

INSTRUCTION MANUAL

ORDER NO. 386-A

**Model 18 AVT/WB-A Vertical
Radiator, Amateur Antenna**

PN 801270

General Description

The Hy-Gain 18AVT/WB-A is an omnidirectional, self-supporting, vertical radiator that operates in the 10- to 80-meter amateur bands. The system will work against earth ground or a resonant radial system when mounted above ground. You make your own radial system following the manual, or you can use the Hy-Gain 14RMQ radial system kit.

Performance of the antenna can be optimized for either phone or CW with either a ground or roof mount. Regardless of the optimization, the VSWR bandwidths of the antenna are broad enough for the antenna to operate at a VSWR of 2:1 or less from 10 to 40 meters. The bandwidth for 80 meters is sharper, because the antenna is top loaded.

Theory of Operation

Heavy-duty "Hy-Q Traps" give automatic band selection. The Hy-Q traps are parallel resonant circuits which isolate the various sections of the antenna. This provides true quarter-wavelength resonance on all bands. The top hat and 80-meter resonator extends coverage to 80 meter by top loading.

Specifications

Mechanical

Overall height 21' nominal (6.401 m)
Mast accepts up to 1 5/8" (4.1 cm)
Wind survival 80 mph (129 kmph)

Electrical

Frequency 80-, 40-, 20-, 15-, and 10-meter amateur bands
Input impedance 52 ohms
SWR at resonance less than 2:1
Power capabilities 2 kW PEP*
Lightning protection DC ground
Input connector SO-239

*Maximum power on 80 meters is 1 kW PEP

NOTE: If the terminals of the input connector are checked with an ohmmeter, they will show a direct short. *This is normal!* The matching coil in the antenna base puts the entire system at DC ground, but presents a perfect 52-ohm impedance to RF energy.

Choosing a Site

A good ground is imperative for any vertical antenna system.

The 18AVT/WB-A can be mounted on the ground, on a rooftop, or on a mast. When mounting the antenna above ground, remember that you *must* also install a ground plane radial system. When the antenna is ground-mounted, a radial system is usually not needed. But in some areas, where soil surface conductivity is poor and a good ground cannot be made using the method shown in Figure 4, you will need to lay out ground radials to improve the efficiency of your antenna.

If you mount your antenna on a roof and find the roof space is too small for a radial system, you can droop the radials over the edge of the roof at almost any angle without seriously changing the performance of the antenna. The radial system must be insulated from the roof and connected to a good ground for lightning protection.

Assembly and Installation

Read through the manual before beginning assembly. Also, acquaint yourself with the drawings by checking the parts as you take them from the carton.

Decide where you will mount your antenna (rooftop or ground) and what mode of transmission you will use (phone or CW). Take special notice of the dimensions on Figure 1. The antenna parts must be set to the exact dimensions given, or it will not operate at peak efficiency. The VSWR charts will help you decide which dimensions to choose.

WARNING

Isolate the antenna from the reach of children or pets. The antenna radials are hot with RF proportional to the operating power.

CAUTION

The antenna dimensions must be set either for CW operation on all bands or phone operation on all bands. It is not possible to mix phone and CW dimensions to allow operation of some bands on CW and some bands on phone.

NOTE: The compression clamps used with this antenna are used in many varied applications, so the screw head may or may not contact the lockwasher or clamp body. Once it is tight, *do not* force the screw by tightening it further. To do so may damage both the clamp and tubes. Do not tighten any of the compression clamps until instructed to do so.

M1 Section Assembly

Refer to Figure 1 to assemble the main portion of the antenna.

() Drop the 1¼" compression clamp, untightened, over the M1 section (the base is attached to it already). Slip the M2 section (1½" x 26") into the top of M1 and set M2 at dimension "A", as shown. Slide the clamp into place around the top of M1 and tighten it just enough to keep M2 from slipping.

M2 Section Assembly

() Drop an untightened 1½" compression clamp over M2. Then slip the 10-meter trap (870138) bottom-first into M2 butting it against the top of M2. (The top of this trap has a plastic cap on it.)

() Slide the clamp into place around the top of M2 and tighten it just enough to keep the trap from slipping.

M3 Section Assembly

() There are two M3 sections supplied — one for ground mount (1½" x 5½"). Choose the correct one for your installation and slide it onto the end of the 10-meter trap. Place a 1½" compression clamp around the lower end of M3. Then set M3 at dimension "B" and tighten the clamp just enough to keep M3 from slipping.

NOTE: There is a drainage hole in the side of the tube above the trap proper. Align this hole with the slot in M3 to allow proper drainage.

() Drop a second, untightened 1½" compression clamp over M3. Slip the 15-meter trap (870135) into M3. Set it at dimension "D" and tighten the clamp just enough to keep it from slipping.

M4 Section Assembly

() There are two M4 sections supplied (1½" x 14" and 1½" x 12") — one for ground mount. Choose the correct one for your installation and slide it onto the end of the 15-meter trap. Place a 1½" compression clamp around the lower end of M4. Set M4 at dimension "E" and tighten the clamp just enough to keep it from slipping.

NOTE: There is a drainage hole in the side of the tube above the trap proper. Align this hole with the slot in M4 to allow proper drainage.

() Drop a second, untightened 1½" compression clamp over M4. Slip the 20-meter trap (870169) bottom-first into M4. (The top of this trap is tapered.) Set the trap at dimension "G", slide the clamp into place, and tighten it just enough to keep the trap from slipping.

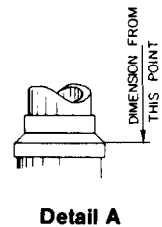
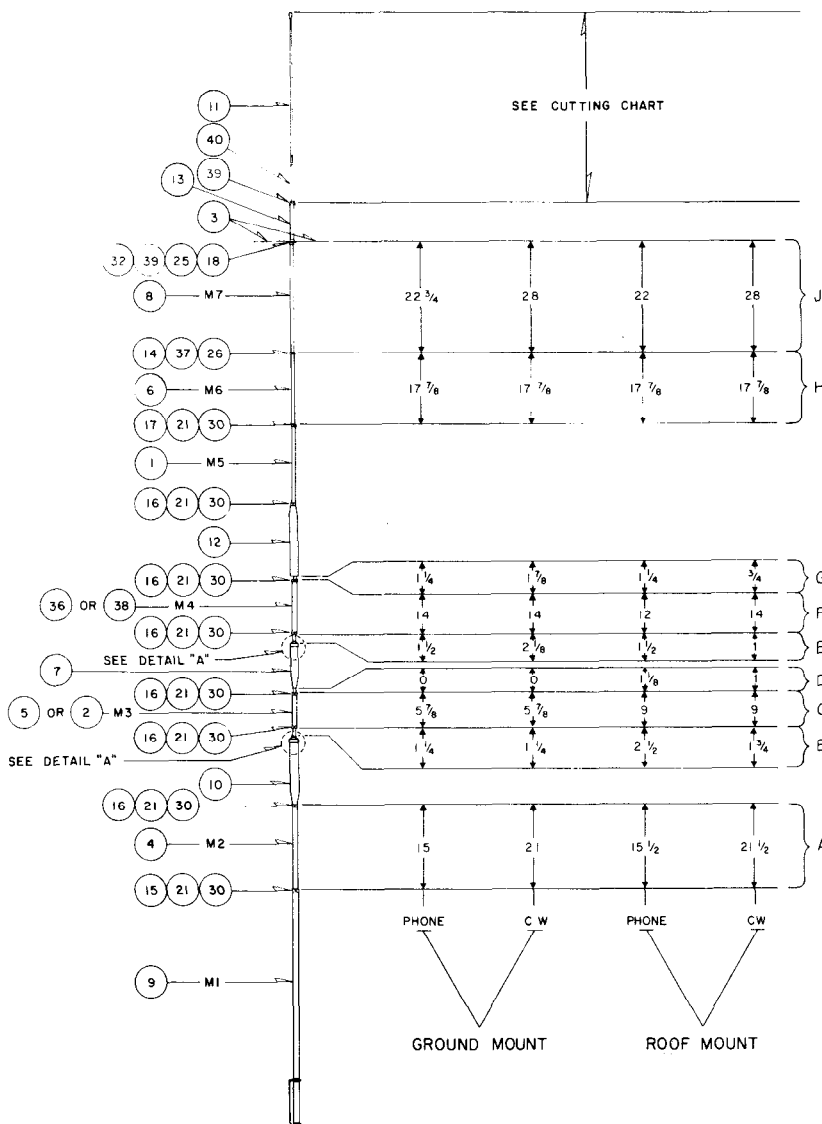
M5 Section Assembly

() Slide the M5 section (1½" x 20½"), swaged end up, onto the end of the 20-meter trap. Place a 1½" compression clamp around the lower end of M5. Butt M5 against the top of the trap and tighten the clamp just enough to keep M5 from slipping.

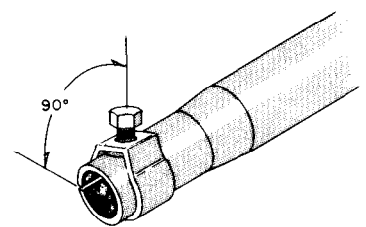
NOTE: There is a drainage hole in the side of the tube above the trap proper. Align this hole with the slot in M5 to allow proper drainage.

AO-0386-C-001

AO-0386-A-007



AO-0221-A-006



**Compression Clamp Detail
Detail B**

Figure 1. Antenna Assembly Dimensions

M6 Section Assembly

Assemble a 1" compression clamp over the swaged end of M5. Slide the M6 section ($\frac{7}{8}$ " x 22 $\frac{1}{2}$ ") into M5. Set M6 at dimension "H" and tighten the compression clamp just enough to keep M6 from slipping.

M7 Section Assembly

() Slide the M7 section ($\frac{5}{8}$ " x 31"), insert end up, into the swaged end of M6. Drop an untightened $\frac{3}{4}$ " compression clamp down over M7. Set M7 at dimension "J", slide the clamp around the swaged end of M6, and tighten it just enough to keep M7 from slipping.

() Recheck all dimensions and *tighten all the clamps* securely in place.

() This completes this portion of the antenna. Set it aside to be completed later.

Top Section Assembly

Refer to Figure 2, Top Assembly Details and Figure 3 in connection with the following steps.

() Push a $\frac{1}{8}$ " caplug on the end of each top radial (170610).

() Attach the four radials to the top plate (170615) as shown. Set the radial assembly aside to be used later.

() Determine the proper length for your antenna as indicated in the cutting chart, Figure 3.

NOTE: The tapered whip must be cut to the correct length so that when the whip is inserted into the fitting 1", the *total* length equals the length in the cutting chart.

() File a deep notch around the rod with a file and snap off as shown in the detail in Figure 3.

() Insert two #8 set screws, item 41, in the top of the whip fitting, item 40, and tighten the whip assembly in the fitting.

() Screw a $\frac{3}{8}$ "-24 nut, item 39, onto the bottom of the whip fitting.

() Screw the completed whip assembly into the top of the white 80-meter resonator (878761), item 13, as shown in Figure 2. The lower end of the resonator has a drainage hole in the side.

() Screw the nut down snug against the resonator.

() Thread $\frac{3}{8}$ "-24 x 1" stud, item 25, $\frac{3}{8}$ " into the insert in the M7 section, item 8. Place radial assembly over the stud as shown in Figure 2. Install one of item 39 ($\frac{3}{8}$ "-24 nut, Hy-Gain part number 552964) on the stud and tighten to secure radial assembly.

() Place $\frac{3}{8}$ " internal lockwasher, item 32, on $\frac{3}{8}$ " stud so that the lockwasher will be between the nut and the 80-meter resonator.

() Thread the whip assembly/resonator, item 13, on the stud and tighten hand tight.

CAUTION

Do not use any tools to tighten the resonator on the M7 section.

Installing the Antenna

Refer to the two mounting details of Figure 2 and Figure 4 to install the completed antenna.

() First mount the completed antenna on your mast (not supplied) as shown in Figure 2. Use the two U-bolts and 5/16" nuts and lockwashers.

() Use three 1/4"-20 x 3/4" bolts, nuts, and lockwashers to attach the insulator to the upper end of the mounting bracket.

() If you are roof-mounting your antenna, use four sets of 1/4"-20 hardware for the preceding step. Before tightening them, attach two adjacent radials to each set of hardware as shown in the two figures.

NOTE: If your antenna is mounted more than 24" above ground, a radial system must be added for proper operation. Also, note that the radial system can serve to guy the system if insulators are used at the proper lengths as shown.

() This system *must* be grounded for lightning protection. Connect a ground wire to one U-bolt on the antenna base and run it to a buried, 8' ground rod by the shortest route.

() If you are ground-mounting your antenna, install it as shown in Figure 2. You must install an 8' ground rod as shown.

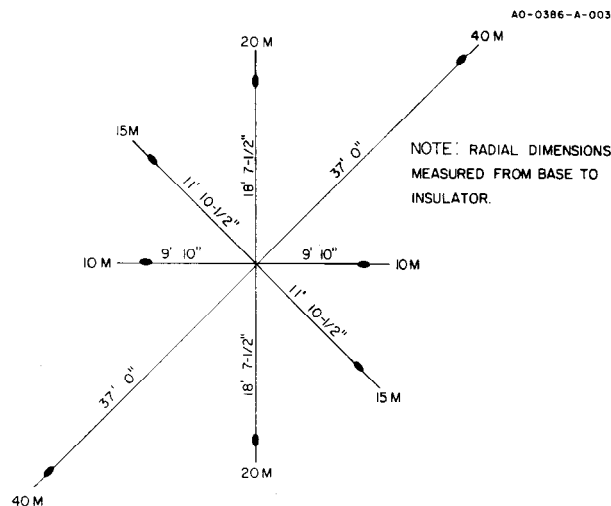


Figure 4. Roof Mounting Radials

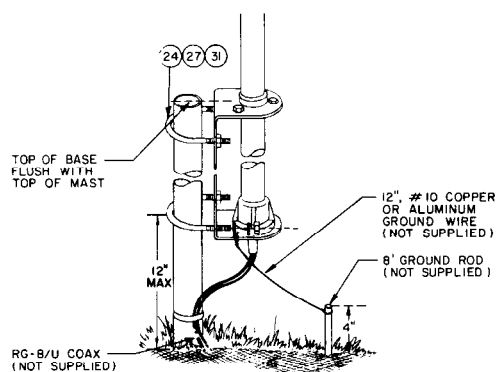
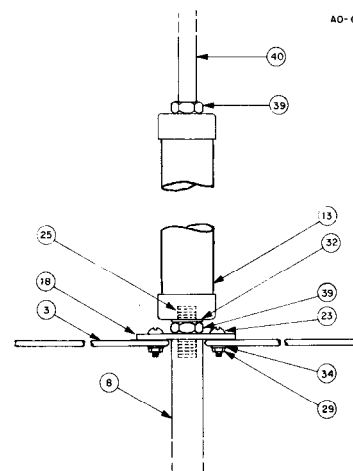
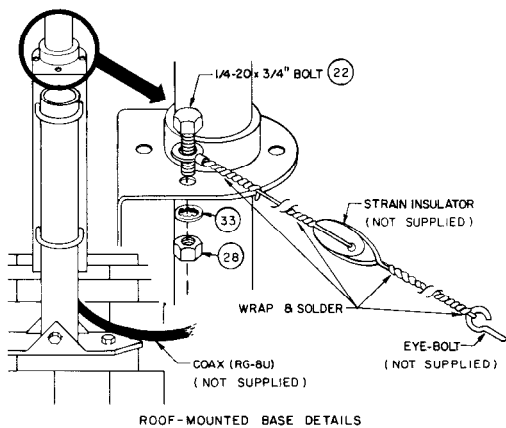
Hooking Up the Antenna

() Connect your coax (RG-8/u) to the SO-239 connector at the bottom of the mounting bracket.

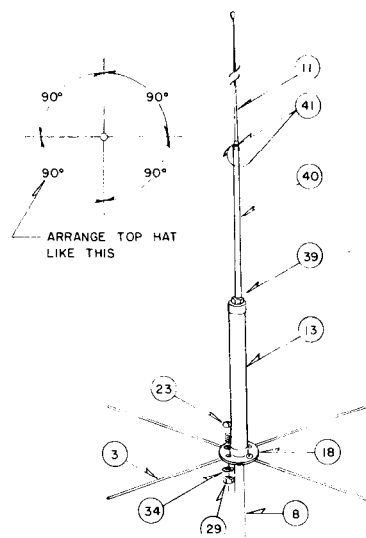
() Weather seal the coax connection with Pli-O-Bond, neoprene, krylon, or equivalent to prevent moisture from shorting out the connection. Further, in coastal areas or smog, cover the hardware with live rubber such as DOW-CORNING Silastic Rubber, or GE Silicone Seal.

() For maximum lightning protection, we recommend the use of a Hy-Gain LA-1 lightning arrestor, available from you Hy-Gain dealer.

Your antenna is now ready to use.

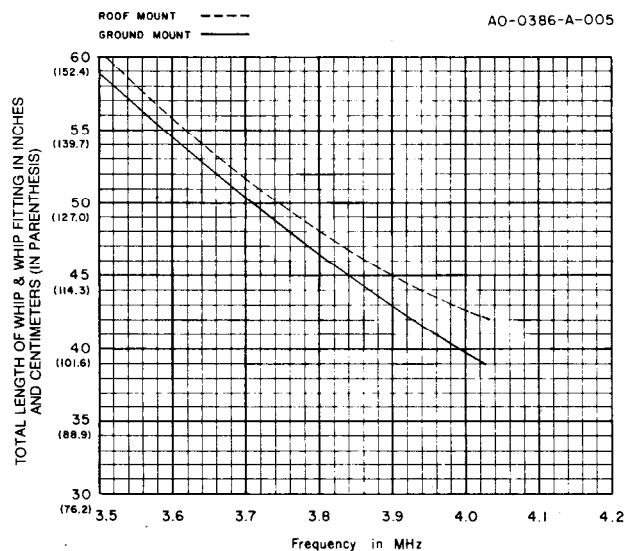


GROUND MOUNTED BASE DETAILS



TOP ASSEMBLY DETAILS

Figure 2. Top and Mount Details



NOTE: Dimension includes 1" for insertion into whip fitting.

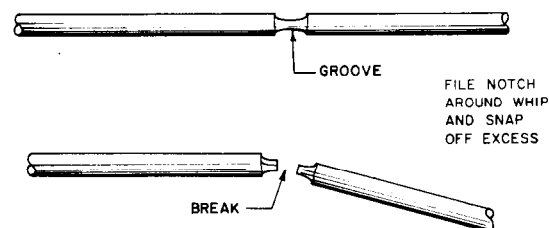


Figure 3. Cutting Chart for Whip Rod

Installing the Antenna

Refer to the two mounting details of Figure 2 and Figure 4 to install the completed antenna.

() First mount the completed antenna on your mast (not supplied) as shown in Figure 2. Use the two U-bolts and 5/16" nuts and lockwashers.

() Use three 1/4"-20 x 3/4" bolts, nuts, and lockwashers to attach the insulator to the upper end of the mounting bracket.

() If you are roof-mounting your antenna, use four sets of 1/4"-20 hardware for the preceding step. Before tightening them, attach two adjacent radials to each set of hardware as shown in the two figures.

NOTE: If your antenna is mounted more than 24" above ground, a radial system must be added for proper operation. Also, note that the radial system can serve to guy the system if insulators are used at the proper lengths as shown.

() This system *must* be grounded for lightning protection. Connect a ground wire to one U-bolt on the antenna base and run it to a buried, 8' ground rod by the shortest route.

() If you are ground-mounting your antenna, install it as shown in Figure 2. You must install an 8' ground rod as shown.

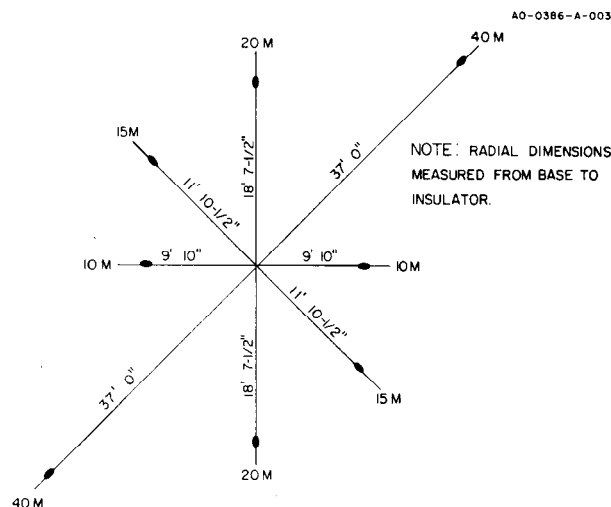


Figure 4. Roof Mounting Radials

Hooking Up the Antenna

() Connect your coax (RG-8/u) to the SO-239 connector at the bottom of the mounting bracket.

() Weather seal the coax connection with Pli-O-Bond, neoprene, krylon, or equivalent to prevent moisture from shorting out the connection. Further, in coastal areas or smog, cover the hardware with live rubber such as DOW-CORNING Silastic Rubber, or GE Silicone Seal.

() For maximum lightning protection, we recommend the use of a Hy-Gain LA-1 lightning arrestor, available from you Hy-Gain dealer.

Your antenna is now ready to use.

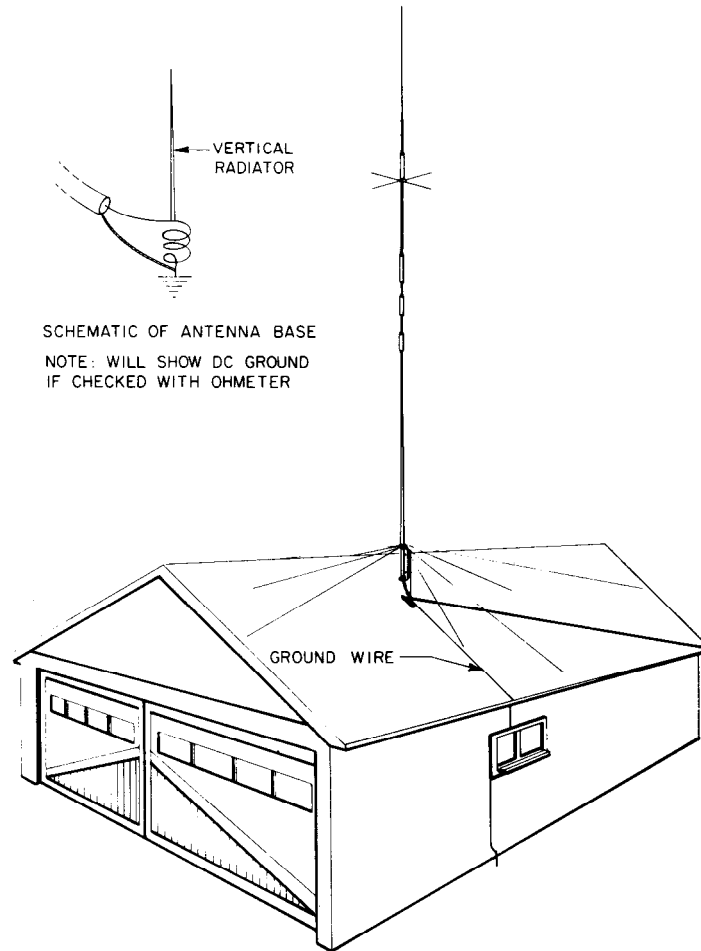


Figure 5. Completed Installation

Converting English Measurements to Metric

Use this scale to identify lengths of bolts, diameters of tubes, etc. The English inch (") and foot (') can be converted to centimeters in this way.

$$1 \text{ inch (1")} = 2.54 \text{ cm}$$

$$1 \text{ foot (1')} = 30.48 \text{ cm}$$

example:

$$42" \times 2.54 = 106.7 \text{ cm}$$



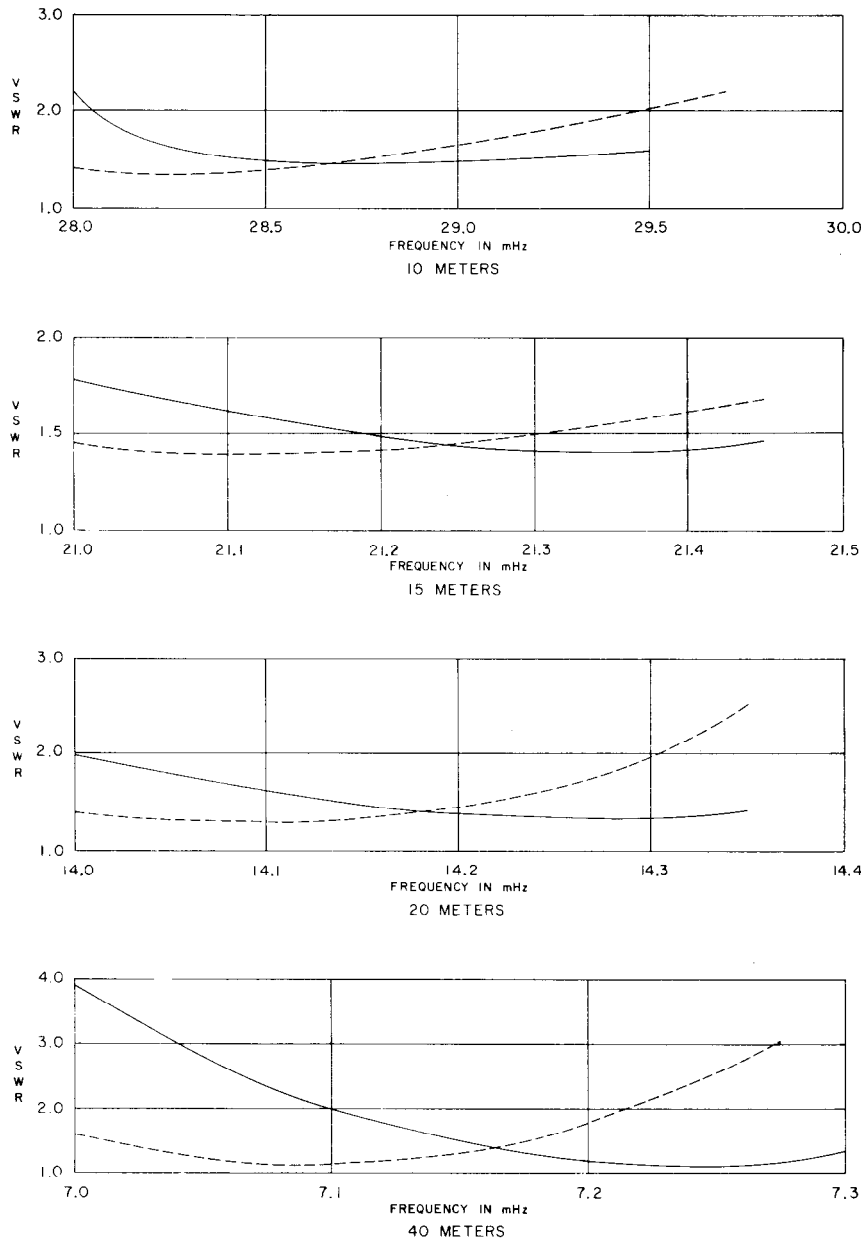


Figure 6. Typical VSWR Curves (ground mount)

90-DAY LIMITED WARRANTY

Hy-Gain Electronics Corporation warrants each new product manufactured to be free from defects in material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit which under normal installation, use, and service, discloses such defect within the ninety-day term of this warranty, dated from the date of purchase by the original owner. This warranty applies only to the original purchaser.

This warranty does not extend to any of our products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us. Nor does it extend to units which have been repaired or altered outside of our factory, nor to accessories used therewith not of our own manufacture.

Upon receipt of equipment, the purchaser is responsible for checking the contents for damage. Any shipping damage should be referred to the carrier.

Hy-Gain Electronics Corporation reserves the right to make any changes deemed necessary or desirable without advance notice or incurring any obligation to make like changes in units previously manufactured or sold.

This warranty does not cover transportation costs that may be incurred. Hy-Gain Electronics Corporation's sole liability is the remedy of any defect for the ninety-day period of this warranty. Hy-Gain Electronics Corporation is not responsible for

personal injury or property damage resulting from improper or careless installation, or usage not intended by the manufacturer.

No person is authorized to assume for us any other liability in connection with the sale of our products.

All warranties are void and terminated one year after the last unit of its type and design has been manufactured by us.

All claims of defect or shortage should be addressed to:

Hy Gain Warranty Service
Hy-Gain Electronics Corporation
4900 Superior Ave.
Lincoln, Nebraska 68504

You must furnish model number, date, place, and proof of purchase, such as a copy of the sales receipt to establish warranty. Your letter should include all pertinent details along with part or item numbers involved. Do not return anything until requested to do so. No warranty card is furnished; you must supply the above information.

Any returned items must have prior authorization. Unexpected returns are greatly delayed in handling. These delays can be avoided by writing in advance and furnishing the necessary information.

Parts List

Item	Part No.	Description	Qty
1	170603	tube, 1 $\frac{1}{8}$ " x 20 $\frac{1}{2}$ " (2.85 cm x 52.07 cm)	1
2	170606	tube, 1 $\frac{1}{8}$ " x 5 $\frac{7}{8}$ " (2.85 cm x 14.92 cm) ground mount	1
3	170610	top radials	4
4	170612	tube, 1 $\frac{1}{8}$ " x 26" (2.85 cm x 66.04 cm)	1
5	170621	tube, 1 $\frac{1}{8}$ " x 9" (2.85 cm x 22.86 cm) roof mount	1
6	170625	tube, $\frac{7}{8}$ " x 22 $\frac{1}{2}$ " (2.22 cm x 57.15 cm)	1
7	870135	trap, 15-meter	1
8	870136	top rod w/insert	1
9	870137	base assembly	1
10	870138	trap, 10-meter	1
11	878793	whip, tapered 52"	1
12	870169	trap, 20-meter	1
13	878761	resonator, 80-meter	1
	870134	parts pack	1
14	165361	compression clamp, $\frac{3}{4}$ " (1.90 cm)	1
15	168680	compression clamp, 1 $\frac{1}{4}$ " (3.175 cm)	1
16	168681	compression clamp, 1 $\frac{1}{8}$ " (2.85 cm)	6
17	168682	compression clamp, 1" (2.54 cm)	1
18	170615	top plate	1
19	351787	Allen wrench, #8 (.41 cm)	1
20	455624	caplug, $\frac{1}{8}$ " (.317 cm)	4
21	505540	screw, $\frac{1}{4}$ "-20 x $\frac{3}{8}$ ", hex head (.625 cm x .95 cm)	8
22	506325	screw, $\frac{1}{4}$ "-20 x $\frac{3}{4}$ " hex head (.625 cm x 1.90 cm)	4
23	506485	screw, #10-24 x $\frac{1}{2}$ " round head (.48 cm x 1.27 cm)	4
24	543792	U-bolt, $\frac{5}{16}$ "-18 x 2 $\frac{1}{4}$ " (.793 cm x 5.72 cm)	2
25	546830	stud, $\frac{3}{8}$ " x 1" (.952 cm x 2.54 cm)	1
26	555362	nut, 10-24, square (.48 cm)	1
27	556945	nut, $\frac{5}{16}$ "-18, hex jam (.79 cm)	4
28	556960	nut, $\frac{1}{4}$ "-20, hex (.625 cm)	4
29	556970	nut, 10-24 hex (.48 cm)	4
30	558685	nut, $\frac{1}{4}$ "-20 square (.625 cm)	8
31	567075	lockwasher, $\frac{5}{16}$ " int. (.793 cm)	4
32	567095	lockwasher, $\frac{3}{8}$ " int. (.952 cm)	1
33	567110	lockwasher, $\frac{1}{4}$ " int. (.625 cm)	4
34	567125	lockwasher, #10 int. (.48 cm)	4
35		(not assigned)	
36	170271	tube, 1 $\frac{1}{8}$ " x 14" (2.85 cm x 35.56 cm) ground mount	1
37	505692	screw, 10-24 x $\frac{3}{8}$ " (.48 cm x .95 cm)	1
		(used with $\frac{3}{4}$ " compression clamp)	
38	170277	tube, 1 $\frac{1}{8}$ " x 12" (2.85 cm x 30.48 cm) roof mount	1
39	552964	$\frac{3}{8}$ " nut	2
40	380261	1 $\frac{1}{8}$ " whip fitting	1
41	531579	#8 set screw	2