



THUNDER 8 — ASSEMBLY INSTRUCTIONS

1) Insert the four fiberglass spreader rods into the 3/8" dia. holes in the 1" and 3/4" dia. aluminum tubing. Bolt in place with 6-32 X 1 1/4 and 1" bolts. Refer to fig.1.

2) Bolt the three telescoping pieces of aluminum together using two 6-32 X 1 1/4" bolts.

3) Unroll the four element wires, taking care to avoid kinks.

4) Attach two of the element wires to the fiberglass rods and center support (3-pc. alum. tube) as shown in fig.2. It is best to work with two opposing wires at a time, as shown.

First fasten the points labelled "A" to the fiberglass, then run each wire through the three wire clamps successively, tightening each clamp as the wire is pulled through. At point "B" center the shrink tubing under the clamp, then tighten the clamp. This will result in a slight bow in both the upper and lower fiberglass rods, which serves to keep the wires in tension.

The two wires eventually run parallel to the aluminum tubing, spaced 6" apart, forming a matching stub. Pull the stub taut by sliding the U-clamp at point "D" downward.

5) Attach the other two element wires in the same fashion.

Note: The two bottom U-clamps (at point "D" in fig.2) must be oriented the same way- that is with the holes that the wires bolt to facing up. This is due to the fact that the fiberglass rods are spaced 0.4" and the U-clamps must end up spaced the same amount.

6) Install the two U-clamps which serve as wire guides at a point near the bolt that joins the 7/8" and 3/4" dia. center support tubing, as shown in figures 2 and 3 (point "C" in fig.2). The nylon cable clamps serve to insulate the wires from the metal, and must be installed as shown in the detail on fig.2.

7) Prepare your 50 ohm coax lines as shown in fig.4. The crimp terminals supplied may simply be crimped onto the coax center conductor and braid, but soldering is recommended. An effective moisture seal at the end of the coaxial cable can be achieved by wrapping with electrical tape or with a silicone-type sealer.



figure 1

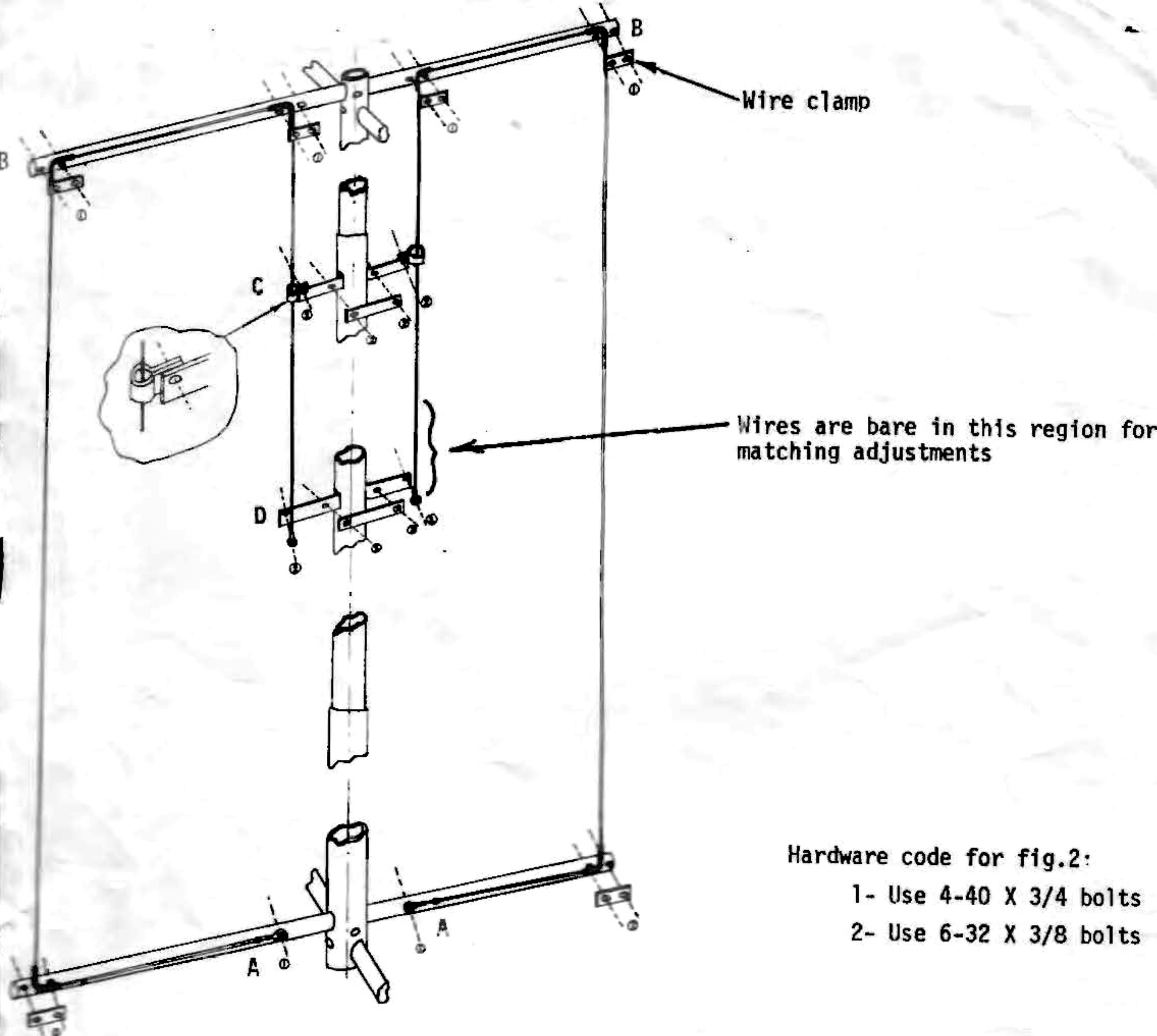


figure 2

Hardware code for fig.2:

- 1- Use 4-40 X 3/4 bolts
- 2- Use 6-32 X 3/8 bolts



figure 3

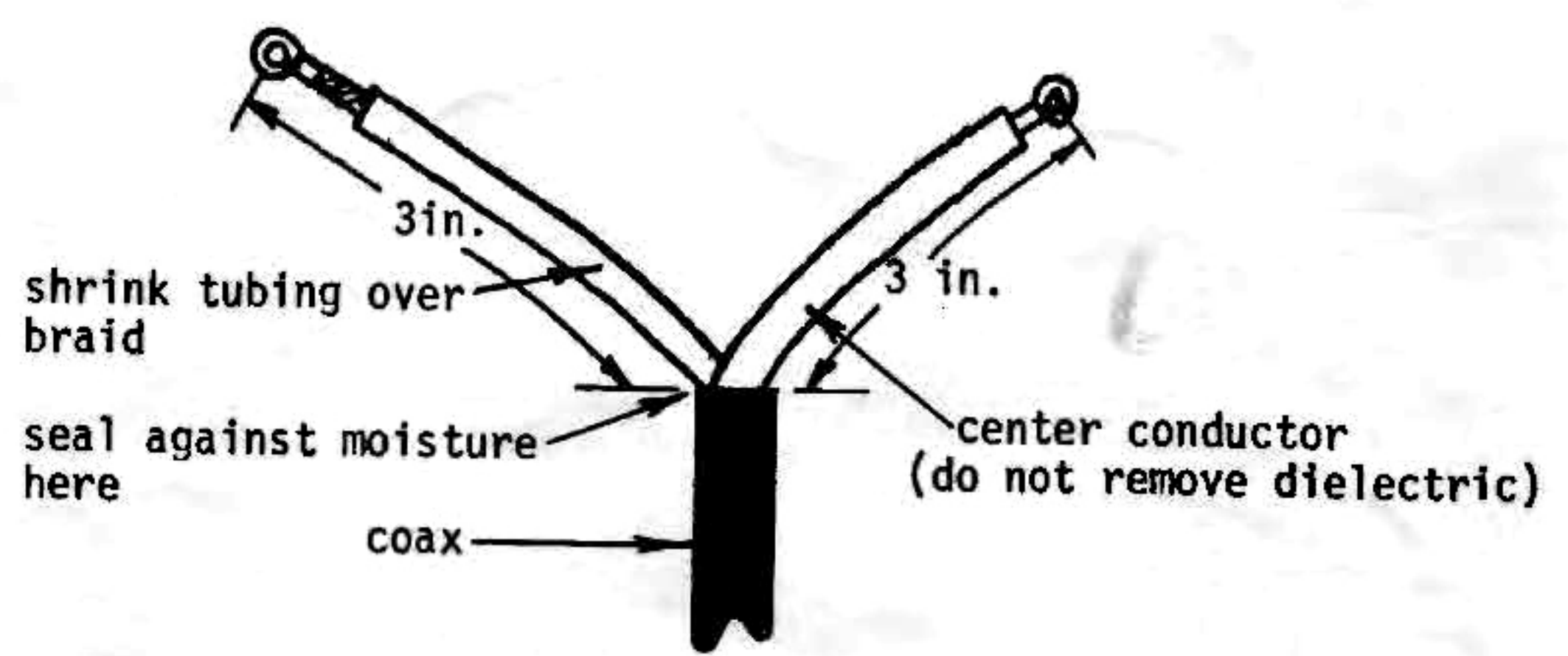


figure 4

- 7) Attach a shorting wire and one coax line to each pair of opposing wires (which form the two matching stubs) as shown in fig.5. Typical settings for D1 and D2 are given below.

CHANNEL WITH MINIMUM SWR

D1

D2

1

4 3/4"

10 3/4"

20

8 1/4"

12 3/4"

40

9 1/8"

13 5/8"

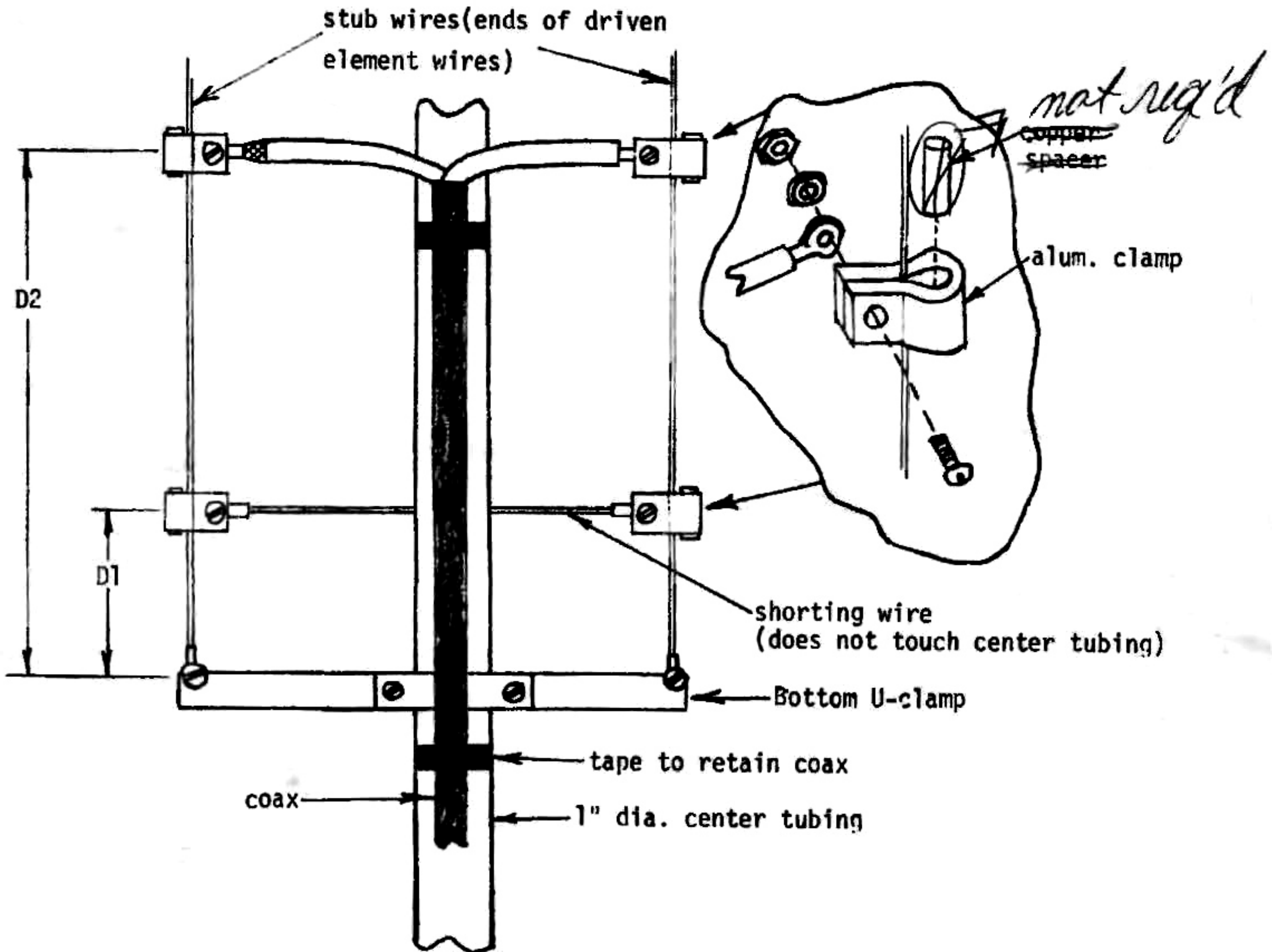


figure 5

- 8) a) Attach the two steel mounting plates to the 1" dia. aluminum tubing using the smaller of the two sizes of U-bolts supplied. Refer to fig. 6. These plates may be spaced up to 5' apart if desired to secure a very rigid mount, however 1 1/2 to 3 ft. separation will normally suffice.
- b) Run the two coax lines along opposite sides of the 1" dia. aluminum tubing, taping periodically. Make certain to tape the coax to the tubing just above the fiberglass rods in order to avoid RF coupling effects to the ends of the wire elements.

9) The antenna may now be U-bolted to your supporting mast or tower. Each of the two two-element beams will radiate along the direction of its fiberglass spreader rods (see fig. 7), therefore when mounting the antenna to the mast, orient it to cover the four primary directions you wish to work with maximum signal strength.

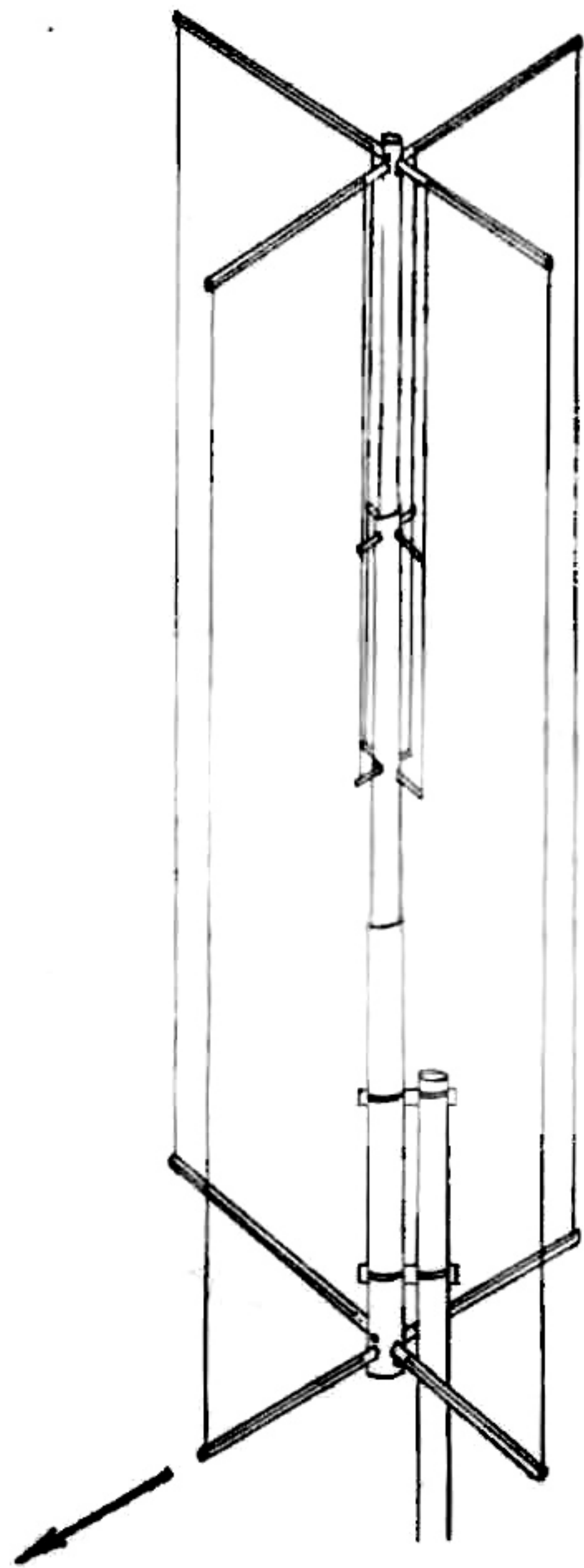
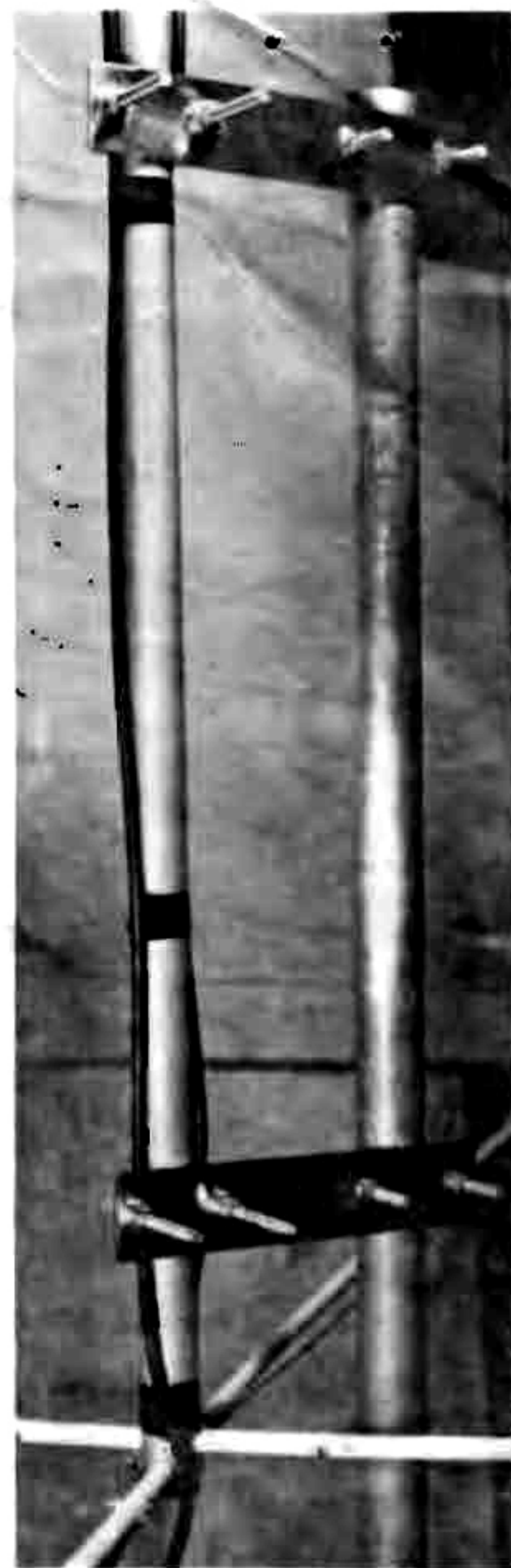


figure 7

Arrows show directions of maximum radiation from one two-element beam



Antenna
Supporting mast
figure 6

10) SWR ADJUSTMENT

SWR should be checked with the antenna temporarily mounted as close as possible to its final position. Settings of D1 and D2 other than those recommended in step 7 may be required to adjust for your particular installation. The following procedure is used to adjust SWR:

SWR ADJUSTMENT (con't.)

If SWR is too high on channel 1: Decrease D2 slightly (slide coax attachment points toward the bottom U-clamp), then adjust the shorting wire position for best broadband SWR.

If SWR too high on channel 40: Increase D2 slightly (slide coax attachment points away from the bottom U-clamp), then adjust the shorting wire position for best broadband SWR.

Note: Make certain all the shorting wire clamps and coax attachment clamps are tight after making any matching adjustments.

SAFETY TIPS

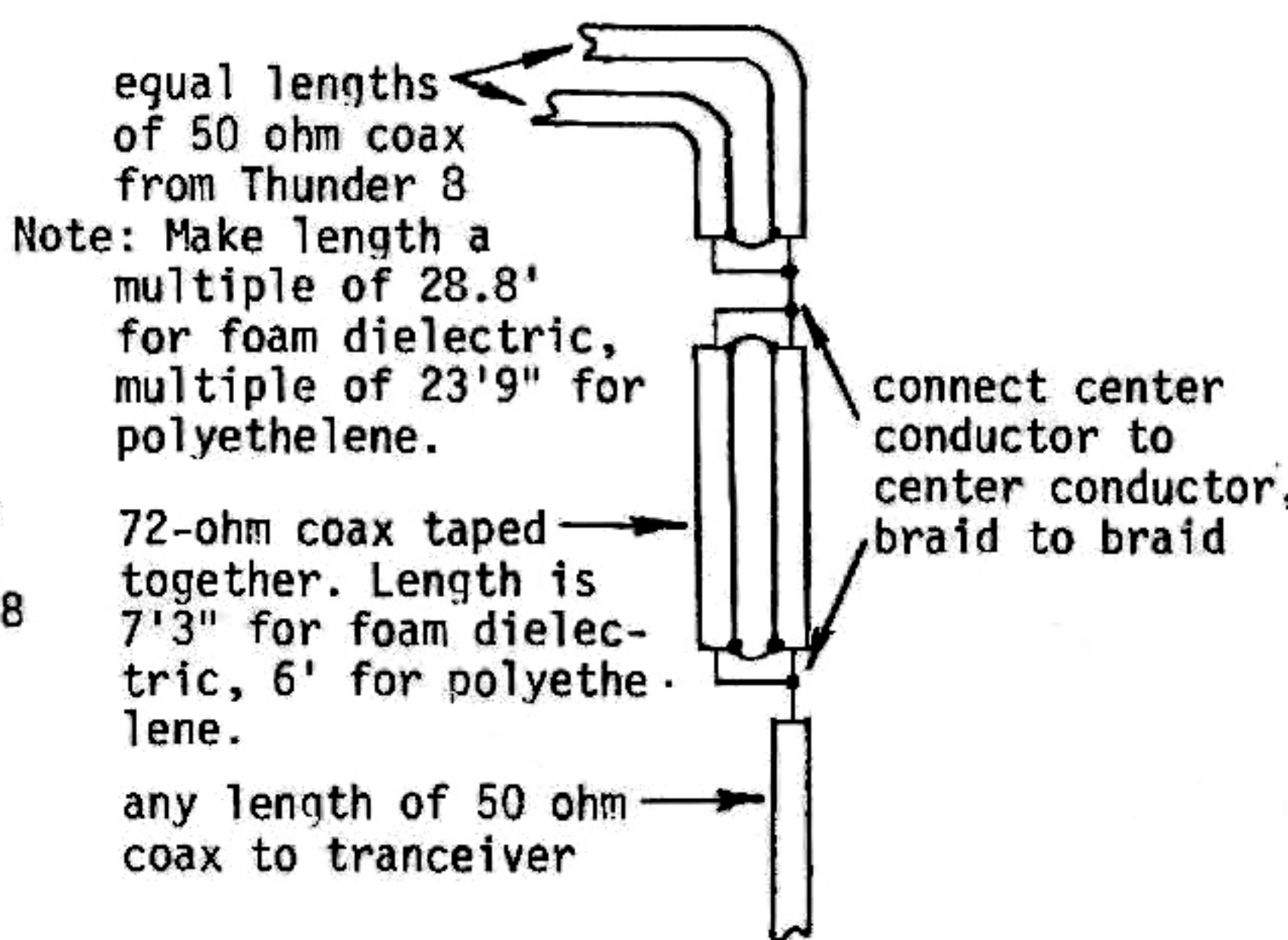
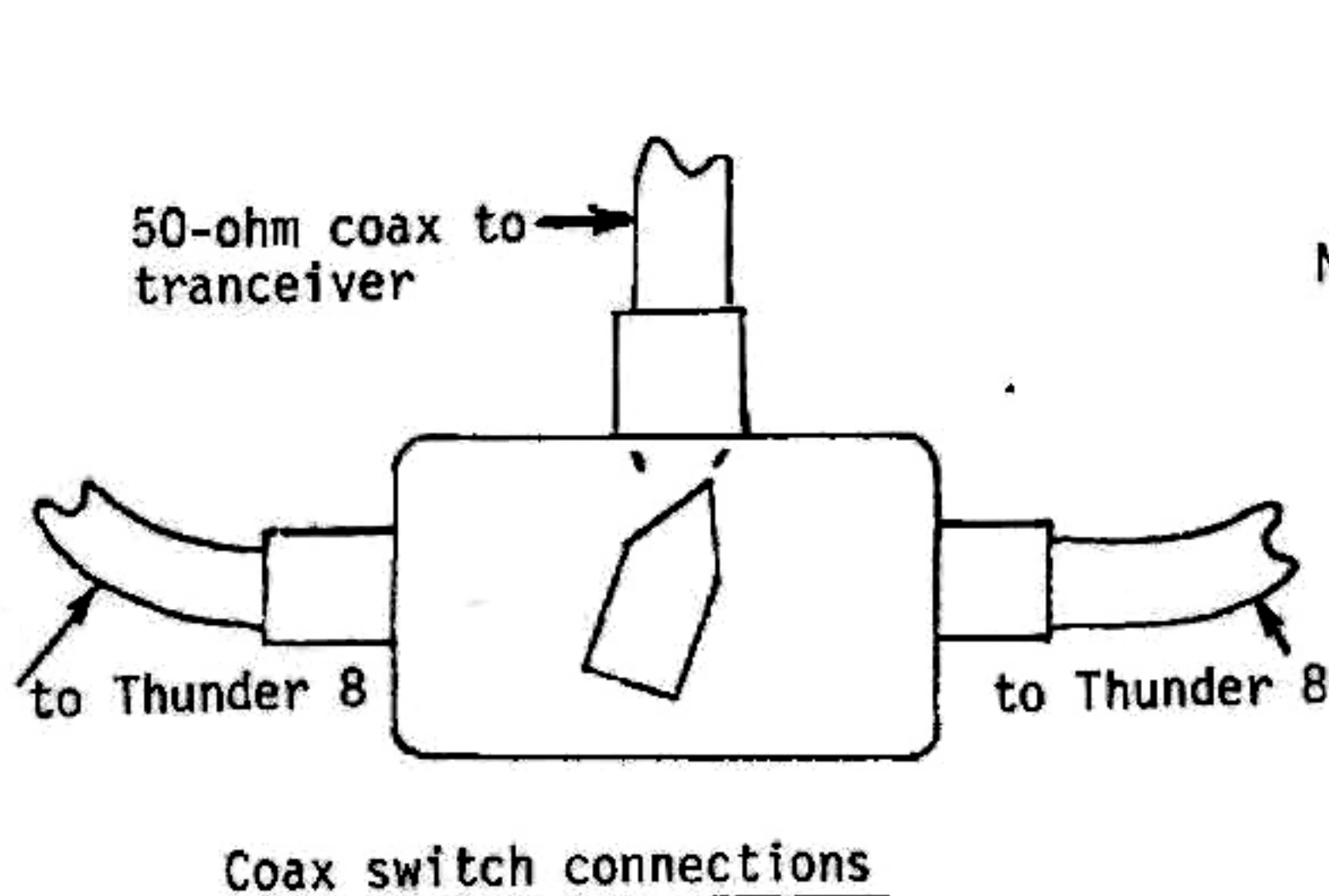
Care should be taken when installing the antenna such that under no circumstance any part of the antenna or supporting mast could come into contact with power lines- even if the entire assembly fell over. The mast selected to support the antenna must be strong enough to support the combined load, including any additional loading from wind.

OPERATING TIPS

Each two-element beam in the Thunder 8 produces a bi-directional (figure-8) vertically-polarized radiation pattern, with deep nulls off the sides. The nulls are most pronounced for vertically-polarized ground-wave signals, such as those from other base stations or mobiles. Skywave or "skip" signals tend to have random polarization, therefore the nulls will be more effective at times than others, corresponding to when the incoming signals are purely vertically polarized.

A two-position coax switch is supplied with the antenna, and connections to it are made as shown below. When receiving, the operator simply switches between the two two-element beams to maximize received signal strength.

The Thunder 8 is designed to be used primarily as a bi-directional beam, however omni-directional operation is possible by running exactly equal lengths of 50 ohm coax from each two-element beam, and using the coax matching transformer as shown below.



feed system for omni-directional use

PARTS LIST- THUNDER 8 ELECTRONICALLY STEERABLE BASE ANTENNA

<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>PART NO</u>
Aluminum tube, 4' X 3/4" dia.	1	T40
Aluminum tube, 6' X 7/8" dia.	1	T41
Aluminum tube, 6' X 1" dia.	1	T42
Fiberglass spreader rod 5'	4	T43
Element wire 25'3"	4	T44
Wire clamp	12	T45
U-clamp ass'y	4	T46
Shorting wire	2	T47
Mounting plate	2	T48
Nylon cable clamp	4	T49
Aluminum cable clamp ass'y.	8	T50
Shrink tubing	2	T51
Crimp terminal	4	T52
Coaxial switch	1	T53
Small U-bolt	2	
Large U-bolt	2	
1/4-20 Nut and lockwasher	8	
4-40 X 3/4 Machine screw	28	
4-40 Nut and lockwasher	28	
6-32 X 1 1/4 Machine screw	4	
6-32 X 1 Machine screw	2	
6-32 X 3/8 Machine screw	24	
6-32 Nut and lockwasher	30	
1/4 Flat washer	12	

ADDITIONAL NOTES ON SWR ADJUSTMENT

Make certain that you have followed the instructions thus far in assembling the antenna- in particular that the coax lines are taped to opposite sides of the center tubing, and taped securely at the bottom of the center tubing per step 8b. The following notes are general in nature, and will make the SWR adjustment process go more smoothly.

- 1) Do not change the length of the coax lines after making SWR adjustments. SWR should be adjusted with the coax lines at their final length.
- 2) You may adjust the SWR of each beam separately, however the other coax & shorting wire must be connected to the other pair of stub wires.
- 3) The settings D1 and D2 on the matching stubs may be different for each antenna. This is due to slightly different capacitance to ground or to surrounding metal objects seen by each two-element beam.
- 4) When taking SWR readings, make certain no one is standing near the antenna, and that the antenna is clear of any metal such as metal ladders, rain gutters, etc. If SWR is set with the antenna close to one of the above, the SWR may change when it is raised to its final position.

When adjusting SWR to be lowest on, say, channel 20, it is not necessary to obtain 1:1 there. The best match at the band edges, channels 1 & 40, will be obtained when channel 20 is somewhat higher than 1:1, at about 1.2-1.3:1. The detailed steps listed below can be followed for the nitty-gritty SWR optimization.

NOTE: Always start with D1 and D2 at the recommended settings from step 7 in the assembly instructions. If the SWR is not as desired, make the following adjustments depending on the observed SWR.

<u>SWR OBSERVED</u>	<u>ADJUSTMENT</u>
a) Channel 1 high, channel 40 low	<u>DECREASE D2</u> until channels 1 & 40 are approximately equal
b) Channel 40 high, channel 1 low	<u>INCREASE D2</u> until channels 1 & 40 are approximately equal
c) Channels 1 & 40 approximately equal, but too high-say greater than 1.8:1	DECREASE D1-move the shorting wire <u>down</u> toward the bottom U-clamp. If the SWR on channels 1 & 40 becomes unbalanced again before reaching an acceptable level, <u>re-adjust D2</u> per steps a or b above to equalize channels 1 & 40. If channels 1 & 40 are still too high (but equal), move the shorting wire <u>down</u> again. Repeat until channels 1 & 40 are acceptably low- let channel 20 fall where it may, as it will always be somewhat lower than channels 1 & 40.

The Thunder 8 is a versatile antenna, in that it may be matched in over a wide range of frequencies, particularly those above channel 40. It is possible to adjust the SWR for operation in the 10 meter amateur band by simply moving the coax and shorting wire attachment points up on the stub wires, thus making this an excellent antenna for "Hams" as well as CB'ers.

WEATHER PROOFING THE THUNDER 8

The Thunder 8 is relatively insensitive to rain, snow, etc., however the following steps are recommended to achieve the least change in SWR in weather.

- 1) Make certain the insulated U-clamps (pt. C in fig. 2) are located at the point on the stub wires where the wires are covered by a short piece of shrink tubing. This point is about midway along the stubs.
- 2) Wrap the bottom ends of the element wires (pt. A in fig. 2) with electrical tape over the last 2". This is done after the antenna is assembled, and serves to further isolate the ends of the wires electrically.
- 3) After the antenna is assembled, space the wires away from the fiberglass rods as much as possible. This is done by lightly pulling the wire at the mid-point along the rod (8 places).