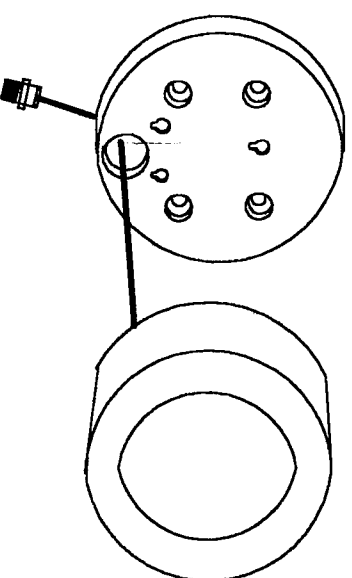
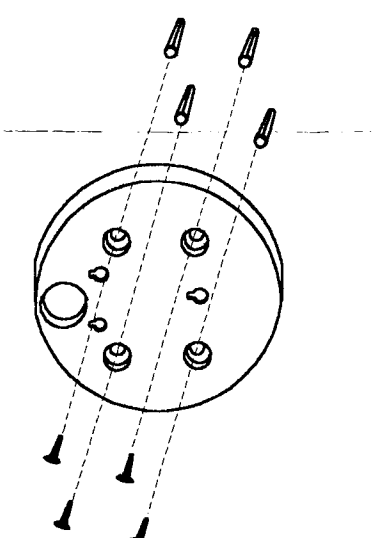
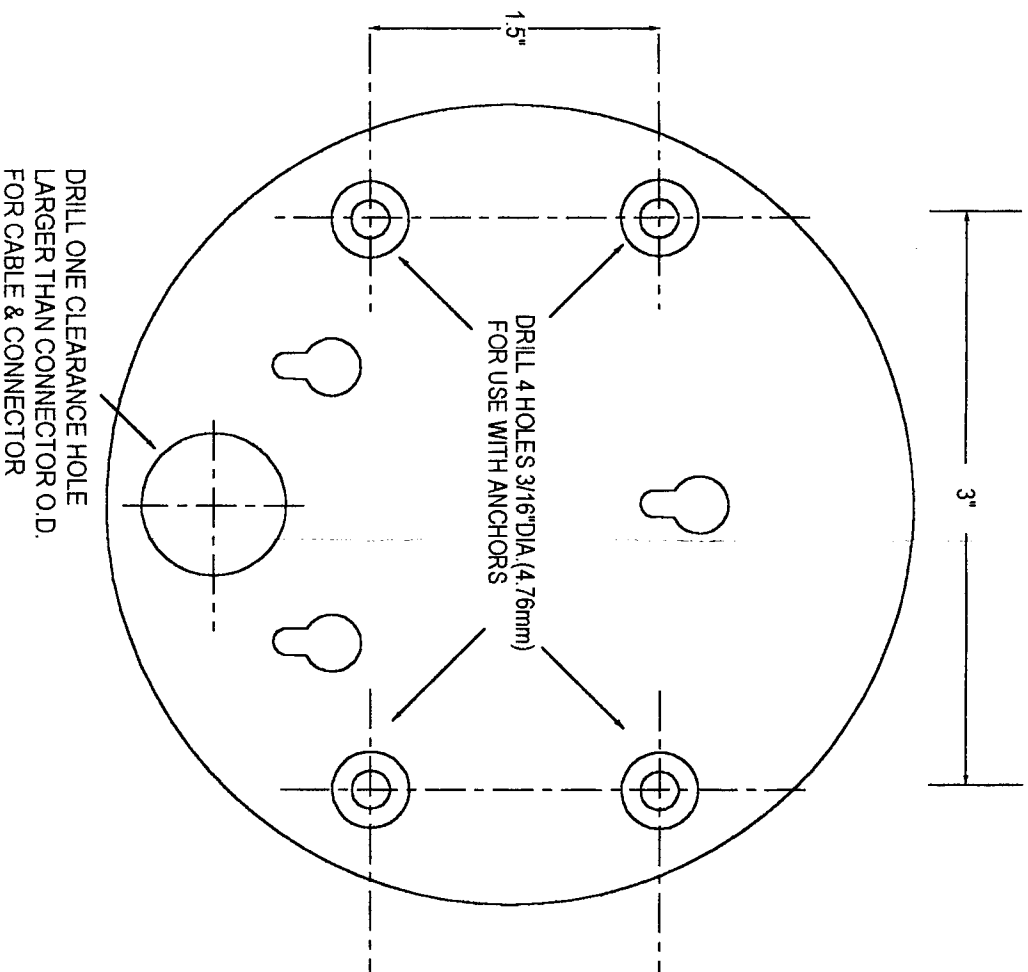
Appendix A

Antenna Mounting Instructions

Mounting Instructions - HG2408U Omnidirectional Antenna

The included bracket should be used to attach the antenna to a standard antenna mast or tower leg. Proper positioning of the brackets is shown in the following diagram. For best results, first attach the bracket to the tower or structure using the included V-bolt. Then, install the antenna into the bracket and lock in place with the integral bolt. Note that the bracket should only be tightened around the aluminum base, and not the fiberglass radome of the antenna.





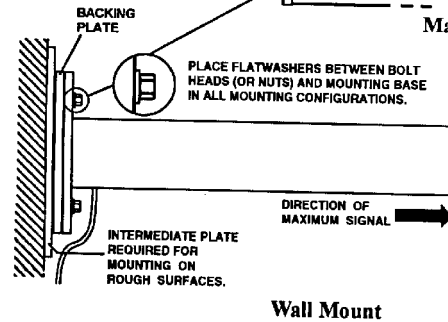
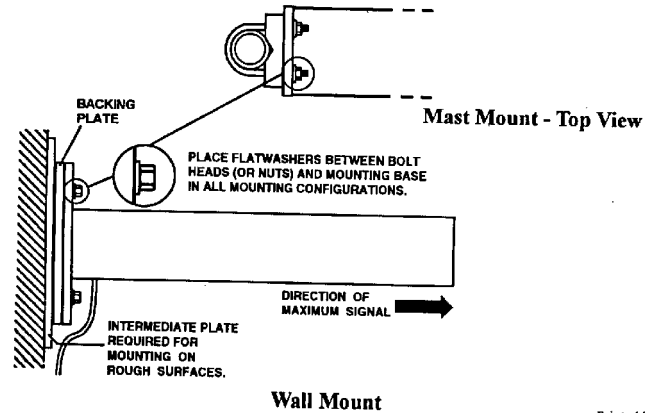
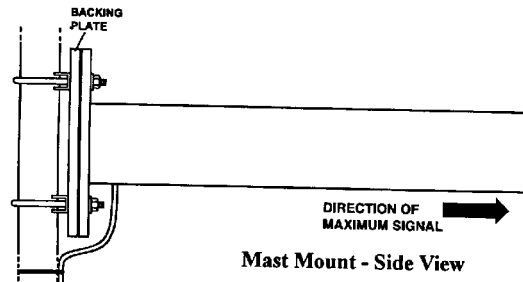
MOUNTING INSTRUCTIONS

1. DRILL FOUR MOUNTING HOLES & CLEARANCE HOLE FOR CABLE AND CONNECTOR.
2. MOUNT BACKPLATE WITH SCREWS AND ANCHORS.
3. MAKE CABLE CONNECTION THROUGH CLEARANCE HOLE
4. SLIDE ANTENNA HOUSING ON BACKPLATE

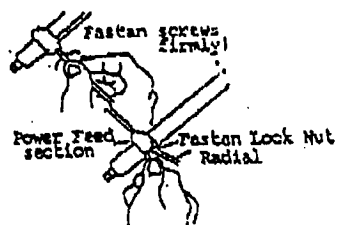
WALL MOUNT TEMPLATE

Mounting Instructions - HyperGain HG2415Y Radome Enclosed Yagi Antenna

The antenna can be mounted to a mast or directly to an exterior wall as shown. The included U-bolts should be used for mast mounting. Note that in either case, the metal backing plate should be placed directly behind the plastic flange in order to provide greater stability.



Mounting Instructions - HG2412U Omnidirectional Antenna



First install the 3 radials at the base of the antenna by screwing in by hand, and then tightening the lock nut with a wrench.

Mount the two mounting brackets to the Mount Support Pipe as shown. Then feed the antenna cable through the Mount Support Pipe and connect to the antenna. Use the included bolt and lock washer to fasten the Antenna to the Mount Support Pipe as shown.

Mount the assembled antenna vertically to the mast using the 2 included "V-bolts".

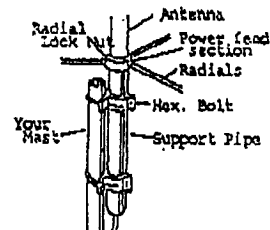
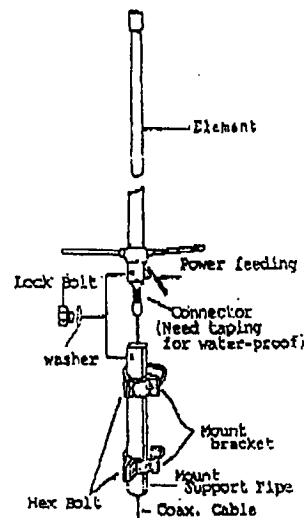
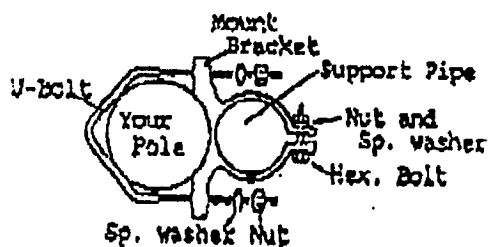


FIGURE MOUNT TO POLE
④ MONTAR AL MASTIL

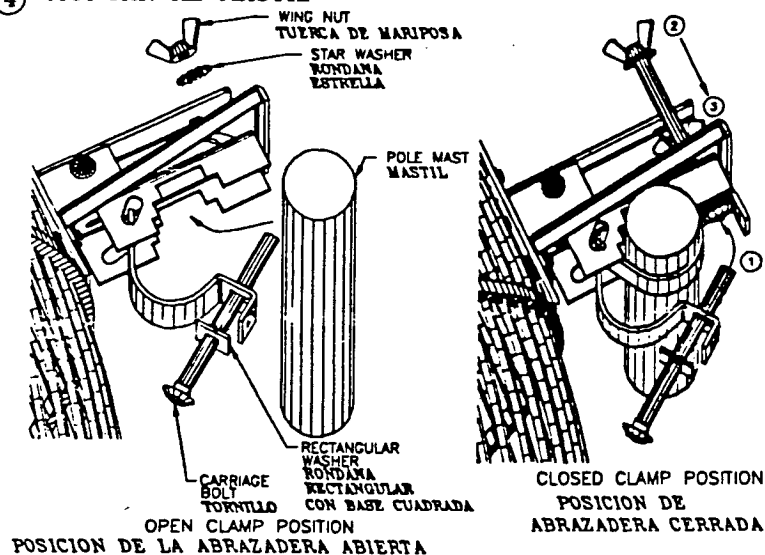
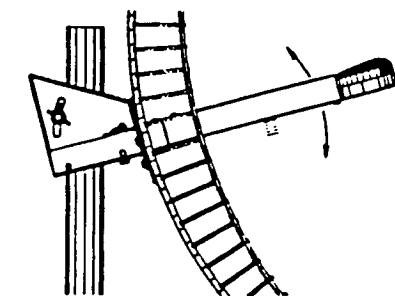
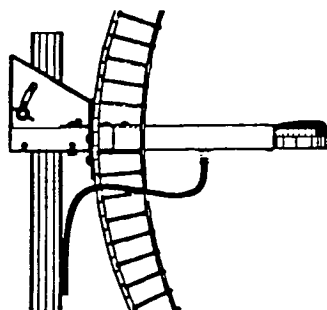


FIGURE
⑤ ANGLE ADJUSTMENT
AJUSTE DE ANGULO



PLACE ON POLE AND ADJUST FOR OPTIMUM PERFORMANCE
COLOQUE AL MASTIL Y AJUSTE PARA MAXIMA SENAL

FIGURE
⑥ CABLE ROUTING
GUIA DEL CABLE



**HyperLink
Technologies, INC.**

HyperGain™ Grid Antennas

HG2415G
HG2419G
HG2424GC

Installation Instructions

INSTALLATION STEPS PASOS PARA INSTALAR

1. DETERMINE THE REQUIRED ANTENNA/DIPOLE POLARITY, EITHER VERTICAL OR HORIZONTAL.
DETERMINE LA POLARIDAD REQUERIDA POR EL DIPOLO Y LA ANTENA.
YA SEA VERTICAL U HORIZONTAL.
2. ASSEMBLE THE REFLECTOR TO THE BRACKET IN EITHER THE VERTICAL OR HORIZONTAL DIRECTION (SEE FIGURE 1).
ARMAR EL REFLECTOR EN EL SOPORTE EN LA DIRECCION REQUERIDA.
VERTICAL U HORIZONTAL (REFERIRSE A LA FIGURA 1).
3. CONFIGURE DIPOLE (SEE FIGURE 2)
REMOVE ADAPTER/EXTENDER FOR 15dBi. USE AS SUPPLIED FOR 19dBi.
CONFIGURE EL DIPOLE (REFERIRSE A LA FIGURA 2)
QUITTE EL ADAPTADOR/EXTENSION PARA 16dBi. USE EL MISMO PARA 19dBi.
4. ATTACH THE DIPOLE TO THE BRACKET IN EITHER THE VERTICAL OR HORIZONTAL DIRECTION INSERTING THE SCREW INTO THE MOUNTING HOLE CLOSEST TO THE REFLECTOR (SEE FIGURE 3).
ARMAR EL DIPOLE AL SOPORTE EN POSICION VERTICAL U HORIZONTAL INSERTANDO EL TORNILLO DENTRO DEL HOLLO DE MONTAJE MAS CERCANO AL REFLECTOR (REFERIRSE A LA FIGURA 3).
5. ATTACH THE ASSEMBLED ANTENNA TO THE MAST POLE (SEE FIGURE 4).
ARMAR LA ANTENA ENSAMBLADA AL MASTIL (REFERIRSE A LA FIGURA 4).
6. ADJUST THE ANGLE OF THE ANTENNA FOR THE MAXIMUM SIGNAL STRENGTH, THEN TIGHTEN THE CLAMP (SEE FIGURE 5).
AJUSTE EL ANGULO DE LA ANTENA PARA MAXIMA SENAL Y APIRIETE LA ABRAZADERA (REFERIRSE A LA FIGURA 5).
7. ROUTE THE CABLE THROUGH THE ANTENNA, ATTACHING IT TO THE POLE (SEE FIGURE 6).
GUIE EL CABLE ATRAVES DE LA ANTENA, SUJETANDOLO AL MASTIL COMO SE MUESTRA EN LA FIGURA 6.

FIGURE FIGURA

① ATTACHING REFLECTOR TO MOUNTING BRACKET
ARMADO DEL SOPORTE EN EL REFLECTOR

HORIZONTAL
MOUNTING POSITION

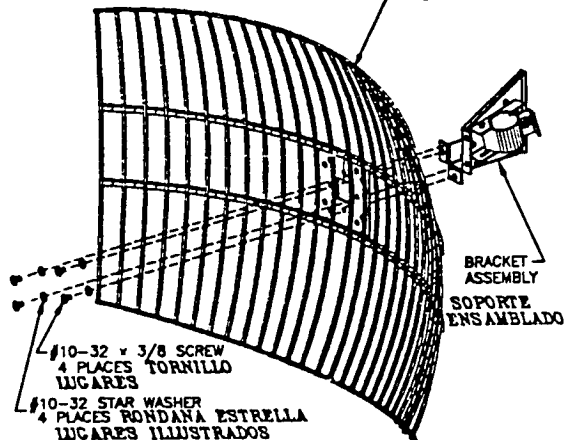
POSICION DE MONTAJE
HORIZONTAL

#10-32 x 3/8 SCREW
4 PLACES TORNILLO
LUGARES

#10-32 STAR WASHER
4 PLACES RONDANAS
LUGARES ILUSTRADOS

VERTICAL
MOUNTING POSITION

POSICION DE MONTAJE
VERTICAL



NOTE: MAKE SURE THE BRACKET IS MOUNTED IN THE CORRECTED POSITION, VERTICAL OR HORIZONTAL USE. REFER TO FIGURE 3 FOR ILLUSTRATION OF HORIZONTAL AND VERTICAL MOUNTING POSITION.
ASEGURAR QUE EL SOPORTE ESTA EN LA POSICION CORRECTA VERTICAL U HORIZONTAL VER FIGURA 3, PARA ILUSTRACION DE LA POSICION DE MONTAJE.

FIGURE FIGURA

② DIPOLE CONFIGURATION
CONFIGURACION DEL DIPOLE

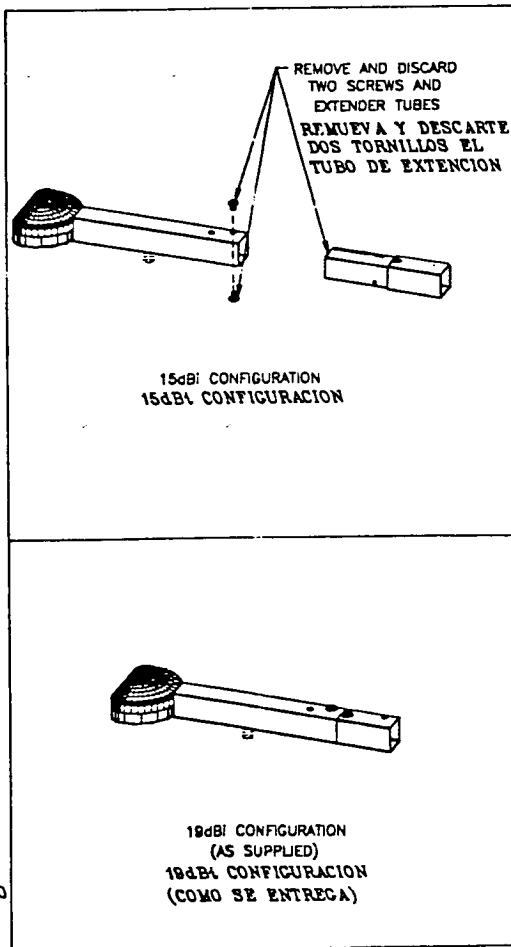


FIGURE FIGURA

③ INSTALLING DIPOLE TO REFLECTOR AND BRACKET
INSTALACION DEL DIPOLE AL REFLECTOR Y SOPORTE

HORIZONTAL
MOUNTING POSITION

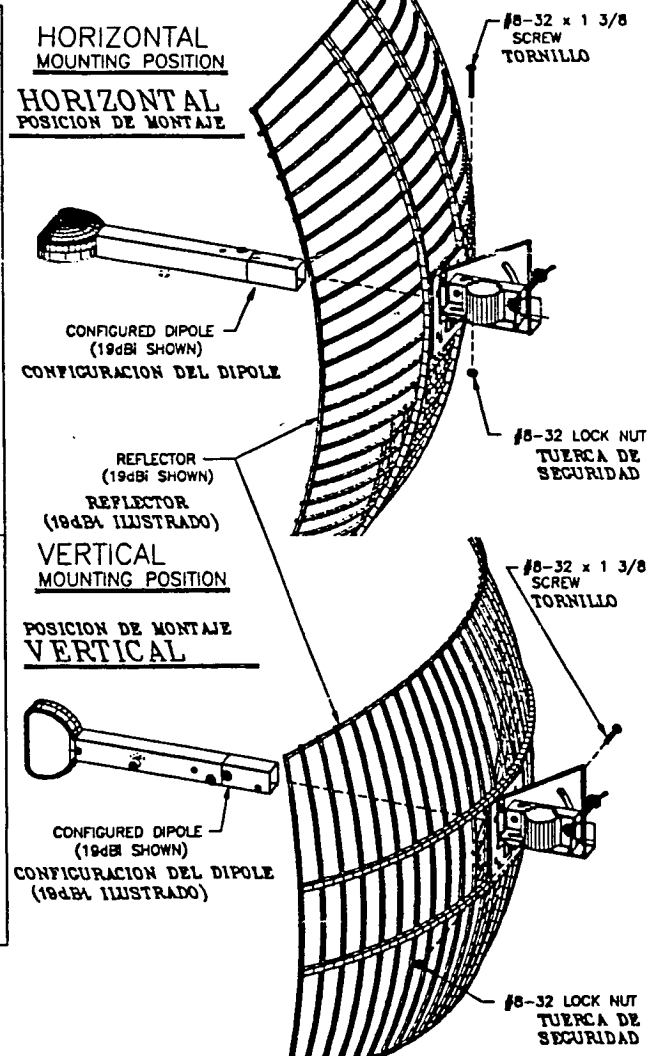
POSICION DE MONTAJE
HORIZONTAL

CONFIGURED DIPOLE
(19dBI SHOWN)
CONFIGURACION DEL DIPOLE

REFLECTOR
(19dBI SHOWN)
REFLECTOR
(19dBI ILUSTRADO)

VERTICAL
MOUNTING POSITION
POSICION DE MONTAJE
VERTICAL

CONFIGURED DIPOLE
(19dBI SHOWN)
CONFIGURACION DEL DIPOLE
(19dBI ILUSTRADO)



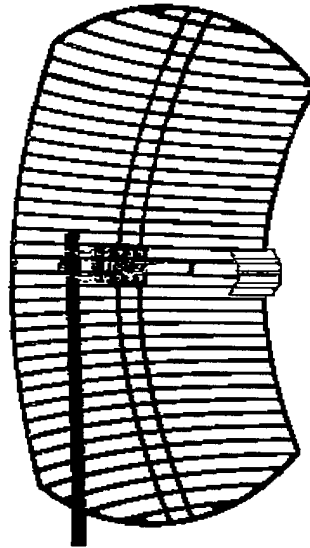
HyperGain™ HG2424G

2.4 GHz 24 dBi Reflector Grid Antenna

Installation Instructions

Antenna Components Included:

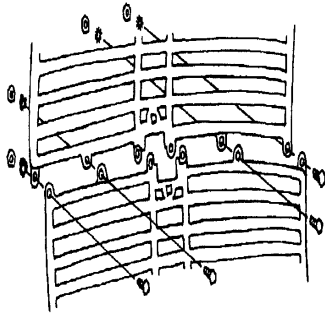
- (1) Antenna Feedhorn Assembly
- (1) Feed Reflector
- (1) #6 x 1/2" Screw
- (2) Grid section halves
- (2) Stainless Steel U-Bolts
- (2) Mast Clamps
- (1) Aluminum "L" Bracket
- (4) Lock Nuts
- (4) #8-32 Machine Screws
- (8) #1/4 x 20 Hex Nut
- (8) Lock Washer
- (4) Carriage Bolt
- (1) Flat Washer



HyperLink Technologies, Inc.
1201 Clint Moore Road
Boca Raton, FL 33487 USA
Tel: 561-995-2256 Fax: 561-995-2432
website: www.hyperlinktech.com
email: support@hyperlinktech.com

Antenna Assembly:

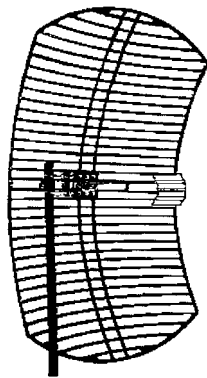
Assemble the two halves of the Reflector Grid using (4) #8-32 machine screws as shown.



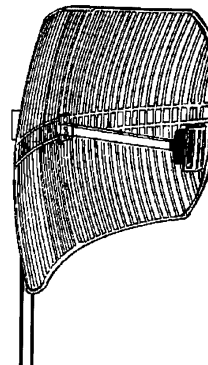
Install the Feed Reflector to the front of the Feedhorn using the #6 x 1/2" screw.



Determine the polarity which will be chosen for the antenna installation. The antenna can be installed either vertically or horizontally polarized. The two polarities are illustrated below:



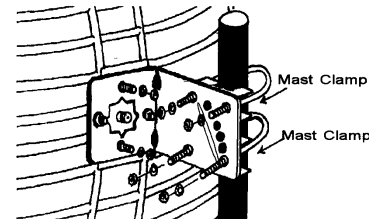
Horizontal Polarity



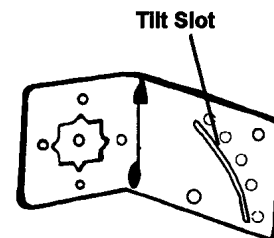
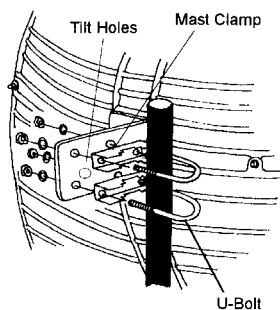
Vertical Polarity

Place the "L" bracket on the back of the grid assembly as shown, noting the orientation required for the desired polarity.

Attach the Feedhorn to the Grid Assembly using (2) carriage bolts, (2) lockwashers and (2) hex nuts.



Install the (2) mast clamps on the U-Bolts as shown and fasten to the "L" bracket using (4) lock washers and (4) 1/4 x 20 nuts. One of the U-Bolts may optionally be installed in the tilt slot rather than the fixed holes to allow for antenna tilting. In that case the flat washer is used to secure the antenna at the required elevation angle.

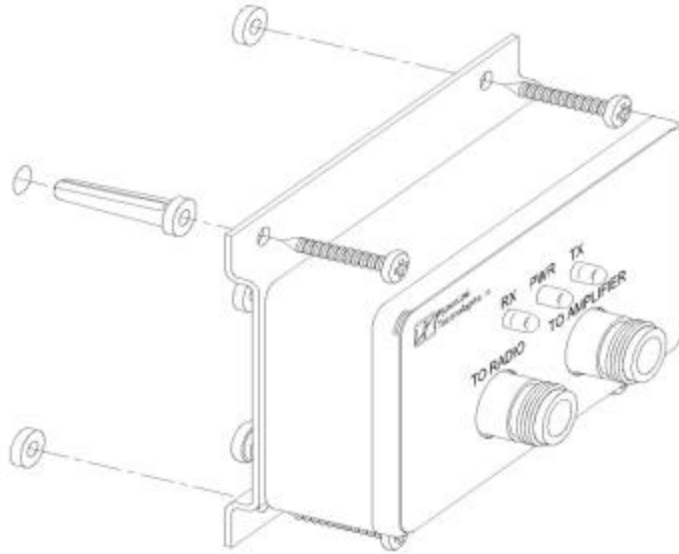


For technical support contact: support@hyperlinktech.com.

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DC Power Injector Wall Mounting

The DC Power Injector may be wall-mounted using the four #10 self-tapping screws and plastic mollies included in the kit:



Amplifier Mast Mounting

The Amplifier Unit should be mast-mounted as shown using the included stainless steel V-Bolt, washers and hex nuts and extruded aluminum bracket:

