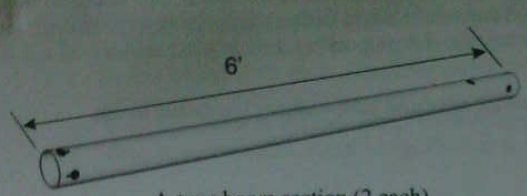
Lightning Antennas

Manufactured in the USA By: Innova

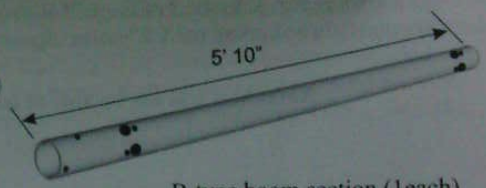
ASSEMBLY INSTRUCTIONS

L4+ QUAD

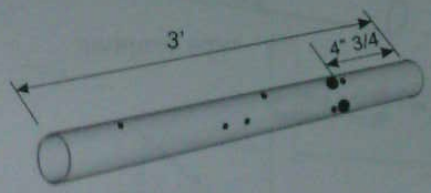
1) The boom of the antenna consists of three 2" diameter sections (two 6' long and one 5' 10" long) and two 1 7/8" diameter coupling sections. These parts are identified in the drawings below.



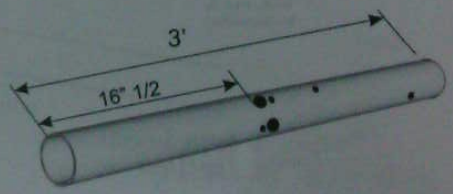
A-type boom section (2 each)
(2" dia.)



B-type boom section (1each)
(2" dia.)



C-type coupling (1each)
(1 7/8" dia.)



D-type coupling (1each)
(1 7/8" dia.)

Figure 1
Boom section & coupling

2) Install 2 of the 1/2" dia x 18" long rod support brackets in one end of an A-type boom section. Refer to figures 2a & 2b. Secure in the boom section with 10-32 x 2 1/2" bolts, nuts, and lockwashers.

Figure 2a

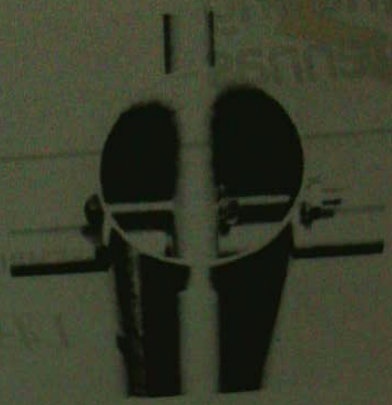


Figure 2b

3) Install the D-type coupling (identify from fig. 1) in the appropriate end of the B-type boom section, as shown in fig. 3. Insert 2 of the 1/2" dia rod support brackets through both the boom and coupling sections after aligning the 1/2" holes. Again bolt the rod support brackets in place with 10-32 x 2 ½" bolts.

Note: You will not be able to install nuts and lockwashers inside the boom.

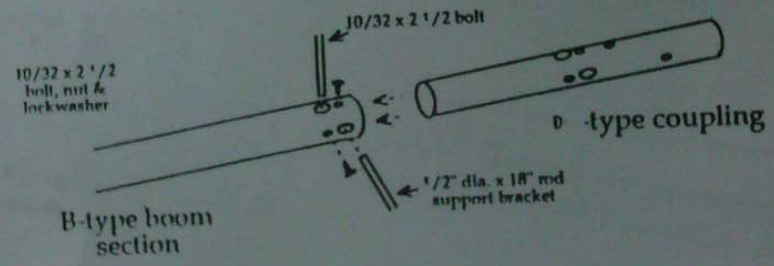


Figure 3

4) *Install the C-type coupling in the other end of the B-type boom section. Insert 2 of the 1/2" diameter rod support brackets through both the 2" boom and coupling section. (refer to Figure 9)*

5) *Install 2 rod support brackets in the last A-type boom section, as in step 2.*

Note: All wires should be facing rear of antenna.

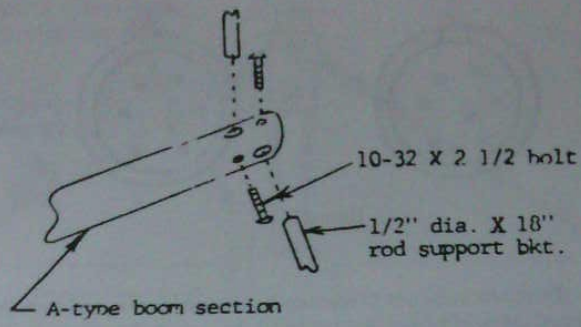


figure 4

6) There are 4 bundles of fiberglass rods. Select the 4 longest rods, and insert then in the 1/2" dia. rod support brackets in the A-type boom section from step 2. (The drilled end of the rods must be away from the boom). Carefully unroll the REFLECTOR element wire. This wire is identified by WHITE shrink tubing, marking the points of attachment to the fiberglass rods. Attach the wire to the rods using 4 wire claps and 4-40 hardware, including 4-40 x 3/4 bolts, nuts, & lockwashers. Refer to figures 5 & 6. (see note in page 2)

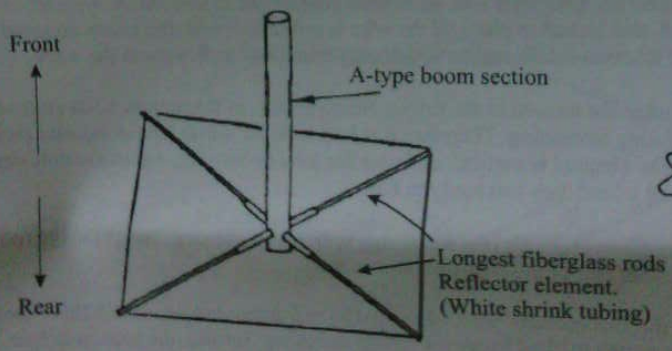


figure 5

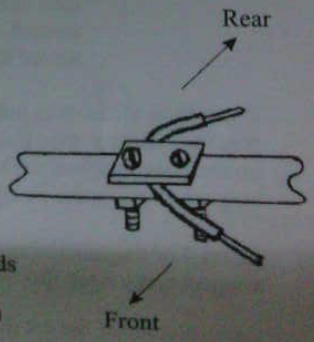


figure 6

Slide each of the fiberglass rods out equally (approximately). Secure two opposing rods (180 degrees apart) in place in the rod support brackets by installing a #8 x 1/4" self-tapping screw in the hole in the bracket. The screw should be started at an angle, and screwed in at an angle in order to capture the fiberglass. Refer to figure 7.

figure 7

Now slide the other two fiberglass rods out to tension the element wire, and lock the rods in place with self tapping screws. The rods should be pushed out until they are just ready to bow but are not bowed. This will ensure adequate tension in the wire and correct element spacing.

7) Select the 4 next-longest fiberglass rods, and the B-type boom section. Insert the rods in the rod support brackets that are spaced in approximately one foot from the end of the boom. (This end with the C-type coupling installed)

Carefully unroll the driven element wire. This wire is in two pieces and is identified by blue shrink tubing marking two attachment points to the fiberglass rods. Attach this wire to the fiberglass rods using two wire claps and two 4-40 x 3/4 bolts. (use single bolt in outermost hole in fiberglass at "Feedpoint A & feedpoint B"). Refer to figure 8 and note in page 2.

Note: Make certain that the wires leave the bolts at feedpoint A & feedpoint B at a 45 degree angle as shown . This is best accomplished by not tightening these two nuts until the fiberglass rods have been pushed out to tension the wire all around, and locked in place. If the wire is not in line with the crimp terminal where it leaves the fiberglass rod, it may break due to flexure in the wind.

It is a little difficult to judge the tension in the driven element wire, as it is not on a flat surface as was the reflector wire during tensioning. Therefore it is best to make a trial tensioning and pick up the boom section so the element is vertical, and note the tension/bowing. Again the rods must be pushed out to the point where they just ready to bow.

8) Insert 4 of the remaining fiberglass rods (the remaining rods are all the same length) in the rod support brackets at the other end of the B- type boom section.

Carefully unroll the 1st director element wire, identified by red shrink tubing. Attach this wire to the fiberglass rods at the points marked by shrink tubing as before. Tension the wire as before. Wire should face rear of antenna. See note to figure 8.

9) Insert 4 last fiberglass rods into each of the remaining boom sections. Attach the director wire identified by yellow shrink tubing to the set of rods, and tension as before.

At this point all 4 elements are assembled and tensioned on the 3 boom sections. You are now ready to join the boom sections together. Refer to figure 9 for the proper sequence.

Mount the boom to mast Plate in the center of the B-type boom section, using two 2" U-bolts. The Plate is aligned parallel to one set of fiberglass rods.

Note: You are looking from the Reflector. The Driven element wire is attached to it's fiberglass rods on the reflector side.

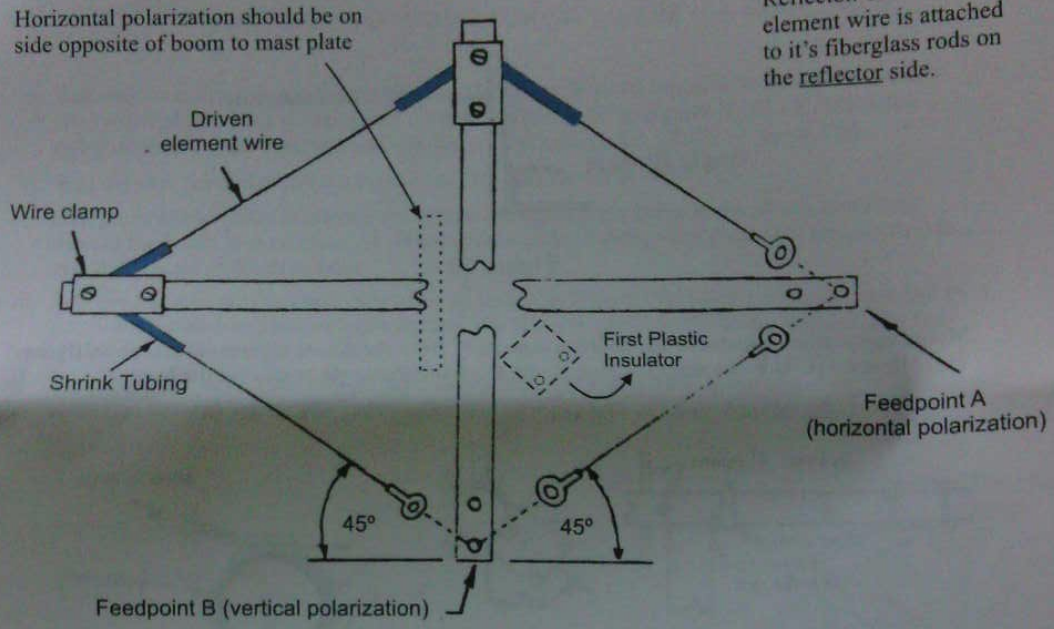
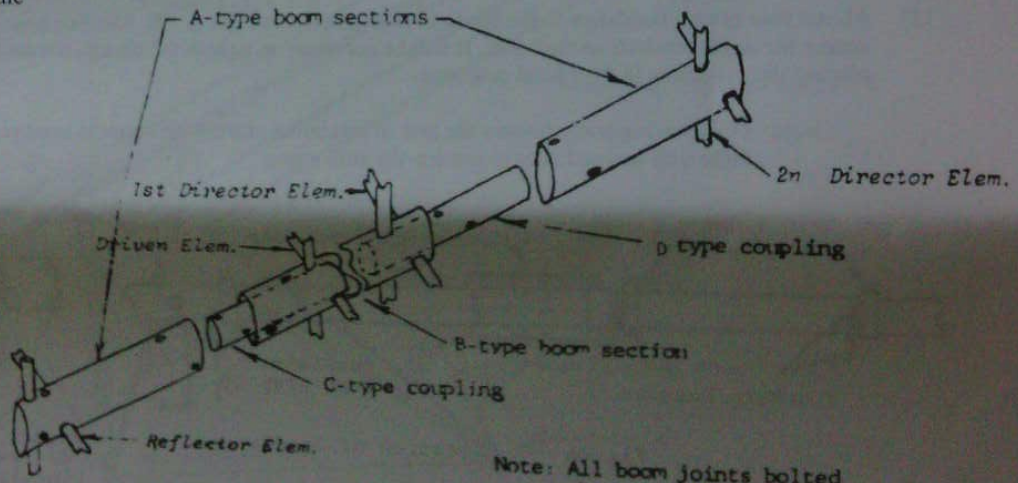


figure 8 - driven element assembly

Note: Drawings not to scale



Note: All boom joints bolted through with 10-32X 2 1/2 bolts, nuts, & lockwashers.

figure 9

10)

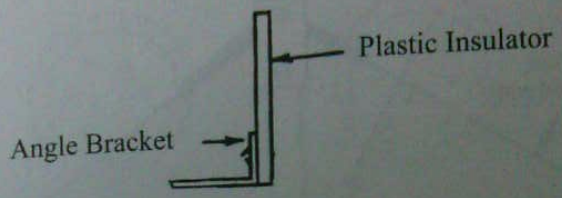


Figure 10

Mount one plastic insulator to the boom at a point 4" from the driven element as shown in figures 11a, 11b and 11c. Use one supplied pipe clamp to secure the angle bracket to the boom.

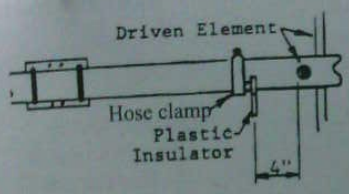


Figure 11a - Location of first Insulator

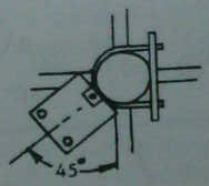


Figure 11b- Angle of First Insulator

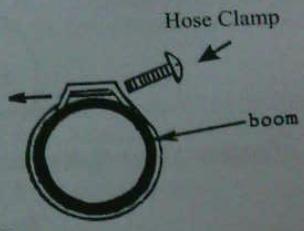


Figure 11c- Use of Pipe Clamps

11) Mount four plastic Insulators to the boom as shown in figures 12a & 12b. Use two hose clamps to secure the angle brackets to the boom. It will be necessary to tighten the clamps somewhat before placing the insulators in their final positions.

Note: Do not completely tighten the pair of insulators nearest the boom to mast plate, as these will be used later to tension the stub wires.

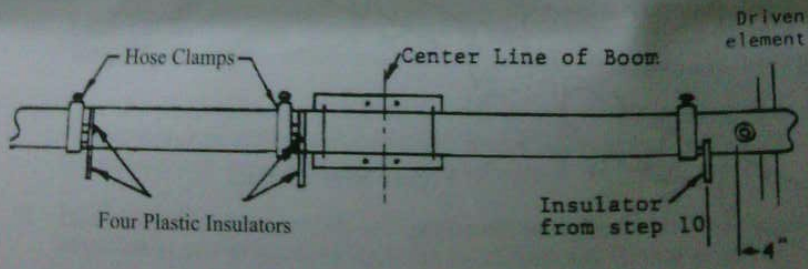


Figure 12a - Location of Insulators

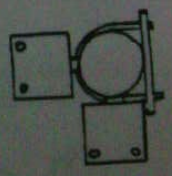


Figure 12b -Angle of last four Insulators

INSTALLATION OF THE MATCHING SYSTEM (See also Figure 17)

a) Connect the crimp terminal end of the two flexible stub wires supplied to the driven element wire at the points labeled "feedpoint A" and "feedpoint B" in figures 8 and 13. Attach the crimp terminal to the 4-40 bolt using 4-40 nut and lockwasher. (Refer to figure 13a)

b) Run the stub wires through the plastic insulators as shown in Figure 13.

c) Slip the bent end of the brass stub wires into the appropriate holes in the plastic insulators nearest the boom to mast plate. The bends in the ends of these short stubs will act as a stop to retain the wires in the insulators.

d) Join the flexible and the brass stub wires as shown in Figure 13b. Simply form the bare end of the flexible stub wire into a small loop and slip the loop between the crimp terminal and flat washer as shown.

e) The two plastic insulators nearest the boom to mast plate may now be moved along the boom to tension the stub wires. The stub wires must be fairly taut all along their length.

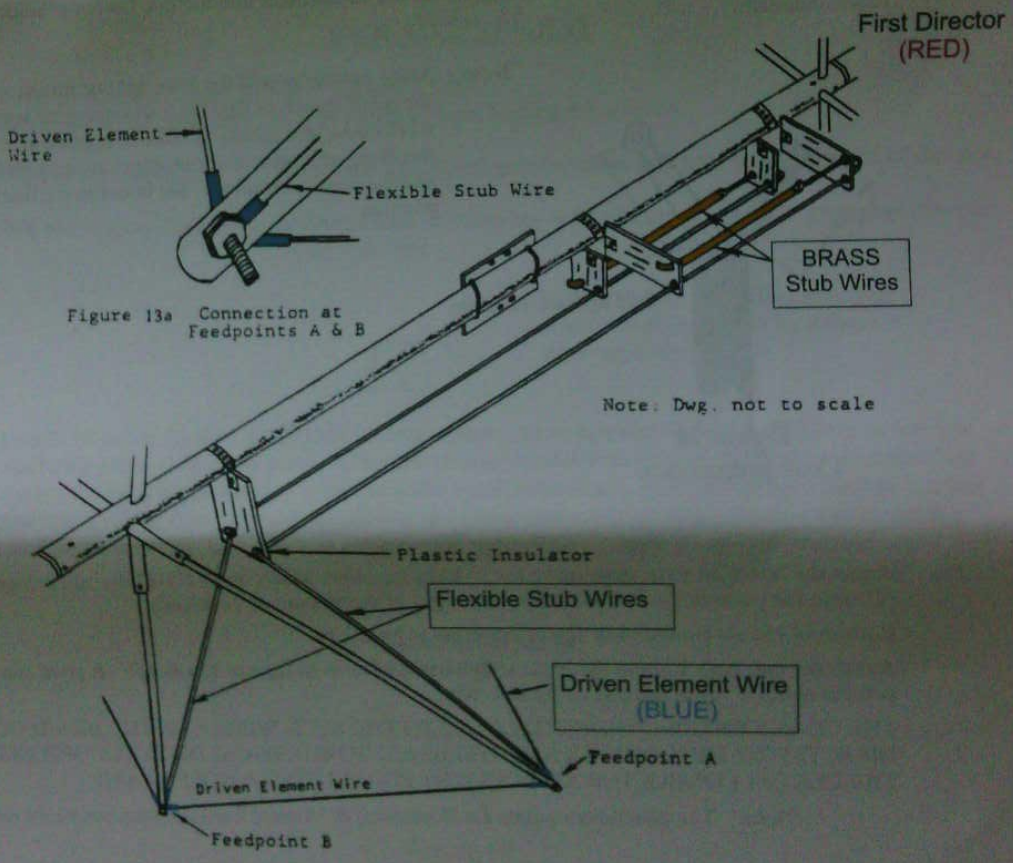


Figure 13a Connection at Feedpoints A & B

Figure 13 Routing of Stub Wires

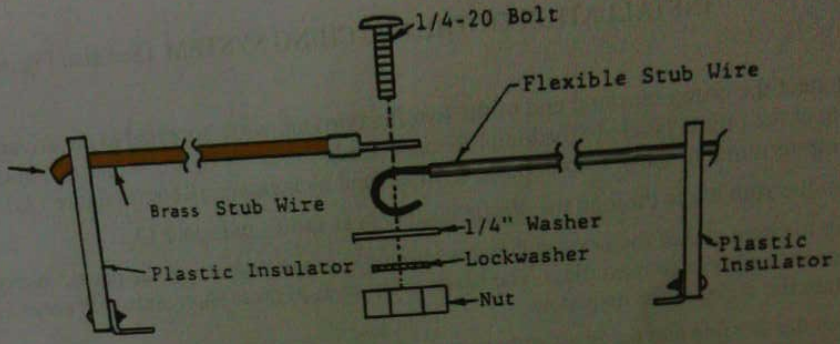


Figure 13b - Joining Brass & Flexible Stub Wires

12) Prepare your 50 ohm coaxial transmission lines (two required) as shown in figure 14. The crimp terminals supplied may be simply crimped onto the coax center conductors, however soldering is recommended.

Note: Make certain to seal the coax against moisture at the point shown in fig. 14. A silicone type sealer works best, and ideally should be applied after any matching adjustments (next steps) are complete and the coax is secured to the boom in it's final position.

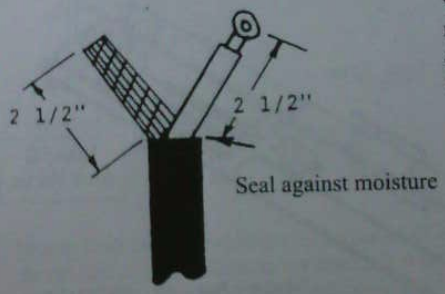


Figure 14
Coax preparation

13) Mount the boom on your mast using the U-bolts supplied. Masts up to 1 3/4" dia. are acceptable. (Choose the point in the boom where the weight of the antenna is balanced).

Bottom of radials should clear top of tower by at least 2 Ft.

Attach the two coax lines to the brass stub wires as shown in figures 15a & 15b . A good starting point is about 2" from the end of the stub wire.

THE COAX CENTER CONDUCTOR GOES TO THE STUB WIRE, AND THE BRAID GOES DIRECTLY TO THE BOOM. CLAMP THE BRAID TO THE BOOM DIRECTLY OPPOSITE THE CENTER CONDUCTOR ATTACHMENT POINT, USING A HOSE CLAMP.

Note: The attachment points for Horizontal & Vertical feedlines may not be the same.

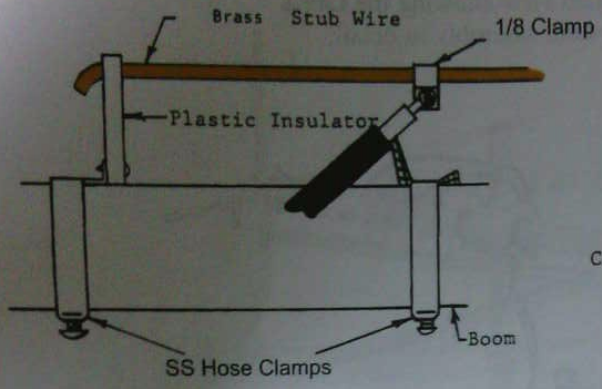


Figure 15a
Coax Attachment to Brass Stub Wire

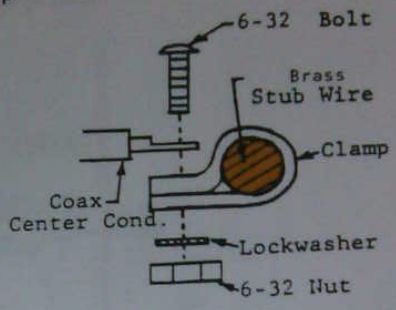


Figure 15b
Center Conductor Attachment Stub Wire

SWR ADJUSTMENT

- Connect both coaxes to switch before adjusting SWR.
- SWR should be adjusted with the final length of coax feeding the antenna.

If SWR too high on channel 1: Move coax attachment point to brass stub wire toward the end of the stub.

If SWR too high on channel 40: Move the coax attachment point to the brass stub wire away from the end of the stub wire.

Note: Both the coax center conductor and braid connections must be moved when adjusting SWR.

Typical SWR curve for the L4+ QUAD is shown below. A two position coaxial switch may be used at the operating position to select between Horizontal and Vertical Polarization. Vertical polarization will almost always be best for working local vertically polarized stations, while either horizontal or vertical may be best for long distance work, depending upon conditions. Make certain the connections to the stub and boom are tight. Tape the coax cable to the boom, where it leads away from the stub.

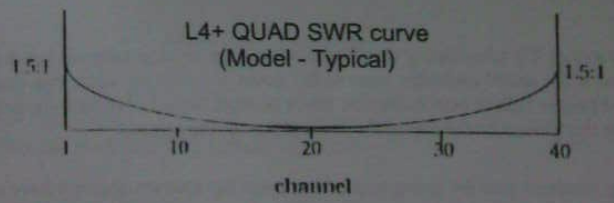
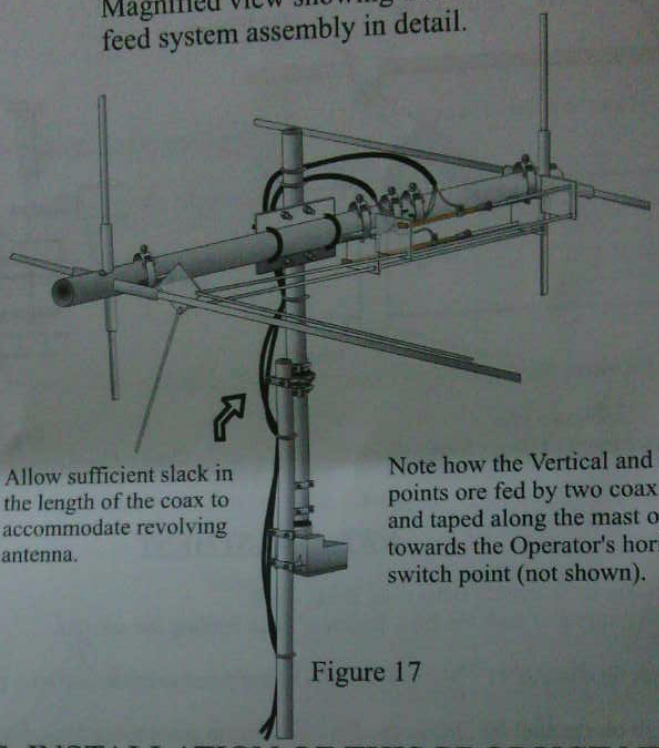


Figure 16

Magnified view showing the L4+'s feed system assembly in detail.



Allow sufficient slack in the length of the coax to accommodate revolving antenna.

Note how the Vertical and Horizontal feed points ore fed by two coax cables, routed and taped along the mast oriented down towards the Operator's horizontal/vertical switch point (not shown).

Figure 17

WARNING, INSTALLATION OF THIS PRODUCT NEAR POWER LINES IS DANGEROUS. FOR YOUR SAFETY FOLLOW THE INSTALLATION DIRECTIONS:

1) When putting up or taking down this antenna, care must be taken to ensure that no part of the antenna or supporting structure comes into contact with electric power lines. If contact is made while a person is holding the antenna, coax or supporting structure, electrocution can result.

2) A light-duty tower is the recommended supporting structure for this antenna. The tower should be rated to carry both the weight of the antenna, rotor and mast and the combined wind load. TV type telescoping (pushup) masts are acceptable for heights up to 20 feet, if well guyed and rated to hold the antenna and rotor weight. Tubular non-telescoping masts are not strong enough to use with this antenna, and pipe is not recommended because it is too difficult to raise the assembly with rotor, antenna, etc. attached.

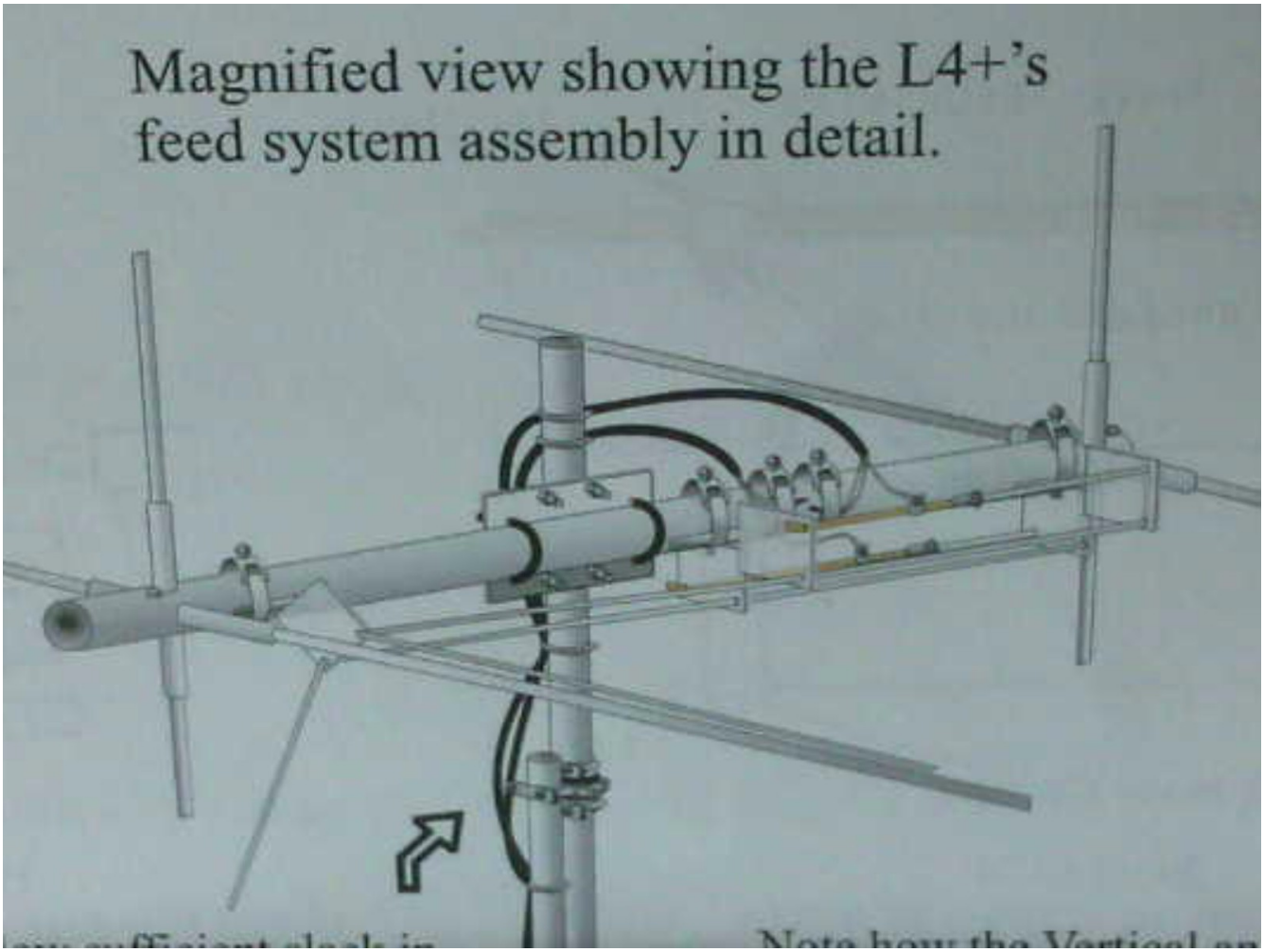
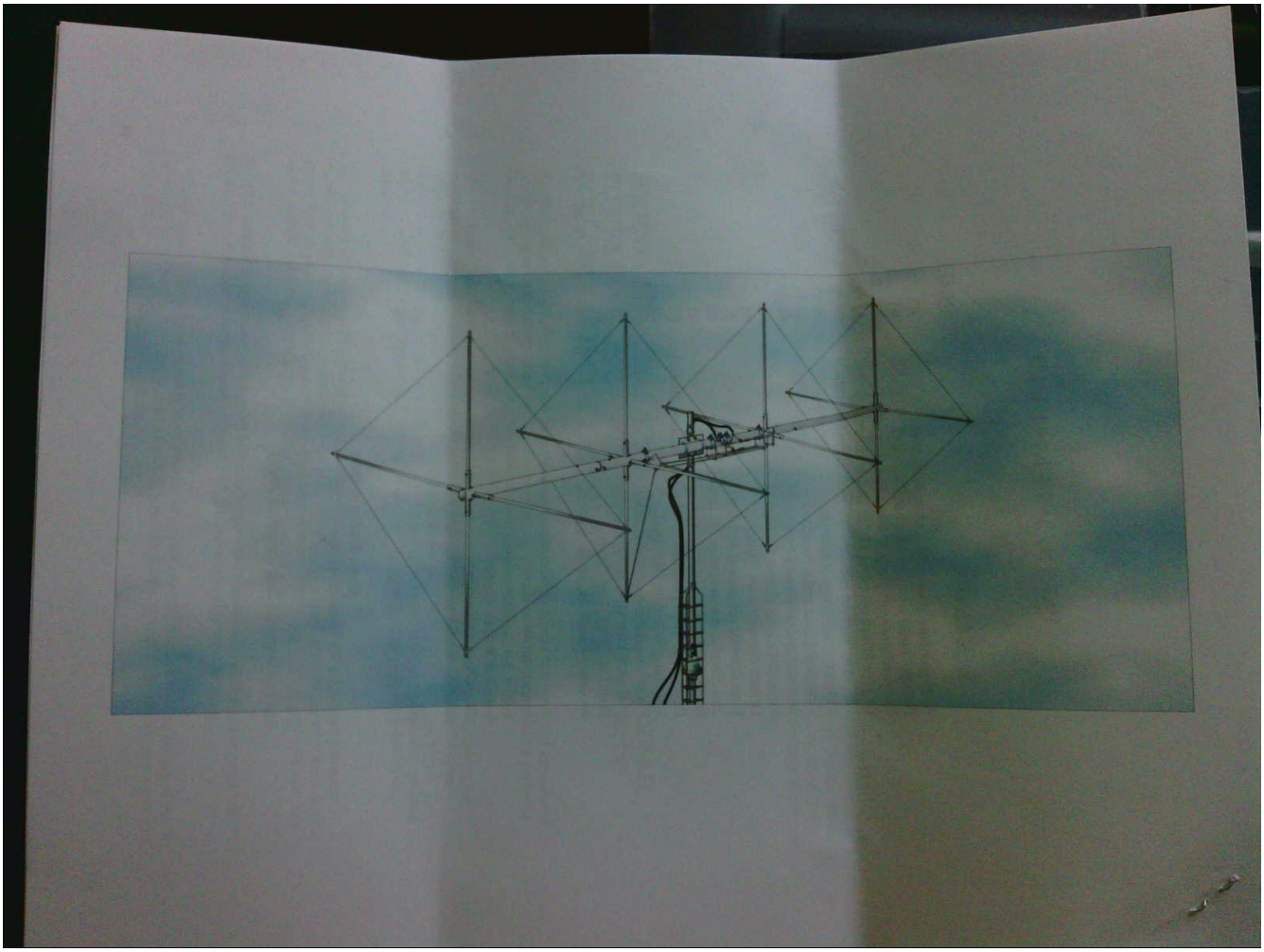
3) For either the tower or TV telescoping mast installation, care must be taken to locate the antenna installation such that if the entire assembly were to fall down, it would not come into contact with electric power lines. A good rule to follow is to locate the tower or mast twice as far from the nearest power line as the distance from the ground to the top of the highest part of the antenna.

4) If the supporting structure you are going to use to support the antenna does not have a warning label attached to it, you must attach the label included with the antenna to your mast or tower.

5) Locate the antenna as far as possible from other antennas and metal objects. Break up all guy wires in the vicinity of the antenna with egg insulators at 7 ft. intervals for the first 28 ft. on the top guy wires and for the first 21 ft. on the second guy wires.

PARTS LIST - L4+ QUAD

DESCRIPTION	QUANTITY
A- type boom section (2 Inches diameter)	02
B- type boom section (2 Inches diameter)	01
C- type boom coupling (1 7/8 Inches diameter)	01
D- type boom coupling (1 7/8 Inches diameter)	01
18" long, support brackets (½" dia. aluminum tube)	08
Reflector rod (longest fiberglass)	04
Driven element rod (fiberglass)	04
Director rod (shortest fiberglass)	08
Reflector element wire (White)	01
Driven element wire (Blue)	01
First director element wire (Red)	01
2nd director element wire (Yellow)	01
Boom to mast plate	01
Brass Stub Wire (assembled with 1/8" sliding clamp)	02
Matching stub wire (flexible)	02
Plastic insulator (polycarbonate)	05
U-Bolt 5/16 x 18 & nuts (Zinc Plated)	04
Stainless Steel Hose Clamps	06
Assembly Instructions manual	01
Fiberglass Assembly	
Aluminum Wire clamps	14
4-40 x 3/4 machine screw	30
4-40 nut & lock washer	32
#8 x 1/4 self tapping screw	16
Boom Assembly	
10-32 x 2 1/2 machine screw	16
10-32 nut & lock washer	18
Brass Stub Assembly	
1/4-20 x 3/8 machine screw	02
1/4-20 nut & lock washer	02
1/4 flat washer	02
Electric Terminal Lug (center of coax)	02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feed system assembly in detail.