

Hy-Gain TH-1 4-Band Rotatable Dipole

INTRODUCTION

The Hy-Gain TH-1 is a 26 foot 20-, 15-, 10-and 6-meter full legal limit rotatable dipole that is inconspicuous and low profile, making it almost invisible from across the street. With its 13-foot turning radius and 8-pound weight, it fits on even small roofs and is perfect for town houses, apartments and condos - and can easily be turned by a lightweight TV rotator such as the HyGain AR-35. If necessary, the TH-1 can even be mounted inside an attic!

And this antenna is no wimp! Its bidirectional pattern can help reduce QRM and/or noise while maximizing your signal in the directions that you want -- so you can work some real DX. High efficiency traps provide operation up to a full 1500 Watts SSB/CW on 20, 15, and 10 meters. Stub matching is used on 6 meters for 1500 watt operation on this band as well.

The Hy-Gain TH-1 is built-to-last – using an incredibly strong solid rod fiberglass center insulator and 6063 T-6 aircraft strength aluminum tubing for the radiator. And it assembles in about 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>Band</u>	<u>Power</u>			<u>Gain</u>	<u>Front-to-Side</u>
	<u>CW</u>	<u>SSB</u>	<u>2:1 SWR BW</u>		
20m	1500	1500	200 KHZ	0 dBd	20 dB
15m	1500	1500	400 KHZ	0 dBd	20 dB
10m	1500	1500	1.1 MHZ	0 dBd	20 dB
6m	1500	1500	600Khz	0 dBd	20 dB

Mechanical Specifications

Mast Size:	1- to 1-1/2" diameter
Overall Length:	26 feet
Turning Radius:	13 feet
Weight:	8 pounds
Wind Load:	1 square foot

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 any part of the antenna.
- **Never** mount this antenna where a mechanical failure might allow the antenna to contact power lines or other utility wires.
- **Always** ground the feedline to a good earth ground at the point where it enters a building for lightning protection.

WARNING: *Always mount this antenna so that it is out of the reach of adults and children. Contact with the antenna during operation can result in 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 and 1-1/2" OD. Do not use soft or thin wall masts.

Portable Operation

The Hy-Gain TH-1 may be disassembled as necessary for transporting to a temporary location. Use a permanent marking pen to mark the tube positions for easy re-assembly.

Even for temporary or portable operation, do not be casual about selecting a suitable mast. If the antenna falls, it will be damaged and may cause serious injury. Whatever type of installation you choose, remember that the antenna should be installed where it can *never* be contacted by people or animals or come in contact with power lines.

TOOLS AND TIME REQUIRED FOR ASSEMBLY

The estimated assembly time is two hours. Antenna assembly requires the following hand tools:

- #2 Phillips screwdriver
- 5/16" nut driver for hose clamps.
- Safety glasses.

It is also convenient if you have a short (6-8') temporary mast (1 to 1-1/2" OD) for temporary antenna mounting for preliminary resonant frequency checks.

HY-GAIN TH-1 PARTS LIST

As you unpack your antenna, verify that the following parts are supplied:

<u>Item</u>	<u>Part Description</u>	<u>QTY</u>	<u>Part No.</u>
1	1-3/8 x 12" AL Tube	2	175168
2	1-1/4 x 12" Fiberglass Rod	1	811-1812
3	1/4-20 x 1-3/4 bolt	2	505763
4	1/4 split lock washer	2	561177
5	1/4-20 hex nut	2	554099
6	1/4" Solder Lugs	2	677556
7	640 U-bolt Set	1	758-9200
9	7/16 x 28" AL Tube	2	178558
10	55" Treaded Rod	2	758-8253
11	Al "L" Stabilizer Bracket	2	805-1796-7
12	1-1/8 x 38" AL Tube	2	190307
13	1 x 6-1/2" AL Tube	2	190605
14	1-1/4 x 48" AL Tube	2	190900
15	Fiberglass Stabilizer	2	807-1796-6
16	Al Stub Channel Bracket	2	807-1796-5
17	Tubing Clamp, #6	2	358756
18	Tubing Clam, #10	6	358757
19	Tubing Clamp, #16	8	358758
20	6-32 kep nut	6	705-0632S
21	6-32 x 3/8" screw	6	656-0375S
22	7/16" Cap Plug	2	455644
23	10-32 hex nut	4	705-1032S
24	#10 lock washer	2	711-1037S-EX
41	Trap, Beam, DE15M	2	878637
43	Trap, Beam, 10M	2	878749

For installation, you will need some items not supplied with the antenna installation kit:

- A 6'-8' rigid mast or other mounting pipe between 1" and 1.5" outside diameter is convenient for a preliminary test of resonant frequencies. Suitable materials include TV mast sections, galvanized iron pipe, or heavy duty rigid conduit.
- Quality low-loss 50-Ohm coax with a PL-259 from 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 when carrying and installing the antenna. It is heavy enough to cause you to lose your balance if it is handled too casually or if the antenna is snagged on anything.
2. Mount the antenna high enough so that it is out of reach. The ends of the antenna can cause eye injury, serious RF burns or both.
3. Make sure that the mast is sturdy enough to support the 8-pound weight and the wind loading of approximately 1-square foot.

ASSEMBLY and INSTALLATION PROCEDURE

Refer to the figures in this manual during assembly. Assembly consists of putting together the center insulator assembly, then connecting the aluminum radiating elements to the center insulator assembly, and finally attaching the feedline. After the antenna is assembled and adjusted for resonant frequency and SWR, it can then be mounted on a tower or rooftop.

WARNING: Wear safety glasses whenever working with this antenna.

Step-By-Step Procedure

- 1) Find a flat work area with the necessary clearance for assembly. The TH-1 is easily assembled on the ground.
- 2) After examining the antenna parts, gather the following tools needed for assembly:
 - Small (4"-6") adjustable wrench OR 5/16" nut driver for hose clamps and 7/16" open end wrench for center insulator bolts.
 - Safety glasses.
- 3) Loosely assemble the U-bolt set to the 1-1/4" fiberglass rod using supplied hardware. The nuts will be tightened when the antenna is mounted on the mast. See Figure 1.

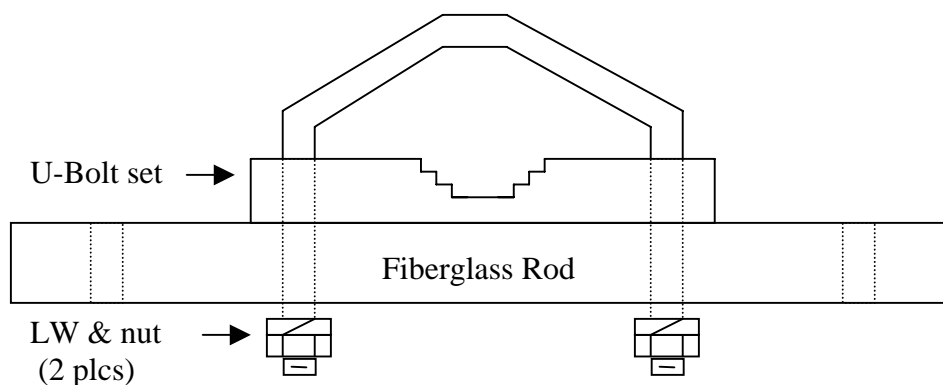


Figure 1: Center Insulator Assy – Top View

- 4) Slide the 1-3/8 x 12" aluminum tubes over each side of the center insulator assembly. Insert the 1/4-20 bolts through the aluminum tube/fiberglass assembly. Add the 1/4-20 split lockwashers and nuts and fasten loosely, as the feedline will be connected to this hardware later on. See Figure 2.

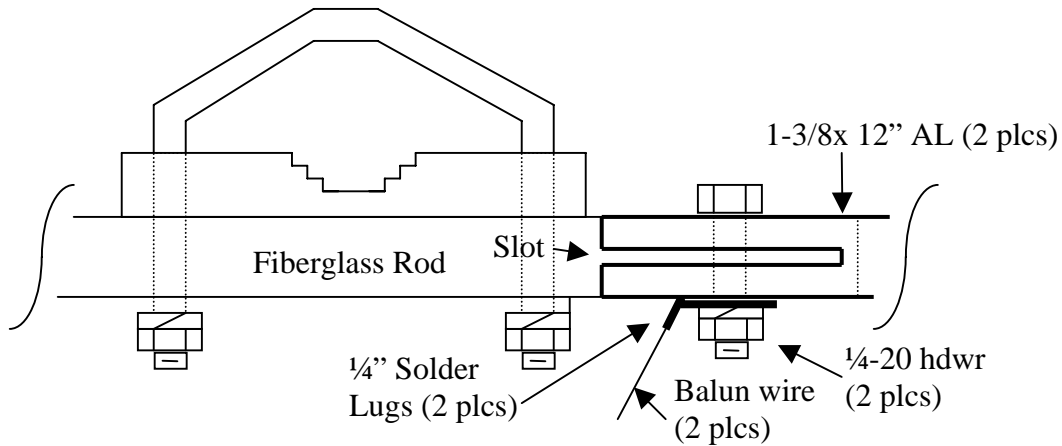


Figure 2: Center Insulator Assy – Top View

5) Slide the two 1-1/4 x 48” aluminum radiator tubes into each of the 1-3/8” x 12” aluminum tubes mounted to the 1-1/4” x 12” fiberglass rod. The 48” aluminum tubes should slide up against the fiberglass rod. Clamp the 1-1/4 x 48” aluminum tubes to the 1-3/8 x 12” aluminum tubes using #16 tubing clamps as shown in Figure 3.

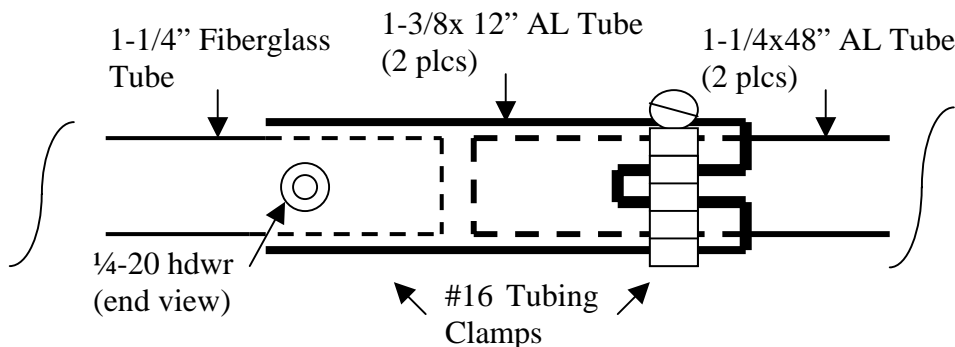
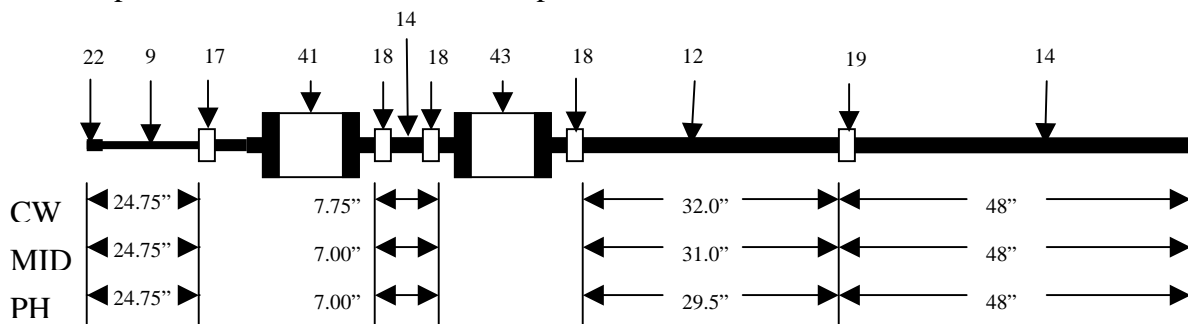


Figure 3: 48” Radiator Tube to Center Insulator Assembly

6) Assemble each side of the dipole as shown in Figure 4. The item numbers in Figure 4 correspond to the item numbers on the parts list.



6 Mtr stub ASSEMBLY and INSTALLATION

Figure 4: Element assembly details

This total length from feed bolt is the important parameter

- 7) Assemble the two small "L" brackets to the two long fiberglass insulators with 6-32 x 3/8" screws (3 each) and the 6-32 kep nuts (3 each) as shown in Figure 5.

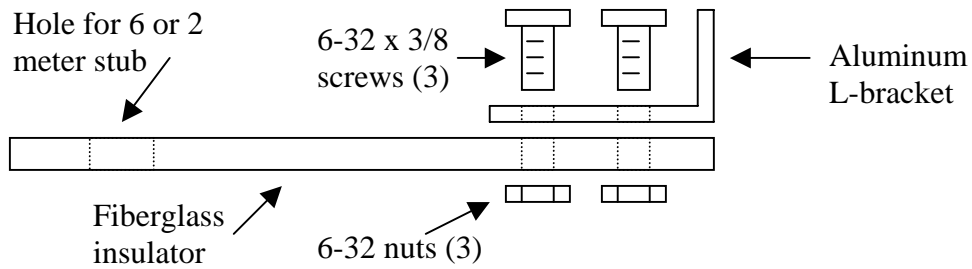


Figure 5

- 8) Open up two #16 hose clamps and install them over the HF beam's driven element as close to the inside ends of the driven element as possible. Clamp the two aluminum stub channel brackets (one on each radiator) as shown in Figure 6.

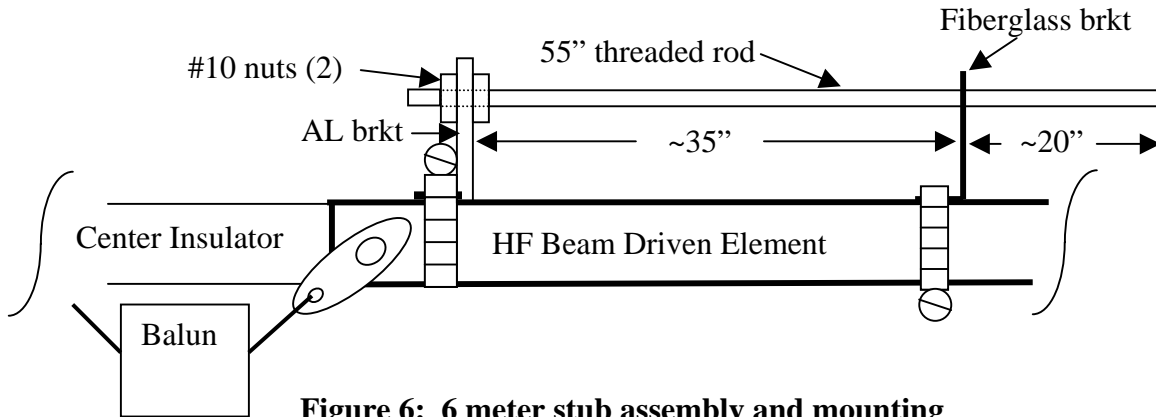


Figure 6: 6 meter stub assembly and mounting

- 9) Open up the remaining two #16 hose clamps (one on each radiator), clamp the fiberglass insulators so as to support the 55" threaded rods. Position the insulators as shown in Figure 6.
- 10) Mount the two stubs by threading a 10-32 x 3/8" nut 1/2" near the end of the threads. Add a second nut and lockwasher to sandwich the bracket between the two nuts, leaving no more than 1/4" of threaded rod exposed beyond the aluminum bracket. See Figure 6.
- 11) Strip four inches of insulation from the end of your coax feedline. Separate the braid from the center conductor and install the 1/4" solder lugs on the shield and center conductor wire (solder in place). Coat the leads liberally with Liquid Electrical Tape™ and let dry. Once the Liquid Electrical Tape™ is dry, connect the feed to the 1/4-20 hardware as shown in Figure 7.

Note: The TH-1 is a balanced antenna, and as such should be balun fed. An effective balun can be created by coiling the coax feedline into 6-turns with a diameter of 4-6 inches as close to the antenna as possible (the coil should be no more than about 12-inches from the antenna). Do not scramble-wind the turns. I.e., preferably wind the turns side-by-side. Finish the balun by holding the turns together with black tie-wraps.

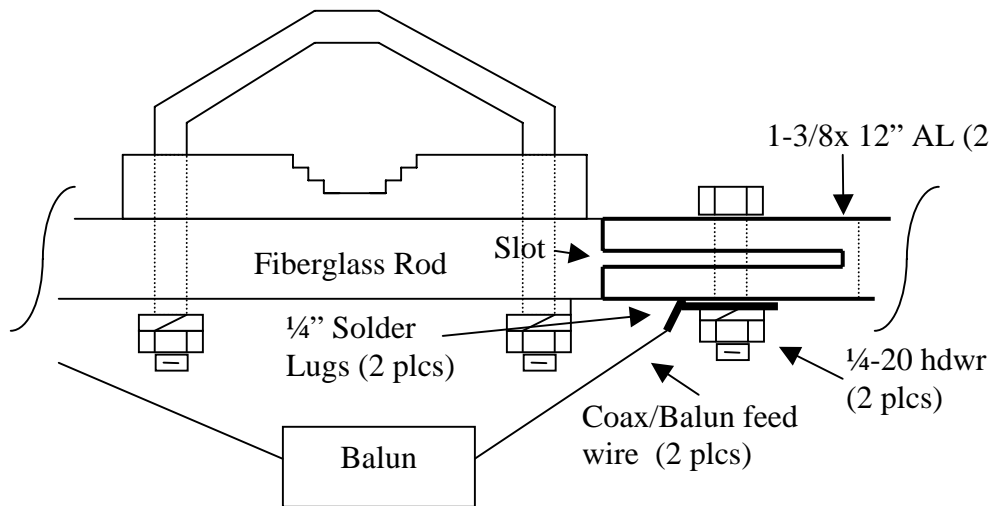


Figure 7: Balun/Feed Connections

- 12) Double check the tightness of all the hardware.
- 13) Tune the antenna as discussed in the next section.
- 14) Mount the antenna in the final location. Slight re-tuning may be necessary.

FREQUENCY AND SWR ADJUSTMENT

An SWR analyzer such as the MFJ-259B or equivalent is highly recommended when tuning the TH-1. While a transceiver and SWR meter can be used, an SWR analyzer will significantly decrease the time and effort necessary to tune the antenna.

The entire antenna must be accessible during tuning and testing. Because of the non-criticality of 6-meter tuning, final tuning of the 6-meter resonant frequency can be made with the antenna mounted 5-6 feet above ground. During tuning, feed the antenna with a reasonably short length of good quality 50 ohm coaxial cable and a balun to ensure proper results. If using a transceiver and SWR meter, set the transceiver to the lowest power possible when making measurements.

Tuning the Antenna

- 1) Adjust the 6-meter resonant frequency first. Then proceed to 10-meters, 15-meters, and finally 20-meters. The SWR should be below 2:1 at resonance on each band.
- 2) The six meter band is tuned by lengthening or shortening the threaded portion of the stubs. This adjustment is very coarse. If the frequency is still too low with the stub element extension at a minimum, the unthreaded ends of the stubs can be trimmed.

NOTE: The six meter stub covers 50 to 54 MHz. Resonance at 50.15 MHz (popular SSB part of the band) typically requires the full 55-inch stub lengths (flat side of aluminum mounting bracket to end of stub).

- 15) If available, mount the antenna on a short temporary mast 6-8 feet above the ground and check the resonant frequency of the antenna on 20-, 15-, and 10-meters.

Note: The resonant frequency will increase about 50 kHz on 20 meters, 75 kHz on 15 meters, and 100 kHz on 10 meters when the antenna is raised to 20-feet or higher.

- 16) If necessary, adjust the resonant frequency on the three bands. Start with 10-meters by adjusting the innermost tubing lengths, then move to 15-meters (adjust the spacing between the two traps), and finally 20 meters (adjust the length of the end tubes). Shortening the tubes increases the resonant frequency, and lengthening the tubes decreases the resonant frequency.

Note: Changing the resonant frequency of a higher frequency band will also change the resonant frequency of the bands below the changed band. I.e., increasing the resonant frequency of the 10-meter element will also increase the resonant frequency of both 15- and 20-meters.

- 17) Mount the antenna in the final location.

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.

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 product, first verify that you have assembled, installed and tuned it correctly. If your problem is not solved by following the manual you may call Hy-Gain toll-free at 1-800-647-TECH (8324) or FAX to 662-323-6551, or TELEX 53 4590 MFJ STKV. Outside of the continental U.S.A. 662-323-5869. Please have your manual and all information on your station handy so you can answer any questions the technicians may ask. You can also send questions to Hy-Gain, P.O. Box 494, Mississippi State, MS 39762. Send a complete description of your problem, an explanation of exactly how you are using your unit and a complete description of your station.