

Hy-Gain VHB-246 Tri-Band Beam

INTRODUCTION

The Hy-Gain VHB-246 is a compact 6-meter and 144-148 MHz/420-450 MHz tri-band beam consisting of a 3-element 6-meter beam, and a separate interlaced 3-element 2-meter/5-element 70 cm antenna. The 2-meter/70-cm antenna is mounted at right angles to the 6-meter beam. This permits the antenna to be oriented for optimum 6-meter SSB/CW operation, and optimum 2-meter/70-cm FM operation. The VHB-246 is about the same size as a TV antenna, and can easily be turned by a lightweight rotator such as the Hy-Gain AR-35 or the digital AR-38.

The VHB-246 utilizes a single 50-ohm coax feed for the 6-meter antenna, and a single 50-ohm coax feed to cover both the 2-meter and 70 cm bands.

The VHB-246 is built-to-last – using 6063 T-6 aircraft strength aluminum tubing. And it assembles in less than an hour.

WARNING: Improper installation and assembly can be hazardous! Read these instructions thoroughly before attempting to assemble, install or operate this product! High power transmitting devices produce voltages that can cause severe burns or other injuries.

SPECIFICATIONS

Electrical Specifications

<u>Frequency</u>	<u>Power (watts)</u>		<u>Elements</u>	<u>Gain</u>	<u>F/B (dB)</u>
	<u>CW</u>	<u>SSB</u>			
144-148 MHz	500	500	3	8 dBi	17 dB
420-450 MHz	500	500	5	6 dBi	10 dB
50-54 Mhz	500	1000pep	3	8 dbi	22 dB

VSWR (at resonance)	Less than 1.5:1
Impedance	50 ohms
Stacking Distance (H Plane)	0.64 wavelength (12' 6")

Mechanical Specifications

Mast Size Required:	1-5/8" to 2-1/16" OD (41mm-52mm)
Boom Length	8'4" (3.6 m)
Boom Diameter:	1-1/4" OD (32 mm)
Longest Element	9'10" (3.2 m)
Turning Radius	12' (2.4 m)
Net Weight:	10 lbs (4.5 kg)
Surface Area:	1.3 sq ft (0.102 sg m)
Wind Load at 80 mph)	28.9 lbs (12.7 kg)
Maximum Wind Survival:	100 mph (161 kmph)

CHOOSING A LOCATION FOR THE ANTENNA

For best performance on receiving and transmitting, mount the antenna in a clear location above or away from buildings, towers, feedlines, utility wires, and other antennas. While your own ingenuity and particular circumstances will determine the final mounting method, we'll pass along a few ideas for both permanent installation and portable operation.

- **Never** mount this antenna in a location that will permit unsuspecting people to come in contact with the antenna elements.
- **Never** mount this antenna where a mechanical failure might allow the antenna to contact power lines or other utility wires.
- **Always** ground the feedline at the point where it enters a building to a good earth ground for lightning protection.

WARNING: Always mount this antenna so that it is out of the reach of adults and children. The elements can cause injury and/or severe RF burns.

Permanent Installation

The ideal installation is a rigid pole or roof mount that puts the antenna completely in the clear. If the ideal installation is not possible, choose the best compromise. TV mast, heavy-duty rigid electrical conduit, and steel water pipes are suitable mast materials. This antenna will mount on masts between 1-5/8" and 2-1/16" OD. The use of soft or thin wall masts is not recommended

Portable Operation

The VHB-246 may be easily transported to temporary locations for portable, emergency, and contest operation.

Even for temporary or portable operation, do not be casual about selecting a suitable mast. If the antenna falls, it can be damaged and may cause serious injury. Whatever type of installation you choose, remember that the antenna should be installed where it cannot be contacted by people or animals or come in contact with power lines.

TOOLS AND TIME REQUIRED FOR ASSEMBLY

The estimated assembly time is 60 minutes. Antenna assembly requires the following hand tools:

- 7/16" socket wrench
- 5/16" socket wrench
- 1/2" socket wrench
- 3/8" socket wrench.
- Tape Measure, 12 foot
- Safety glasses.
- Two sawhorses or similar supports

PARTS LIST

Part Description	QTY	Part No.
Bracket, Feed-to-Boom, left hand	1	735-1620L
Bracket, Feed-to-Boom, right hand	1	735-1620R
Bracket, Boom-to-Mast	1	385142-1
Bracket Clamp, Boom-to-Mast	1	385144-1
Bracket, #1 driven	2	165138
Bracket, #11	4	161422
Insulator, 6 meter 5/8" to 1-1/4"	2	461057
Insulator, 2 meter	1	465420
Tube, Driven Element, 7/16x52"	2	175165
Tube, Director, 7/16"x49"	2	172929
Tube, Reflector, 7/16"x53"	2	172928
Tube, 5/8 to 7/16	6	190002
Tube, 7/16"x17.5" 2 meter driven	2	160123
Tube, Rear boom 1-1/4"x47"	1	170396
Tube, Front Boom 1-1/4"x53"	1	170395
2-meter Reflector 3/16"x40-1/4"	1	160038
2-meter Director 3/16"x35"	1	160023
70cm Reflector: 3/16"x13-3/8"	1	160122
70cm Director #1: 3/16"x12-3/16"	1	160121
70cm Director #2: 3/16"x12-5/16"	1	160120
70cm Director #3: 3/16"x11-13/16"	1	160124
70cm Director #4: 3/16"x11-9/16"	1	160083

Parts Pack	QTY	Part Number
Clamp, Tube, 5/8"	2	171329
Clamp, #4 tubing	6	745-31045S
Clamp, 1-1/4"	1	171333
Bolt 10-24 x 2" bolt	2	500157
Bolt 10-24 x 1" SS bolt	4	504069
Bolt, 10-24x1/2"	6	500158
Nut, 10-24	10	554071
Nut, 10-24 Square	4	555693
Lockwasher, split # 10 SS	10	561178
Bolt, 1/4-20x3/8"	2	500156
Bolt, 1/4-20x3/4"	28	505266
Lockwasher, split, 1/4"	28	561177
Nut, 1/4-20	28	554099
Nut, 1/4-20 Square	2	551367
U-Bolt, 5/16-18 x 2-1/16"x3-5/8"	2	540067
Lockwasher, Split, 5/16"	4	564792
Nut, Hex, 5/16-18	4	555747
Cap plug, 7/16"	8	455644
Cap plug, 1-1/4"	2	455630
1/4"ID x 6" push-nut tool	1	808-1768-2
SS 3/16" Push nut	16	550081
Coax/Balun pigtail 6 meter (smaller beads)	1	13-0246-6
Coax/Balun pigtail 2 meter (larger beads)	1	13-0246-2
Tie-wraps	6	745-2158B

For installation, you will need the following additional items:

- An antenna mast or other mounting pipe between 1-5/8" and 2-1/16" outside diameter.
- Quality low-loss 50-Ohm coax with PL-259 connectors to connect the antenna to transmitter.
- An Antenna Analyzer (MFJ-259B or similar), or SWR meter and transceiver

SAFETY PRECAUTIONS:

WARNING! You can be killed if the antenna, feedline, or the equipment used to install the antenna accidentally contacts any utility lines. Never install an antenna near power lines!

- 1) Be careful while climbing and carrying the antenna. You can lose your balance if it is handled too casually – which could lead to injury.

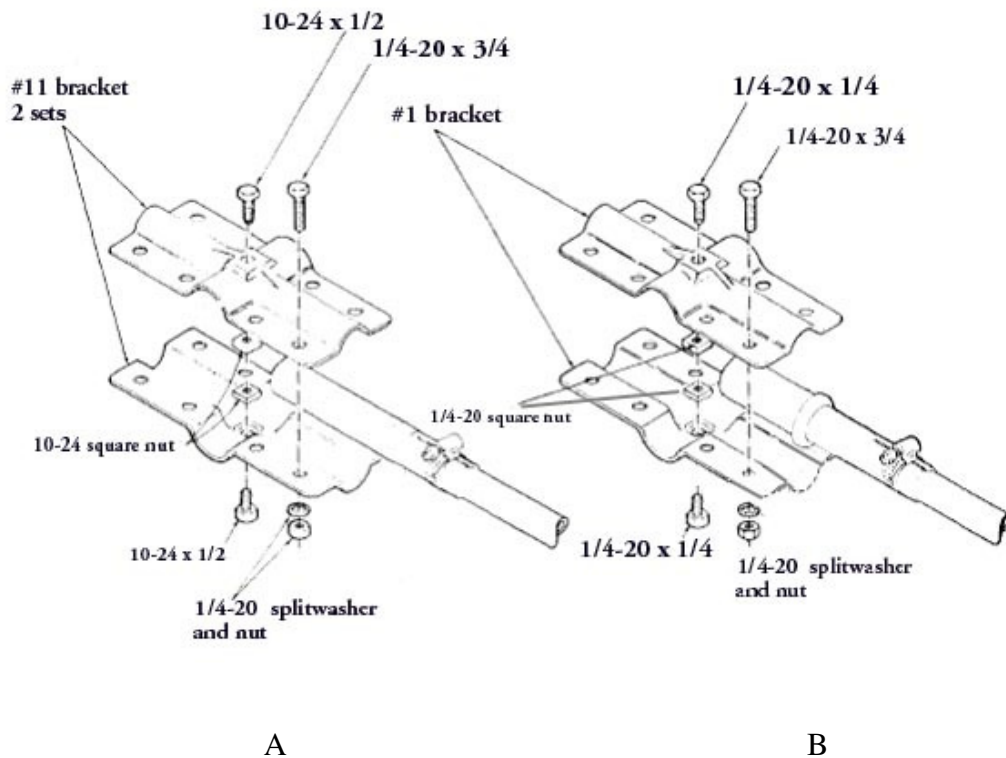
- 2) The open ends of the antenna can cause eye injury.
- 3) Mount the antenna high enough so that it is out of reach.
- 4) Make sure that the mast is sturdy enough to support the weight and the wind loading of the antenna.

ANTENNA ASSEMBLY

Assembly involves first assembling the 3-element 6-meter beam, and then adding in the 2m/70cm integrated beam.

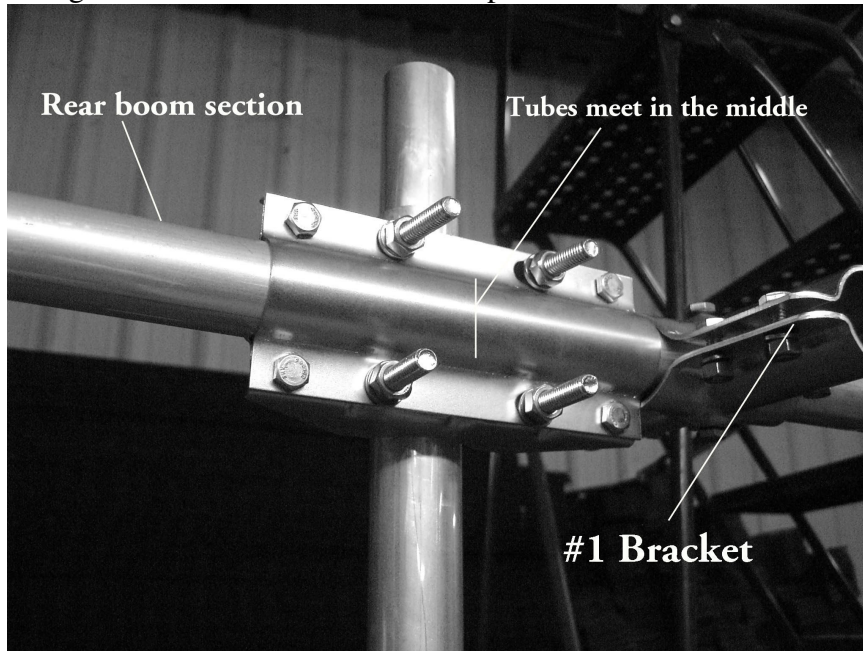
6-METER BEAM ASSEMBLY

- 1) Loosely assemble the three Element-to-Boom brackets using eight 1/4-20x3/4" bolts, nuts, and lock washers for each assembly. See details A and B.



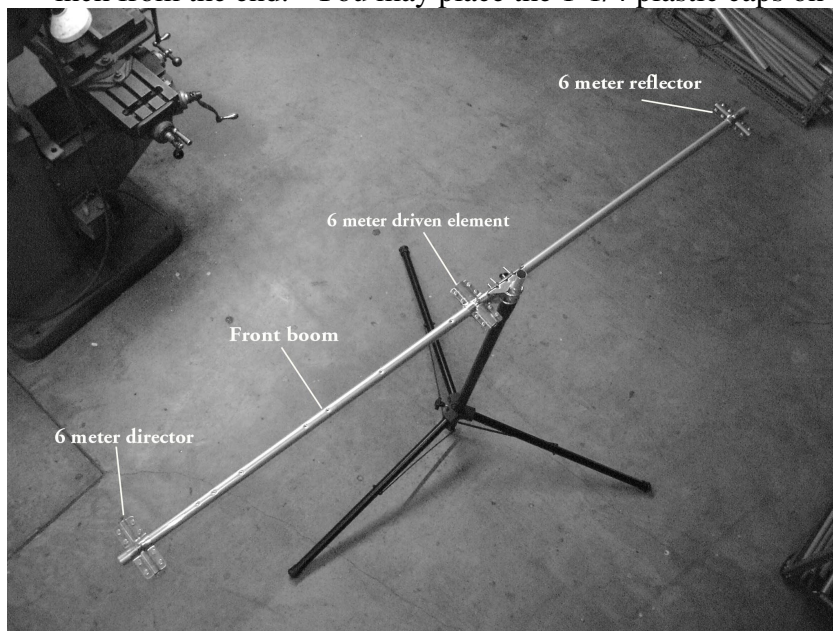
- 2) Loosely assemble the boom to mast bracket using the two 5/16 ubolts, splitwashers, and nuts.
- 3) Install the four 1/4-20 x 3/4 bolts, splitwashers, and nuts but do not tighten them.
- 4) Slide the front and rear boom into the bracket so that they meet in the middle.

- 5) Hand tighten the bolts so that the boom will stay in the bracket but you can twist the front boom so it can be aligned later when the elements are in place. Slide the #1 bracket that you assembled earlier onto the front section of the boom (the one with the holes) all the way against the mast bracket. See the picture below.

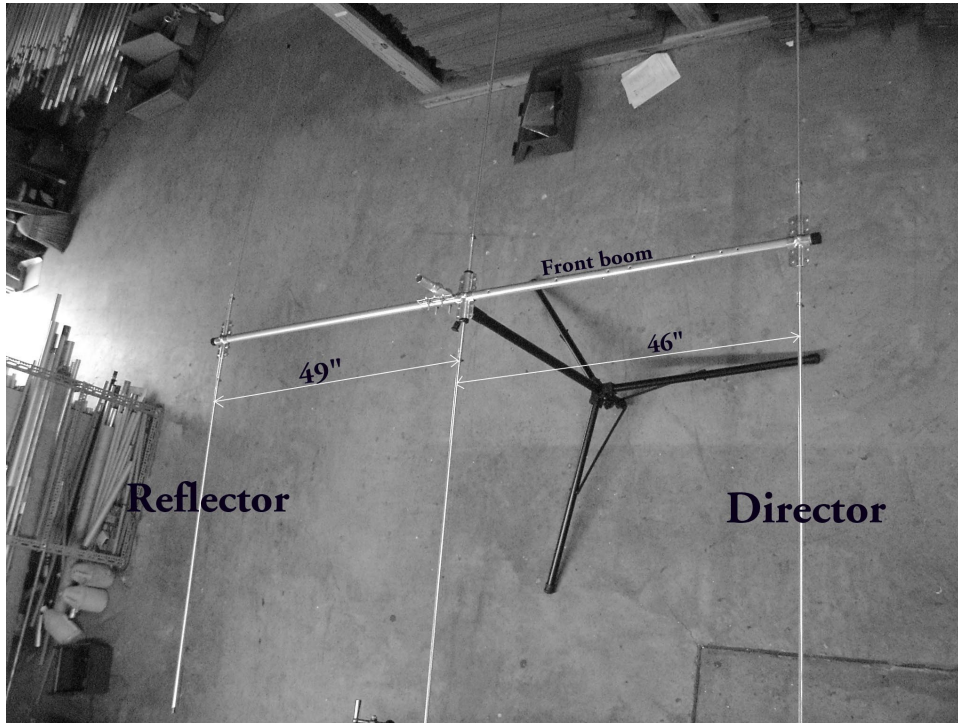


Don't tighten the brackets yet. Once the elements are installed they will need to be aligned.

- 6) Install the two remaining #11 brackets loosely on the front and rear of the boom, about an inch from the end. You may place the 1-1/4 plastic caps on the boom ends now.



- 7) Assemble the Driven Element, which consists of two insulators, two 7/16"x52" driven element tubes, and two #4 hose clamps. Install the Driven Element tubes into the Driven Element-to-Boom bracket.
- 8) Assemble the Reflector, which consists of two 5/8"x7-1/2" tubes, two 7/16"x53" tubes, and two #4 hose clamps. Install the Reflector elements in the rear boom bracket assembly.
- 9) Assemble the Director, which consists of two 5/8"x7-1/2" tubes, two 7/16"x49" tubes, and two #4 hose clamps. Install the Director elements in the front boom bracket assembly.
- 10) Adjust the Reflector and Director element spacing and lengths as shown. The measurements are from center to center of the tubes.



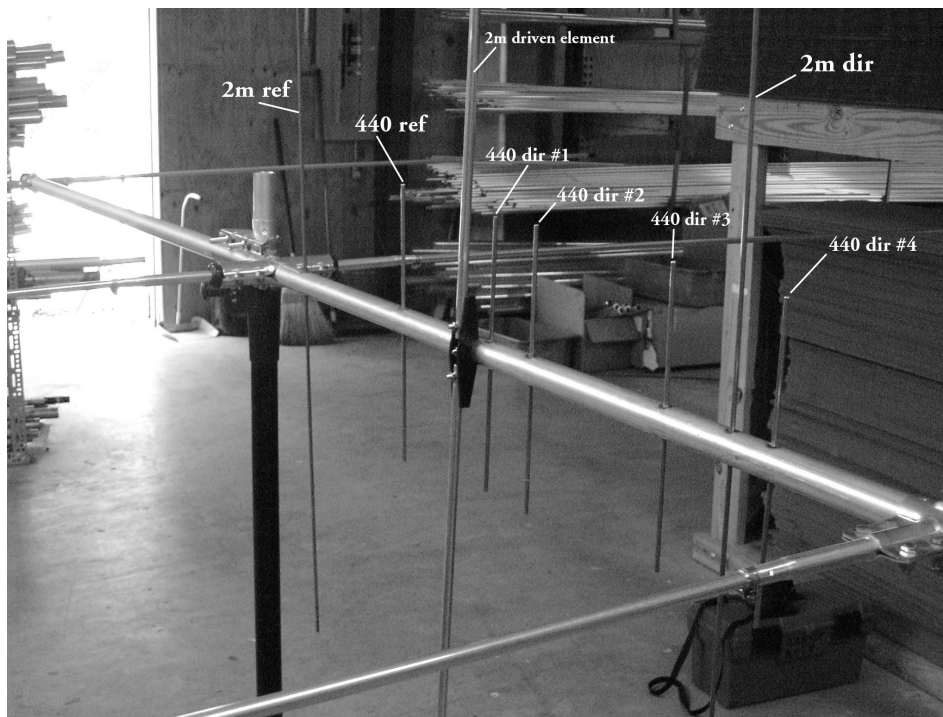
Space the reflector 49 inches and the director 46 inches from the driven element. Adjust the element lengths to the frequency you intend to operate by the chart below. The measurements are from the center of the boom.

Overall Element Lengths

Freq.		REF	DE	DIR
50.125	MHz	57"	55"	54"
52	MHz	56"	54"	51"
53	MHz	55"	53"	50"

2M/70CM BEAM ASSEMBLY

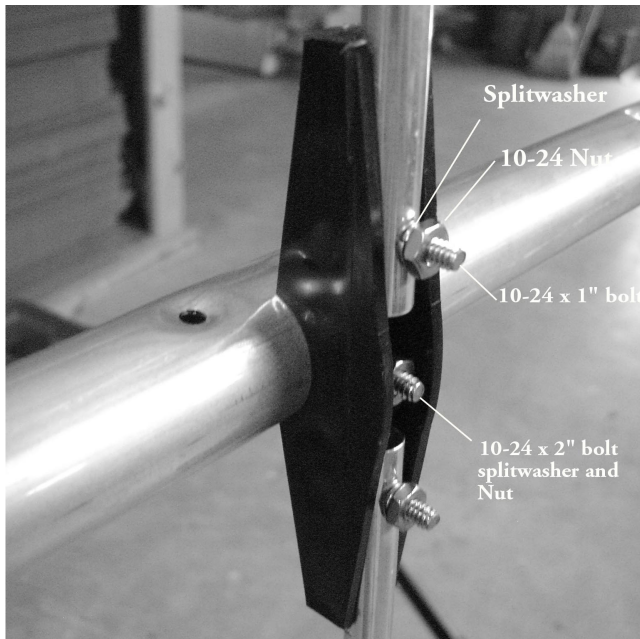
The 2-meter/70-cm beam assembly mounts perpendicular to the 6-meter beam, with all the elements mounting in pre-punched holes in front boom. The 2-meter reflector element is located in the first drilled hole in the front boom. The picture below shows the layout of the elements. All directors and reflectors are held in place with push nuts. To install, carefully press on a push nut on one side of the element, and slide towards the element center until the element can be placed through the boom such that it is centered on the boom. Then slide on a push-nut from the opposite side of the element to secure the element to the boom. Notice that the 70 cm Director #1 is SHORTER than the 70-cm Director #2. This is not a mistake.



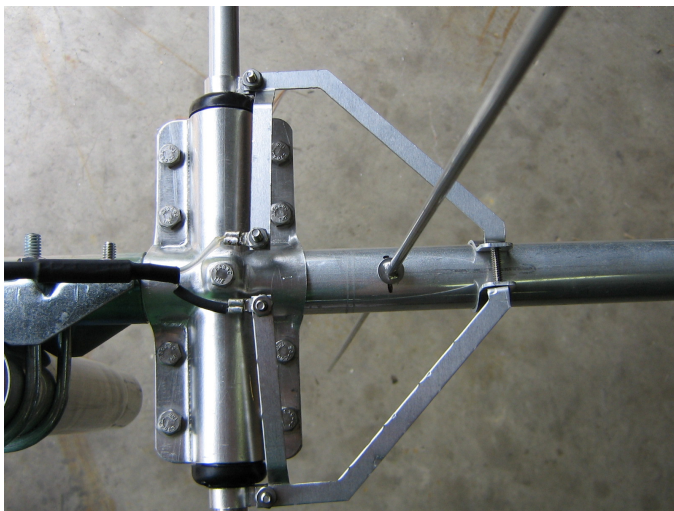
The elements have color bands on them for identification.

2m ref	-----Red
440 ref	-----Green
440 dir#1	-----Blue
440 dir#2	-----Yellow
440 dir#3	-----None
2m dir	-----Yellow Red
440 dir#4	-----Violet

Mount the 2meter driven element as shown. Insert the two 7/16 elements into the insulator and align the holes. Insert the 1-24 x 1" bolts and secure with a splitwasher and a nut. Don't over tighten the nuts as it will cause the elements to bend. Align the driven element with the directors and reflectors so that they are parallel. Secure the insulator using the 2" bolt once you have aligned the elements.



Install the 6 meter feed system. This consists of the coax/balun pigtail (small ferrite beads), and the two feed-to-boom brackets shown below. Attach the brackets to the boom using the 1-1/4 clamp shown and a 10-24 x 2" bolt, nut, and splitwasher. Attach the other end to the driven elements using the 5/8 clamp and 10-24 x 1" bolt, nut, and splitwasher. Attach the coax pigtail to the 6 meter feed point using 10-24 x 3/8 bolts, nuts, and splitwasher.



Attach the 2 meter coax assembly (larger ferrite beads) to the 2 meter driven element using two 10-24 nuts and split washers. Use the supplied cable ties to secure the pigtails to the boom and out of the way of the elements.



FINAL ASSEMBLY

- 1) Align all the elements and tighten all hardware. Mount the antenna in the final location. Appropriate mast diameters are 1-5/8" and 2-1/16" OD.
- 2) Connect the 6-meter and 2m/70cm antenna feeds to the transmitter using high quality low loss coaxial cable such as Times Microwave LMR-400 or equivalent.

SWR CHECK

Six-meter resonance can be checked with an MFJ-259B or MFJ-269. Alternately, a transceiver and SWR meter can be used. Six-meter resonance may be changed by shortening the driven element to raise the frequency or lengthening the driven element to lower the frequency. Adjust the driven element in 1/4-inch increments until the desired resonant frequency is obtained. The SWR should be less than 1.5:1 across the 6-meter band segment desired.

For 2-meters and 70-cm, no tuning is required. However, an SWR analyzer such as the MFJ-269 or equivalent is recommended for checking this section of the antenna prior to use. Alternately, a transceiver and SWR meter can be used. The SWR should be less than 1.5:1 across the 2-meter and 70-cm ham bands.

GROUNDING CONSIDERATIONS

Although this antenna is designed to operate efficiently without the requirement of an earth ground, Safety grounding must still be provided to protect equipment, property and persons from the hazards of lightning strikes and other weather related electrical discharges. In addition, the coaxial cable feeding the antenna should have the shield grounded to eliminate the risk of any indoor equipment failure allowing hazardous voltages that could create a shock hazard.

Adequate protection can be accomplished by grounding the shield of the coax to a good earth ground where it enters the building, or directly burying the cable in the earth for several feet before it enters the building. For maximum lightning protection, the coaxial cable should be totally disconnected from the station during threatening weather conditions.

A less effective method of protecting station equipment is to install an in-line coaxial lightning arrester with a heavy duty ground wire to a suitable earth ground, or a safety switching system as part of the basic ham station equipment.

MAINTENANCE

Your antenna is constructed of heavy duty non corrosive materials and should withstand normal climates for many years. The use of some type of coaxial connector moisture protection is recommended at the balun coax connection, and also around the center-feed connections, especially in coastal areas where salty mist is commonplace.

GE makes a pure, silicone grease called "SILICONE DIALECTRIC COMPOUND" that can be applied SPARINGLY to the threaded area of the female connector. This compound, or even a clear silicone heatsink compound, will prevent moisture from entering the connector through the threads and protect the connectors from corrosion. This is the same type of sealer that commercial antenna installers and CATV companies use with great success.

Plast-DipTM and Liquid Electrical TapeTM, available at your local hardware store, also do an excellent job of insulating/waterproofing connectors, and can be easily peeled off when desired.

A less desirable, but still adequate sealer is the automobile seam sealer commonly sold as "coax seal". This is a semi-pliable black or white sealing compound.

When installing any "coax seal", NEVER completely cover the barrel of the coax connector. The sealer should ONLY be placed near the junction of the threaded part of the chassis connector and the knurled area of the male connector. This will leave the bottom of the male outer sleeve open and permit the connector to "breathe" so it does NOT collect moisture!

TECHNICAL ASSISTANCE

If you have any problem with this unit first check the appropriate section of this manual. If the manual does not reference your problem or your problem is not solved by following the manual you may call Hy-Gain toll-free at 1-800-973-6572 or FAX to 662-323-6551. Outside of the continental U.S.A. call 662-323-9538. You will be best served if you have all information on your antenna and station handy so you can answer any questions the technicians may ask.

You can also send questions to Hy-Gain, 308 Industrial Park Road, Starkville, MS 39759. Send a complete description of your problem, an explanation of exactly how you are using your antenna and a complete description of your station.

FULL 12 MONTH WARRANTY

Hy-Gain warrants to the original owner of this product, if manufactured by Hy-Gain and purchased from an authorized dealer or directly from Hy-Gain to be free from defects in material and workmanship for a period of 12 months from date of purchase provided the following terms of this warranty are satisfied.

- 1) The purchaser must retain the dated proof-of-purchase (bill of sale, canceled check, credit card or money order receipt, etc.) describing the product to establish the validity of the warranty claim and submit the original or machine reproduction of such proof of purchase to Hy-Gain at the time of warranty service. Hy-Gain shall have the discretion to deny warranty without dated proof-of-purchase. Any evidence of alteration, erasure, or forgery shall be cause to void any and all warranty terms immediately.
- 2) Hy-Gain agrees to repair or replace at Hy-Gain's option without charge to the original owner any defective product provided the product is returned postage prepaid to Hy-Gain with a personal check, cashiers check, or money order for **\$10.00** covering postage and handling.
- 3) Hy-Gain will supply replacement parts free of charge for any Hy-Gain product under warranty upon request. A dated proof of purchase and a **\$8.00** personal check, cashiers check, or money order must be provided to cover postage and handling.
- 4) This warranty is **NOT** void for owners who attempt to repair defective units. Technical consultation is available by calling 1-800-973-6572 or FAX to 662-323-6551. Outside of the continental U.S.A. call 662-323-9538. You will be best served if you have all information on your antenna and station handy so you can answer any questions the technicians may ask.
- 5) Under no circumstances is Hy-Gain liable for consequential damages to person or property by the use of any Hy-Gain products.
- 6) **Out-of-Warranty Service:** Hy-Gain will repair any out-of-warranty product provided the unit is shipped prepaid. All repaired units will be shipped COD to the owner. Repair charges will be added to the COD fee unless other arrangements are made.
- 7) This warranty is given in lieu of any other warranty expressed or implied.
- 8) Hy-Gain reserves the right to make changes or improvements in design or manufacture without incurring any obligation to install such changes upon any of the products previously manufactured.
- 9) All Hy-Gain products to be serviced in-warranty or out-of-warranty should be addressed to Hy-Gain, 308 Industrial Park Road, Starkville, MS 39759, USA and must be accompanied by a letter describing the problem in detail along with a copy of your dated proof-of-purchase.
- 10) This warranty gives you specific rights, and you may also have other rights which vary from state to state.