INSTALLATION INSTRUCTIONS
HUSTLER 4-BTV, 5-BTV TRAP VERTICAL

WARNING
INSTALLATION OF THIS PRODUCT NEAR POWER LINES IS DANGEROUS

FOR YOUR SAFETY, FOLLOW THE INSTALLATION DIRECTIONS

GENERAL DESCRIPTION:

The Hustler 4-BTV is a four-band trap vertical antenna providing an omni directional pattern. The 4-BTV is designed as a self-supporting vertical to provide optimum operation in the 10,15, 20 and 40 meter bands. It can also be adapted to operate in the 75 meter band. This antenna is designed for installations with restricted space.

The Hustler 5-BTV is a five band trap vertical antenna adding 75/80 meter operation to the 4-BTV. This is achieved by adding the RM-80S resonator and 4457-1 spider assembly (see diagram page 3).

The Hustler 4-BTV provides electrical selection of bands through the use of optimum Q traps, which are individually and precisely tuned and internally sealed at the factory. The traps are parallel tuned circuits, which provide efficient isolation between the vertical sections, permitting the multi-band operation. Broadband operation over the entire ham band at very low SWR's is possible in a proper installation. Operation in the 75/80 meter band is provided by installing the appropriate resonator on top of the 4-BTV.

The Hustler 4-BTV was designed to provide optimum performance from both an electrical and mechanical standpoint. Mechanically, this antenna boasts a heavy duty base and heavy duty aluminum tubing. The mechanical assembly is accomplished with all stainless steel hardware. The use of clamps permits readjustment if necessary, and allows individual peaking of each band. The mechanical construction is such that guying is not ordinarily needed. If the 75 meter resonator is attached to the 4-BTV, it may be desirable to guy the antenna above the 20 meter trap with small diameter polypropylene rope.

The performance provided by the Hustler 4-BTV is better than any other antenna of this type. Broad banding is such that one measurement and setting permits both phone and CW operation. The antenna provides a nominal 52 ohm base impedance when installed and tuned according to the instructions. The radiation efficiency is equivalent to, or greater than, other trap verticals.

STEP-BY-STEP ASSEMBLY:

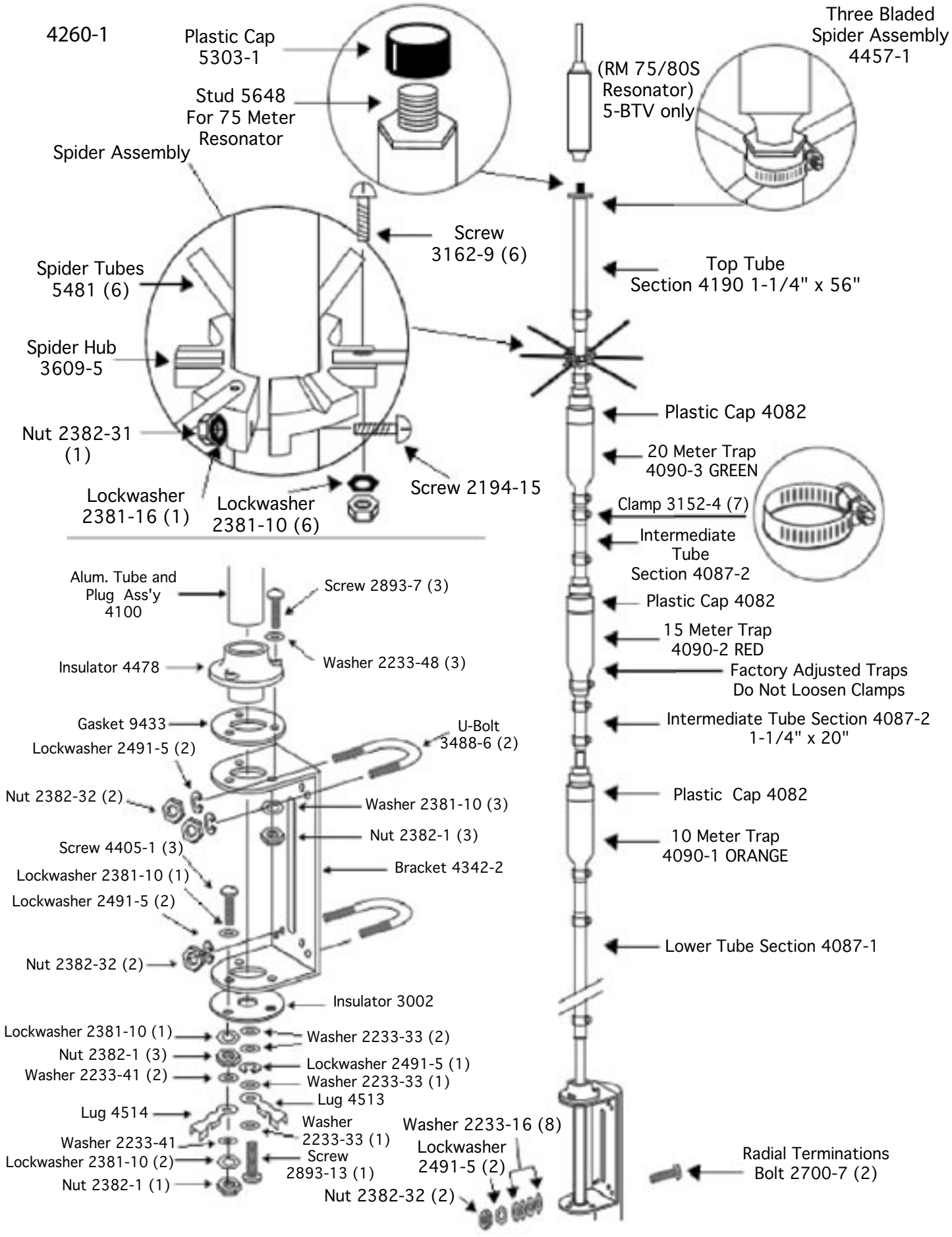
1. Check the parts against the package contents listed on the following page.

2. Install mounting bracket on the support mast or stake. Tighten "U" bolts securely. Use
   lock washers and 1/4"-20 hex nuts (heavy nuts). Use 1-1/4" I.D. water pipe or other very strong support.

3. Accurately cut radial lengths (if needed or desired) in accordance with radial length table (Fig. 6)

PACKAGE CONTENTS

Qty.	Part Number	
1	4098-1	Bracket Assembly
1	4190	Top Tube Section
1	4087-1	Lower Tube Section
2	4087-2	Intermediate Tube Section
1	4090-1	Ten Meter Trap
1	4090-2	Fifteen Meter Trap
1	4090-3	Twenty Meter Trap
6	5481	Spider Tubes
1	4198	Accessory Kit Consisting of the Following:
	IN PLASTIC BAG	
7	3152-4	Clamp, #12, SS
2	3488-6	"U" Bolts
4	2491-5	Lock washers 1/4" Split
1	3609-5	Spider Hub
1	2194-15	Screw 6-32 x 3/4"
1	2382-1	Nut Hex, 10-32 SS
7	2832-31	Nut Hex, 6-32 SS
4	2832-32	Nut 1/4-20 x 7/32" Thick
1	4513	Terminal Lug 1/4" Hole
1	4514	Terminal Lug #10 Hole
6	3162-9	Flat Head Screw 6-32 x 5/8"
2	2233-41	Washer 1/2" O.D. x 3/16" I.D.
7	2381-16	Lock washer Ext. #6 SS
1	6099	Danger Label
	IN PLASTIC BAG FOR RADIAL MOUNTING	
2	2700-7	Hex Head Bolt 1/4-20 x 1-1/2"
8	2233-16	Washers 5/8" O.D. x 1-1/4" I.D.
2	2491-5	Lock washer 1/4"
2	2832-32	Nuts 1/4-20 x 7/32" Thick


4260-1
Plastic Cap 5303-1
Stud 5648 For 75 Meter Resonator
Spider Assembly
Screw 3162-9 (6)
Spider Tubes 5481 (6)
Spider Hub 3609-5
Nut 2382-31 (1)
Lockwasher 2381-16 (1)
Lockwasher 2381-10 (6)
Screw 2194-15
(RM 75/80S Resonator) 5-BTV only
Three Bladed Spider Assembly 4457-1
Top Tube Section 4190 1-1/4" x 56"
Plastic Cap 4082
20 Meter Trap 4090-3 GREEN
Clamp 3152-4 (7)
Intermediate Tube Section 4087-2
Plastic Cap 4082
15 Meter Trap 4090-2 RED
Factory Adjusted Traps Do Not Loosen Clamps
Intermediate Tube Section 4087-2 1-1/4" x 20"
Plastic Cap 4082
10 Meter Trap 4090-1 ORANGE
Lower Tube Section 4087-1
Radial Terminations Bolt 2700-7 (2)
Alum. Tube and Plug Ass'y 4100
Screw 2893-7 (3)
Washer 2233-48 (3)
Insulator 4478
Gasket 9433
U-Bolt 3488-6 (2)
Lockwasher 2491-5 (2)
Nut 2382-32 (2)
Washer 2381-10 (3)
Nut 2382-1 (3)
Screw 4405-1 (3)
Lockwasher 2381-10 (1)
Bracket 4342-2
Lockwasher 2491-5 (2)
Nut 2382-32 (2)
Insulator 3002
Lockwasher 2381-10 (1)
Washer 2233-33 (2)
Nut 2382-1 (3)
Lockwasher 2491-5 (1)
Washer 2233-41 (2)
Washer 2233-33 (1)
Lug 4513
Lug 4514
Washer 2233-33 (1)
Washer 2233-41
Lockwasher 2381-10 (2)
Screw 2893-13 (1)
Nut 2382-1 (1)
Washer 2233-16 (8)
Lockwasher 2491-5 (2)
Nut 2382-32 (2)

Recommended Method of Preparing Coax

Separate strands of braid with an awl being careful not to break any.

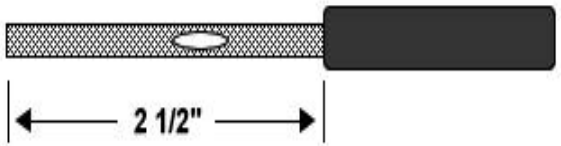


Figure 2

Draw center conductor out with an awl or dull pointed instrument.



Figure 3

Lug with 3/16" dia. Hole on shield end.



Lug with 1/4" dia. hole on side.

Solder on the size lugs as indicated above.
Tape tightly with plastic electrical tape.
After installing coat with sealant

Figure 4

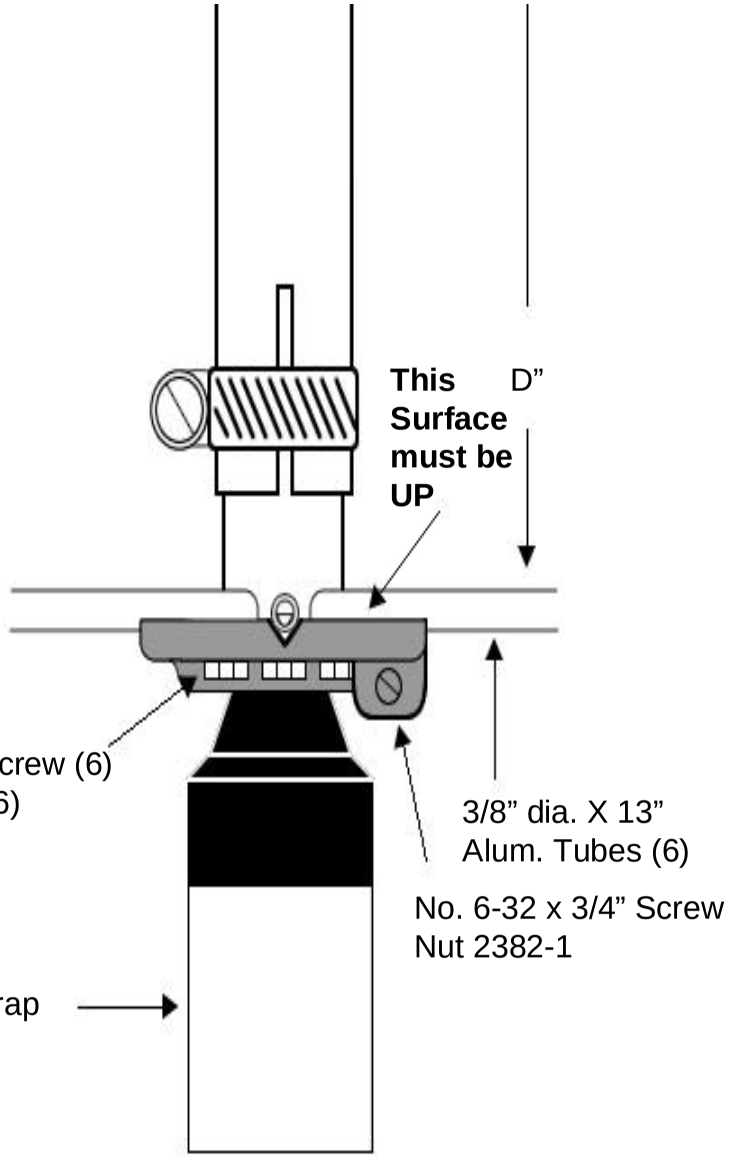


Figure 5

4260-1

Figure 6

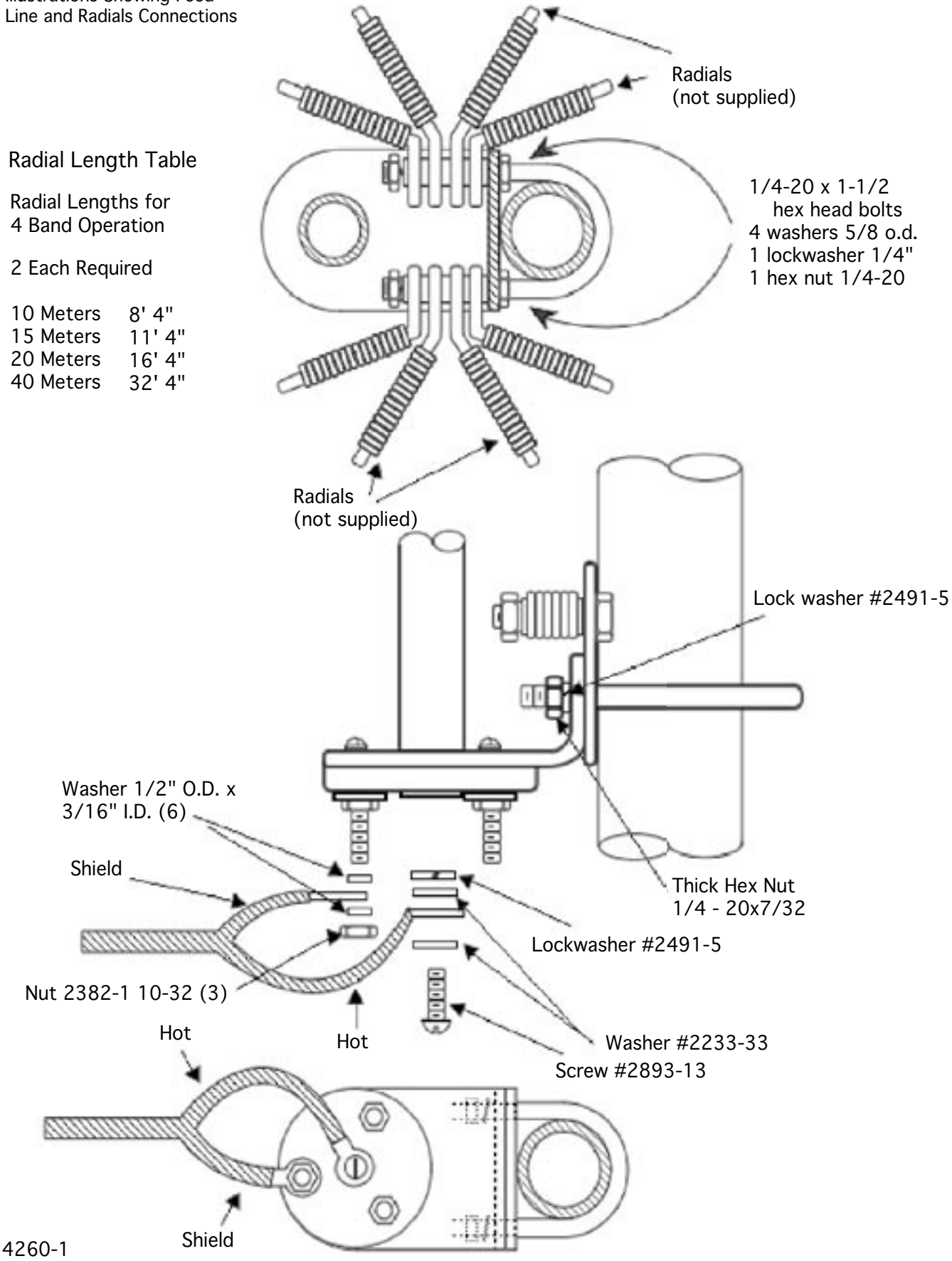
Illustrations Showing Feed Line and Radials Connections

Radial Length Table

Radial Lengths for 4 Band Operation

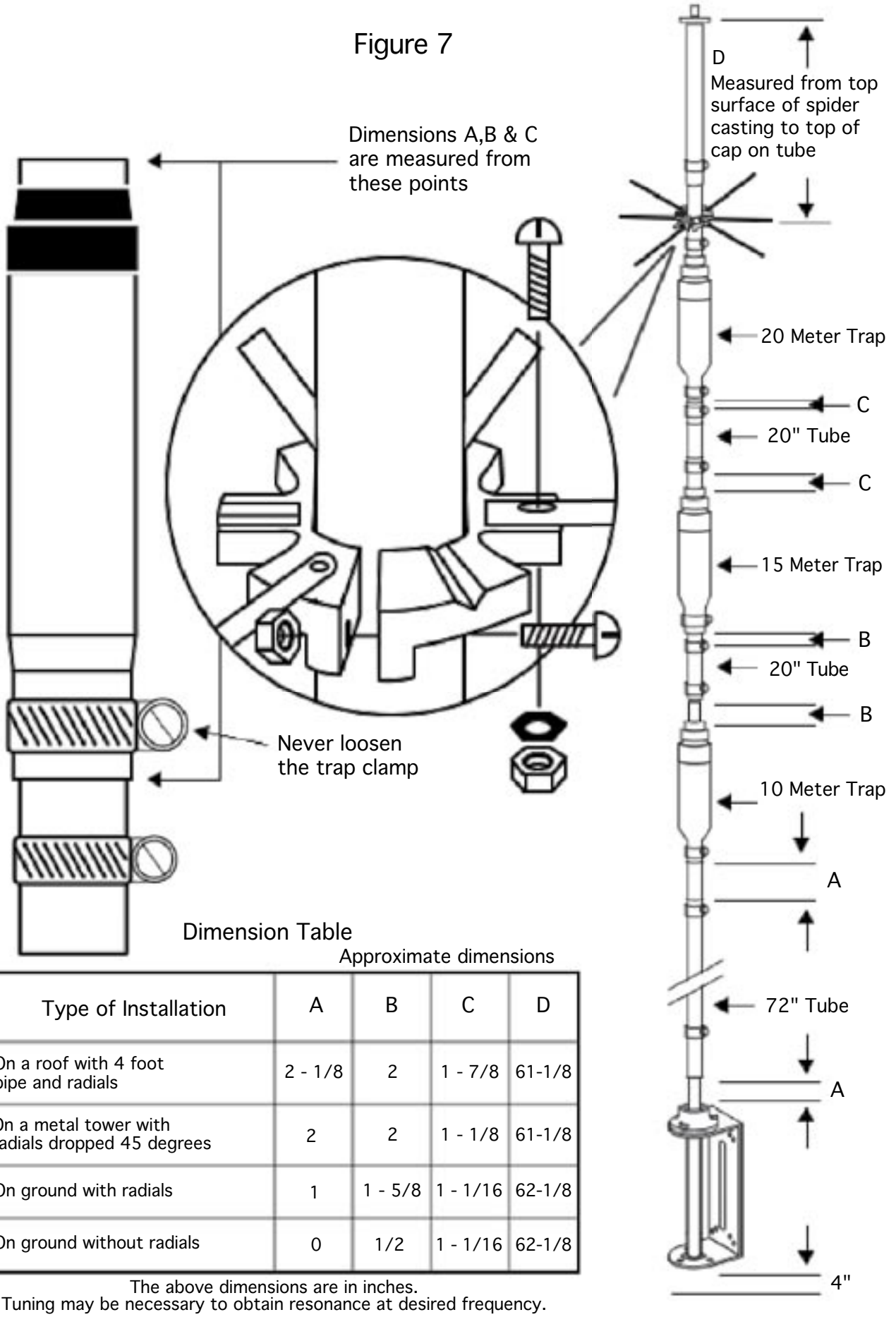
2 Each Required

10 Meters	8' 4"
15 Meters	11' 4"
20 Meters	16' 4"
40 Meters	32' 4"



4260-1

Figure 7



Dimension Table

Approximate dimensions

Type of Installation	A	B	C	D
On a roof with 4 foot pipe and radials	2 - 1/8	2	1 - 7/8	61-1/8
On a metal tower with radials dropped 45 degrees	2	2	1 - 1/8	61-1/8
On ground with radials	1	1 - 5/8	1 - 1/16	62-1/8
On ground without radials	0	1/2	1 - 1/16	62-1/8

The above dimensions are in inches.
Tuning may be necessary to obtain resonance at desired frequency.

4. Prepare split lead on coax in accordance with Figure 2 and 3. RG-8U coax is recommended.

5. Install lugs on coax as shown in Figure 4 and weatherproof with electrical tape.

6. Install coax feed line and radials as shown in Figure 6.

7. After making all connections to the mounting bracket, a heavy protective coating such as Krylon clear spray would be very advantageous.

8. Assemble the 3/8" x 13" tubes to the hub as shown in Figure 5, using the 6-32 machine screws, number 6 lock washers and the 6-32 hex nut.

9. Install the 10 meter trap to the 1-1/4" x 72" tube, using one of the clamp assemblies. Set to dimension A and table in Figure 7, the measurement should be made at the end of the long tube and the bottom edge of the trap. Securely and carefully tighten the clamp.

   IMPORTANT

   THE PLASTIC CAP IS THE TOP OF THE TRAP AND MUST BE INSTALLED IN THAT POSITION, THE CLAMP AT THE BOTTOM OF THE TRAP SHOULD NOT BE LOOSENED. THIS WOULD UPSET TRAP CALIBRATION.

10. Install #12 clamp at each end of one of the 1-1/4" x 20" tubes and slide over the tube of the 10 meter trap. Install the 15 meter trap in the opposite end of the same tube and set both dimensions B from table in Fig. 7. The measurement should be made from the upper most edge of the plastic cap to the bottom edge of the 15 meter trap. Securely tighten clamps.

11. Install the second 1-1/4" x 20" tube, complete with clamps, on the 15 meter trap and then install the 20 meter trap in the top of that tube. Set to dimension C from the table in Fig. 7, again measuring from the top of the plastic at the bottom of the tube, and from the top of the tube to the bottom edge of the trap.

12. Install spider assembly as shown in Fig. 5, it should be flat against the top of the 20 meter trap cover. Securely tighten the 6-32 x 3/4" screw with lock washer and hex nut.

13. Install the 1-1/4" x 56" tube to the 20 meter trap and set to dimension D from table in Fig. 7. Securely tighten clamps.

14. Each clamp should be installed near the edge of the tubing to obtain the best mechanical and electrical connection. Re-check all bolts to insure tightness. Re-check all dimensions against table in Fig. 7.

15. Install assembled antenna on mounting bracket and set the bottom dimension A, from table in Fig. 7, and securely tighten clamps. Never allow the mast on which a 4-BTV is mounted to extend above the bracket.

INSTALLATION:

READ THE ATTACHED SAFETY WARNING ON LAST TWO SHEETS BEFORE PROCEEDING FURTHER

An important part of any vertical antenna is its ground plane. While the Hustler 4-BTV was designed as a space saver, we recommend one of the following installations from a performance viewpoint.

1. For optimum performance, roof mount with radials. Roof mounting of the antenna will provide height which, in turn will generally provide better transmission and reception.

   The 4-BTV can be mounted on a ground mounted tower, heavy duty chimney clamp, wooden pole, short roof mounted tower or other suitable support assembly. Try to locate the antenna 10-15 feet away from non-metallic structures.

   CAUTION: Mounting the 4-BTV on towers, tripods, or large mast pipes, approximately a quarter wave in length, can often provide an upset to the counterpoise created by the radial system, and act as a vertical dipole instead of the desired ground plane. To correct this problem, the radial system must be R.F. isolated from the mounting structure. This may be done by using a non-conductive mounting mast, such as heavy wall fiberglass tube or fiberglass rod or by sliding a split piece of PVC pipe over the metal mast. The coax or mounting bracket should not be directly grounded.

   The 4-BTV installation is most easily accomplished by installing the base only to your support assembly. After connecting radials and feedline to the base, the 4-BTV can be attached to the base.

   Using the radial length table (Fig. 6) install two insulated wire radials for each band used. It is recommended that the radials be constructed of large diameter insulated wire, 14 gauge is usually ample.

   When radials are installed they should be equally spaced around 360 degrees with radials of equal length opposite each other. Never bunch radials as one will detune the other. They should be attached to the base mount in accordance with Figure 6.

   Care should be taken to make a good electrical connection at the antenna bracket. When radials are used in a roof mount configuration, every attempt should be made to permit a 45 degree droop angle below horizontal.

   This is accomplished by choosing a mounting pipe or short tower long enough to make these angles possible. If space is limited, some compromise is permissible providing the droop angle is held between 10-60 degrees below horizontal with radials fanned out as much as possible.

   If space is severely restricted, radials may be zigzagged or run in an "L" configuration avoiding near parallel wrap back less than 90 degrees.

1. The importance of the ground system cannot be over-emphasized. The ground or radial system must be considered as half the antenna.

   When radials are used, high impedance will exist at the ends of the radials, and adequate insulation must be provided, or their purpose will be defeated. Tie them off using a non-conductive material such as polypropylene rope or heavy gauge fishing line. In a case where the antenna or the radials are mounted over or near metallic objects the radials must be insulated or mounted at least 4 in. over the roof.

2. Second Choice, ground mount with radials; if you are unable to mount the antenna in the preferred roof mount configuration, the second best choice would be that of ground mounting. In ground mounting it is important to choose a location reasonably free from obstructions such as houses, metal fences, trees, wires, vertical downspouts, aluminum siding, other antenna, etc. Try to maintain at least a radius of 10-15 feet of clear area around the antenna. It is recommended that the 4-BTV be mounted on a 4 foot metal stake such as a 1-1/4" I.D. Water pipe. Do not exceed this length. This stake should be buried in the ground with 18 inches left protruding. (Do not concrete or put into a pre-dug hole. Drive it into the ground.) Position the 4-BTV base on this pipe to a location not exceeding four inches of separation between earth and coax connection. Do not try to use a network of ground rods around the base of the antenna. If the ground supplied by this pipe is not sufficient, radials must be employed.

   The radials in this type of installation will provide a better overall performance than that of stake mount only. Ground mount radials may be either buried a couple of inches below the surface or left on top of the ground. If they are left on unburied, power equipment (such as lawnmowers) or pedestrian traffic could become entangled in the wires.

   Using the radial length table, Fig. 6, install two insulated radials for each band. It is recommended that the radials be constructed of large diameter wire; #14 gauge is usually sufficient. The radials should be spaced around the base 360 degrees with radials of equal length opposite each other. Never bunch radials, as one will detune the other. They should be attached to the base mount in accordance with Figure 6. Any wire droop on the ground need not be of concern.

Least Desirable, ground mount without radials. If you do not have sufficient space and are unable to use a ground radial system, ground mounting of the antenna on a 4 foot ground stake driven into the ground with only 18 inches protruding, will provide good performance, which in turn, will be in direct ratio to the ground conductivity and soil conditions in your particular area.

In ground mounted location, performance (SWR, bandwidth and radiation efficiency) is directly related to ground conductivity. If the ground conductivity is good, you obviously will obtain better results. As stated previously, the 4-BTV was expressly designed to give you satisfactory performance even in this configuration. Therefore, if ground mounting without radials is a necessity, you can still obtain better performance from the 4-BTV than obtainable from any similar antenna.

NOTE: Adding more pairs of radials than the 2 per band prescribed in instructions, may result in obtaining better results for DX'ing.

Favorable soil conditions can be a reason that sometimes a ground mount using the soil as a ground plane may result in better DX'ing than a roof mount using only a pair of radials per band.

TUNING FOR ALL CHOICES:

The dimensions given in the table are approximate and will vary, depending on environment. To check antenna tuning, use a sensitive SWR bridge. (DO NOT USE A FIELD STRENGTH METER.) Using only sufficient power to obtain a full scale reading, check and record the SWR at the high, center and low edge of the bands. If the SWR reading is lowest at the high end, lengthen the related section of the antenna; if it is lowest at the low end, shorten this antenna section. Always attempt to get the very lowest SWR reading in the center of the band. Tuning in this manner will permit operation in both the phone and CW portions with a low SWR. If you favor one end of the band or the other, you can retune the antenna to provide the lowest SWR in that portion, if desired.

In the process of tuning the antenna, it is mandatory that you always start with 10 meters and work your way up the antenna. Tune 10 first, then 15, 20 and 40 meters. Any adjustments made on 10 will affect the other bands. Any adjustment made on 15 will affect 20 and 40. By the same token, any adjustments on 20 will affect 40. Adjustment of the individual bands is as follows: 10 meters, adjust dimension A; 15 meters, adjust dimension B; 20 meter, adjust dimension C; and 40 meters, adjust dimension D.

It is not necessary to remove the bracket each time to adjust the antenna. It is only necessary to remove the antenna from the bracket. (If the desired SWR cannot be achieved, it is probably because of an insufficient counterpoise system or poor soil conditions.)

If resonance can be adjusted properly but a low SWR cannot be reached, then it is probably due to insufficient insulation at the ends of the radials, improper angle of the radials, or reflections from nearby resonant objects. A number of conditions may cause the resonance to shift from the factory dimensions occasionally to the point that resonance cannot be reached within the normal range of adjustment; lengthening or shortening the radials may help to compensate for these conditions. Changing coax length or adjusting a tuner may make the SWR appear better but will not change the antenna, the final radiator, or its performance. When the antenna is tuned properly at resonance, little change in SWR will occur regardless of where the bridge is located in the line.

Never use an antenna tuner to tune the 4-BTV. Proper tuning of this antenna requires the 4-BTV sections. Use of a tuner only fools the transmitter and does not correct a problem at the antenna. The antenna system must be tuned properly at the antenna to radiate efficiently.

Filters should never be used in a coax line while trying to tune an antenna.

1ADDING 75/80 METER CAPABILITY

1. With reference to Figure 7, mark the location at the bottom of the dimension “A” and remove the 4-BTV from its base by loosening the lowest stainless steel clamp.

2. If your installation is elevated, two radials are required at the following lengths. If space is restricted, radials may be zigzagged or run in an “L” configuration avoiding near parallel wrap back. Phone Band: 75 meter resonator – 64’ 4”, CW Band: 80 meter resonator – 65’ 6”.

3. Install a spider assembly, part #4457-1, after bending the three spider arms as illustrated in Figure 1 on the top of the 56” upper tube section just below the 75 and 80 meter resonator.

4. Determine and set approximate tip rod length from Figure 8 for your desired band location. Tighten tip rod locking nut securely and attach resonator to 4-BTV.

5. Replace the 4-BTV on the mounting bracket to its original “A” dimension.

6. Check performance with SWR bridge. Minor adjustment (lowest SWR) may be required on the tip rod length to establish resonance at the desired 75 or 80 meter frequency.

7. Reactance of the resonator may cause slight change in 40 meter resonance. This is easily corrected by adjusting element dimension “D”, Figure 7.

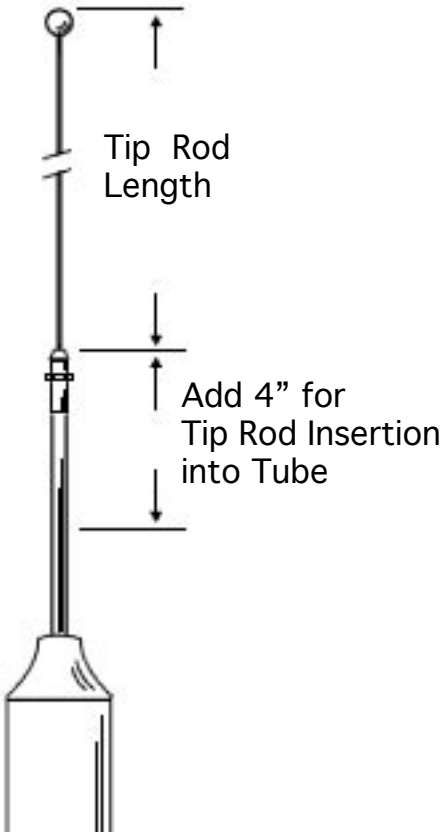
TIP ROD LENGTHS FOR 75 OR 80 METER RESONATORS USED WITH 4-BTV

Tip rod length measured from top of tip ball down to top of clutch locking nut as illustrated.
NOTE: All resonators are supplied with tip rod lengths for mobile operation. With the 4-BTV, a shorter length is required, therefore, remove the tip rod from the resonator and grind off the necessary amount from the end that inserts in the resonator. Before cutting ascertain the approximate rod length from the chart plus no less than 4 inches for insertion in the upper tube section of the resonator.

DIMENSIONS INDICATED ARE APPROXIMATE

FREQUENCY (KHz.)	RM-75-S RM-80-S	RM-75 RM-80
4000	18”	21-1/4”
3950	19-5/8”	22”
3900	21”	22-1/2”
3850	22-1/2”	23-3/4”
3800	24-1/8”	24-3/4”
3750	25-5/8”	26”
3725 (Novice Band)	26-1/2” (Novice Band)	26-3/4”
3700	27-1/4”	27-3/4”
3650	29”	29-1/4”
3600	30-5/8”	31”
3550	33”	33”
3500	34-5/8”	34-3/4”

The above dimensions are exposed lengths of tip rod.



GUYING

The 4-BTV is designed as a self-supporting vertical. However, if your area encounters severe wind velocities or icing conditions, simple guying will prevent the possibility of failure. Attach a small diameter polypropylene rope just above the 20 meter trap. The polypropylene rope should ultraviolet (UV) stabilized and weather resistant. Guying should be tightened just enough to permit the antenna to swing in a two to three degree arc. If a 75 or 80 meter resonator is included in your installation, use guying.

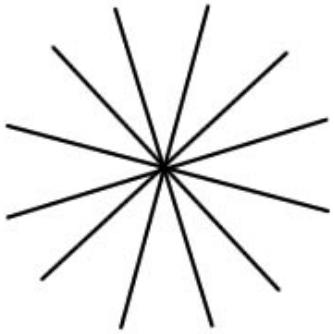
RADIALS

Radials should be made from insulated wire of #14 gauge or larger, insulating the bare ends of wire on the outer end of the radials. A minimum of two radials per band is required.

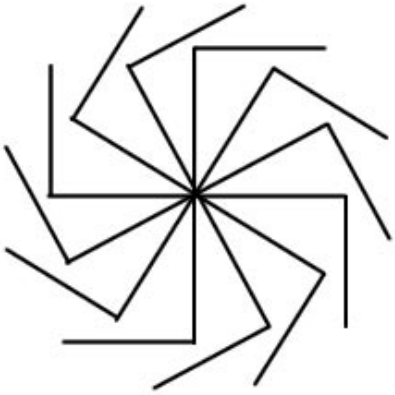
RADIAL LENGTHS ARE AS FOLLOWS

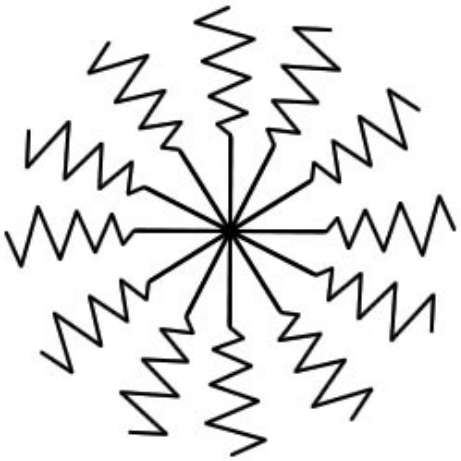
10 Meters	8' 4"
15 Meters	11' 4"
20 Meters	16' 4"
40 Meters	32' 4"
75/80 Meters	64' 4"

Normal Configuration



Limited Space Configurations





NEW-TRONICS ANTENNA CORPORATION LIMITED WARRANTY

New-Tronics Antenna Corp. warrants its products to be free of defects in material and workmanship and extends this warranty under intended use and normal service conditions to the original owner for a period of one year from the date of purchase. This warranty does not apply to any product that has been repaired or altered in any manner and is void for any damage due to accident, neglect, unreasonable use, improper installation, or any other cause not arising out of defects in material or workmanship.

The obligations of New-Tronics Antenna Corporation are limited to repairing or replacing, at its option, any product or part that is returned to the factory; all transportation charges prepaid, accompanied by proof of purchase, and upon examination reveals to have been defective within the warranty period stated above.

New-Tronics Antenna Corp. does not assume nor is any person authorized to assume for it, any obligations other than that herein stated. Any implied warranties, including but not limited to fitness for a particular purpose, is limited in duration for the above one year period. New-Tronics Antenna Corp. shall not be liable under this warranty, or any implied warranty, for loss of use of the product or for other consequential loss or damage incurred by the purchaser. Some states do not allow the exclusion or limitation of implied warranties of consequential damages and so the above exclusions or limitations may not apply in those states. This warranty gives you special legal rights and you may have other rights that vary from state to state.

New-Tronics Antenna Corp.
One Newtronics Place
Mineral Wells, TX 76067-9563
940-325-1386

DECOUPLING YOUR TRANSMISSION LINE

Since your coax shield is connected to where a radial would connect, it too will act as a radial. This is not desirable since this imposes additional currents which will detract from the antennas low SWR at the rig end of your coax.

To prevent this from occurring, form at the base of the antenna or within eight feet of the base, a coil in your coax. By wrapping your coax in a single layer fashion, ten times around a 6" diameter form, you will form an RF choke in the braid which will isolate these additional currents from your coax. Since your coax (the shield) is in the R.F. near field of your antenna, it will act as a collector of R.F. energy (an antenna). This too is not desirable since this can impose similar additional currents which will register as a higher SWR at the rig.

To prevent this, form the same type coil as before at/or within eight feet of your rig.

These coils will NOT impede the RF energy contained inside the coax from flowing. It only acts as a high impedance to the undesirable additional currents on the outside braid of your coax.

After having installed these coils, you may need to retune the antenna.

If you still have a high SWR, perhaps tuned radials are needed.

