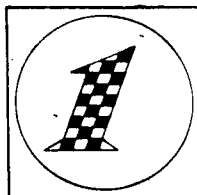


# ASTRO-BEAM

U.S. PATENT NO. 3587109



**avanti**

**AVANTI RESEARCH & DEVELOPMENT, INC.**

**THE PACESETTER IN HIGH PERFORMANCE ANTENNAS**

**340 STEWART AVE.  
ADDISON, ILLINOIS 60101**

AV-150

You have purchased one of the finest antennas available, but it won't work - UNLESS you follow the instructions very carefully. Prior to assembly, check each part on the parts list and read through the instruction manual from beginning to end. After you have an understanding of each of the parts and their function, you are ready to assemble your ALL NEW ASTRO-BEAM!

## ASTRO-BEAM PARTS LIST

| <u>DESCRIPTION AND SIZE</u> | <u>QTY.</u> | <u>DESCRIPTION AND SIZE</u>    | <u>QTY.</u> |
|-----------------------------|-------------|--------------------------------|-------------|
| Panhead Bolts:              |             | Tubing:                        |             |
| 10-32 x 3/4"                | 8           | 3/8" x 24" Curved Hoop Sec.    | 4           |
| Hexhead Bolts:              |             | 1/2" x 41" Director Spreader   | 2           |
| 1/4-20 x 3/4"               | 6           | 1/2" x 51" Reflector Spreader  | 2           |
| 1/4-20 x 1 1/4"             | 1           | 1/2" x 48" Tube A - Expanded   | 1           |
| 1/4-20 x 1 1/2"             | 4           | one end                        |             |
| 1/4-20 x 2"                 | 2           | 1/2" x 48" Tube B - Expanded   | 1           |
| 1/4-20 x 2 3/4"             | 4           | both ends                      |             |
| Self-tapping Screws:        |             | 5/8" x 36" Driver Spreader     | 1           |
| #2 x 5/16"                  | 18          | 5/8" x 63" Inner Spreader      | 4           |
| Threaded Driver Stud:       |             | 1/2" x 48" Tube C & D - flat   | 2           |
| 1/2 x 3"                    | 1           | one end                        |             |
| U-Bolts:                    |             | 1/2" x 48" Driver Spreader     | 1           |
| 5/16-18 x 1 3/4"            | 1           | Booms:                         |             |
| Square Nuts:                |             | 1 1/4" x 61 1/2" Reflector     | 1           |
| 10-32                       | 4           | 1 1/4" x 63 3/4" Director      | 1           |
| 1/4-20                      | 1           | Tubing Retainer Plates:        |             |
| Hex Nuts:                   |             | 1/4" x 1" x 2 1/4"             | 4           |
| 1/4-20                      | 16          | Top Plate:                     |             |
| 1/2-13                      | 1           | 1/4" x 3" x 4 1/4"             | 1           |
| 5/16-18                     | 2           | Angle Brackets:                |             |
| External Star Washers:      |             | 1/4" x 2" x 2" x 3"            | 2           |
| #10                         | 4           | Main Bracket Assembly:         | 1           |
| 1/4"                        | 24          | Element Hubs:                  | 2           |
| 5/16"                       | 2           | Element Hub Cover:             | 2           |
| Flat Washers:               |             | Boom Brackets:                 | 2           |
| 1/4"                        | 16          | Dual 59-U Matching Harness     | 1           |
| Tube Clamps:                |             | NOTE: CHECK AND IDENTIFY EACH  |             |
| 5/8"                        | 6           | ITEM PRIOR TO ASSEMBLY OF YOUR |             |
| Stainless Steel U-Clamps:   |             | ASTRO-BEAM!                    |             |
| Mast Clamp                  | 1           |                                |             |
| Spreader Clamp              | 2           |                                |             |
| Hoop Clamp                  | 2           |                                |             |
| Fiberglass Rod:             |             |                                |             |
| 13"                         | 1           |                                |             |
| Bridge Straps:              |             |                                |             |
| 1/8 x 1/2 x 3 3/8"          | 2           |                                |             |
| Aluminum Bushings:          |             |                                |             |
| 3/8"                        | 4           |                                |             |
| Cap Plugs:                  |             |                                |             |
| 1/2"                        | 5           |                                |             |

- Fig. 2 & 3 1) A. Select a flat hard surface. Stand the main bracket assembly on end with the coaxial cable toward the bottom. (Fig. 2)
- B. Find tube A, the 1/2" tube with one expanded end. (Fig. 3)
- C. Insert the end which is not expanded into the plastic insulator end of the main bracket. (Fig. 2) Push down until the tube strikes the flat surface on which the main bracket is standing. This method prevents pushing the split sleeve out of the insulator and breaking the internal connection. CAUTION: If, for some reason, the tube must be removed from the insulator, hold the split sleeve down with a screw driver while pulling the tube out.
- Fig. 2 2) Place 1/4" x 3/4" long bolts in holes 1 & 2, use star washers under the nuts. Tighten, using a wrench on the heads of the bolts.
- Fig. 3 3) Find tube B, the 1/2" tube which has both ends expanded.
- Fig. 2 4) Insert one end of this tube (B) into the other end of the main bracket. Use 1/4" x 3/4" long bolts in holes 3 & 4 and tighten as in Step 2. This tube should be inserted so that the end of the tube is flush with the edge of the main bracket.
- Fig. 4 5) The two 1/2" tubes, C & D, with the flattened ends should be inserted into the expanded ends of tubes A & B. Position the flattened ends so that the flattened surfaces face each other.
- Fig. 5 6) There are five stainless steel "U" clamps:  
2 are hoop clamps (smallest size clamp)  
2 are spreader clamps (medium size clamp)  
1 is the mast clamp (largest clamp)
- Fig. 4 7) Slide mast clamp onto fiberglass rod, selecting the proper pair of holes to match mast diameter you intend to use. For mast diameters in excess of 1 1/4", use outer holes. Attach fiberglass rod to tubes A & B loosely, using spreader bar clamps as shown in Fig. 4.
- Fig. 6 8) Spread tubes A & B apart so only 1/4" of the fiberglass rod protrudes beyond the outer edge of each spreader bar clamp.
- Fig. 6 9) Tighten bolts 5 & 6. Double check to see that tubes C & D are all the way into the expanded ends of A & B before tightening. Also, take special note that the faces of the flattened ends are parallel as described in Step 5. The mast clamp is left loose. Set the assembly aside.
- Fig. 7 10) Install all four 5/8" x 63" tubes (tubes E) on both element hubs as shown in Fig. 7. The threaded hole nearest the end of the tube should face toward the hub.

- Fig. 7 11) Take the two 1 1/4" Boom sections, push the ends, which have the holes through both sides of the tube, into each hub. Line up the holes so bolt number 7 will slip through. Use a 1/4" flat washer under the head of the bolt. On the other side, use a flat washer and a star washer under the nut. The flat washer should be next to the plastic hub - tighten.
- Fig. 8 12) Stand both assemblies on end. The tallest one should be marked "director" and the shortest should be marked "reflector."
- Fig. 9 13) Slip tubing clamps over all four ends of tubes E and leave loose.
- Fig. 10 14) Identifying the proper elements: There are five 1/2" tubes remaining, two are 51" long, two are 41" long, and one is 48" long. Mark these tubes as follows:
- A. On the two 51" tubes, measure and make a mark 3 13/16" from one end; use a felt tipped marker or pen. Label these two tubes "reflector."
  - B. On the two 41" tubes, measure and make a mark 5 13/16" from one end. Label these two "director."
  - C. On the 48" tube, make a mark 7" from one end. Label this tube "driver."
- Fig. 11 15) The two 51" tubes labeled "reflector" are slipped into the two E arms of the reflector hub assembly. They should be slid in until the marks line up with the edge of tube E. Tighten tubing clamps.
- Fig. 11 16) The two 41" tubes labeled "director" are slipped into the two E arms of the director hub assembly. Tighten tube clamps.
- Fig. 11 17) To fasten both element assemblies together, lay the two element assemblies on the floor with the director boom butted against the reflector boom.
- Fig. 12 18) Sandwich the reflector and director booms between the two boom blocks as shown in Fig. 12. The locating holes in the booms should be mated with the locating pins on the boom blocks. Place the "top plate" on the top of one boom block and the angle brackets on the bottom of the other boom block.
- Fig. 12 19) Fasten together with four 1/4 x 2 3/4" long bolts. Use a flat washer under the ends of the bolts and a star washer under the nuts. Leave the bolts slightly loose. SPECIAL NOTE: MAKE SURE THE 1/2" THREADED STUD HOLE IS NEAREST THE DIRECTOR ASSEMBLY.

- Fig. 13 20) To attach the boom assembly to the driver assembly:
- A. Slide the main bracket of the driver assembly between the two angle brackets. The coaxial cable of the main bracket assembly should be facing toward the reflector side of the element assembly.
  - B. Line up the two holes in the main bracket with the holes in the angle bracket.
  - C. Insert the "U" bolt from the director side of the element assembly. (The nuts of the "U" bolt should be on the same side as the coaxial cable of the main bracket.

NOTE: The "U" bolt cannot be tightened until the entire assembly has been mounted on a mast. The four 2 3/4" bolts should be tightened last; AFTER the "U" bolt has been tightened. This procedure will allow the angle brackets to clamp tightly to the main bracket.

### THE ANTENNA MAST

The mast is supplied by the user. It should be a minimum length of 10 feet above the rotor. If the rotor is mounted inside of a tower, the length of the mast should be calculated to allow a minimum of 10 feet to extend above the top of the tower.

- 21) Attaching the antenna to the mast:
- A. Slide one end of the mast through the mast clamp (Fig. 4) and into the "U" bolt. Tighten the 1/4" bolt of the mast clamp (Fig. 6), taking care that the bolt strikes the center of the mast pipe and remains straight while tightening. Also, check to see that the mast is centered between tubes A & B.
  - B. Tighten the nuts of the "U" bolt. The director and reflector elements should be in line with the mast. If they are out of line when the antenna is standing up, loosen the "U" bolt enough to readjust alignment, then tighten.
  - C. Tighten the four K bolts. (Fig. 13)

- Fig. 13 22) The "driver stud" and assembly:
- A. Thread a 1/2" nut all the way onto the drive stud. Screw the driver stud into the top plate as deep as it will go. Tighten the lock nut against the top plate.
  - B. Take the 48" driver tube which was marked in Step 14 and slip it into one end of the 5/8" x 36" tube. It should be inserted up to the mark.

- Fig. 13 22) The "driver stud" and assembly. (cont'd)
- C. Put a tubing clamp on each end of the 5/8" x 36" tube.
  - D. Tighten the clamp by the marked 48" tube.
  - E. Put the other end of the 5/8" tube over the driver stud, push down until the tube strikes the lock nut.
  - F. Tighten the tubing clamp.
- Fig. 13 23) Install plastic cap plugs in the top tips of the 3 elements. NOTE: DO NOT install plastic cap plugs on the bottom of the elements. These should be left open for water drainage.
- 24) Install a plastic cap plug in tubes A & B on top of the main bracket.
- Fig. 14 25) Stand the antenna up and assemble the hoop as follows:
- A. Insert plain ends of loop sections into expanded ends. Slip the clamps over connections and tighten.
- Fig. 15 - 16 B. Attach loop section to arms C & D as shown in Fig. 15 & 16. It is important to use starwashers in the places shown. Use a 1/4 x 3/4 bolt, flatwasher, starwasher, retainer clips and nuts.
- Fig. 17 26) Refer to Fig. 17 to install the bridge straps. The straps should be installed in both the director and reflector element hubs.
- 27) Attach both element hub covers with the #2 self-tapping screws.
- 28) Attach coax from transceiver to Dual 59-U Matching Harness.

## SPECIAL NOTE:

If steel guy lines are used to support the mast or tower structure, insulators should be installed between the mast and the guy lines directly at the mast. If this is not observed, high V.S.W.R. may result. RG8/U is the recommended coaxial cable to use with the NEW ASTRO-BEAM. For neatness of installation, the coax should be taped along the mast.

FROM ALL OF US AT AVANTI R&D, INC.-----HAPPY CB'ing!!!

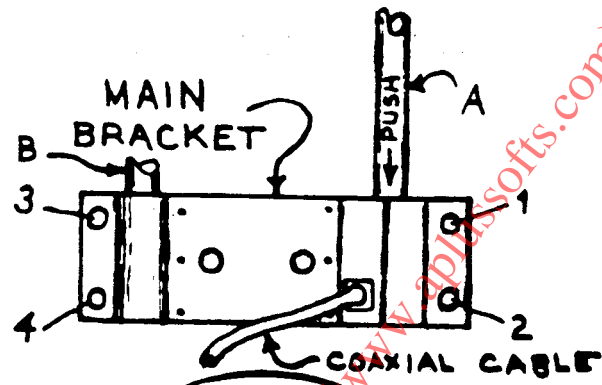
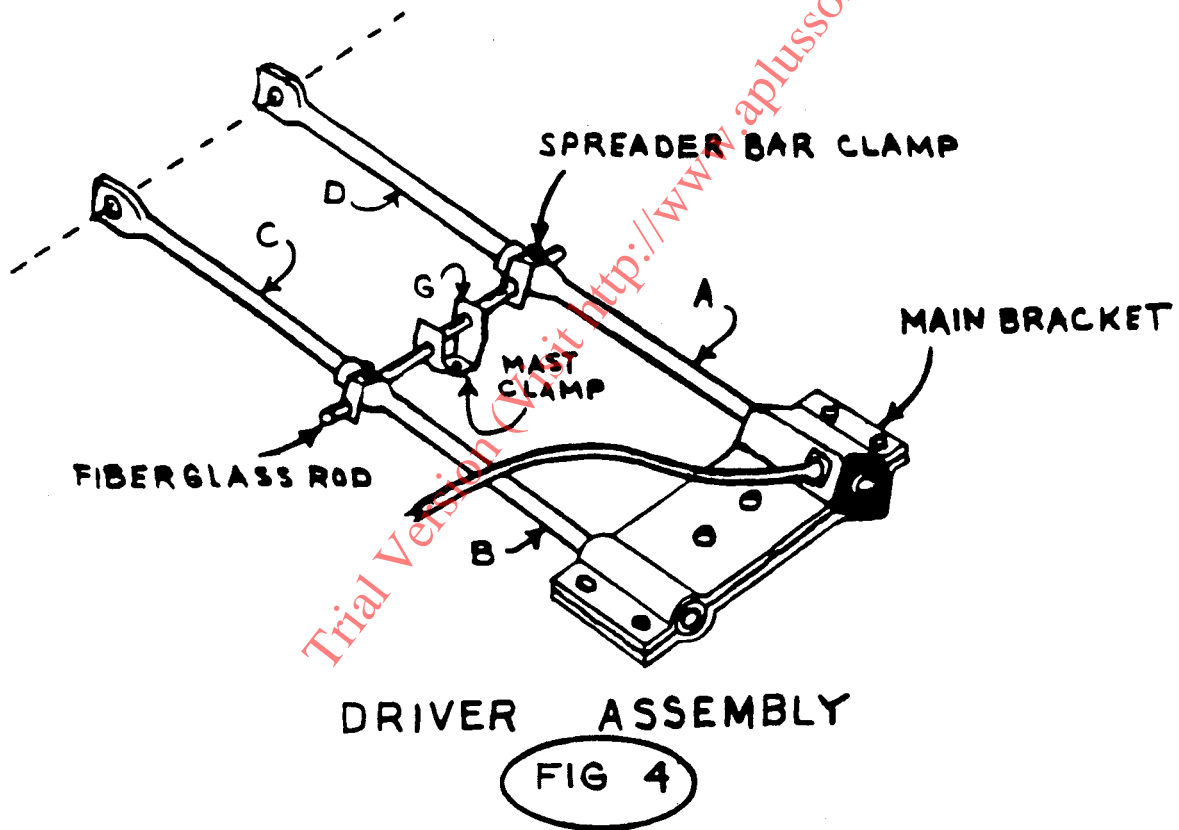
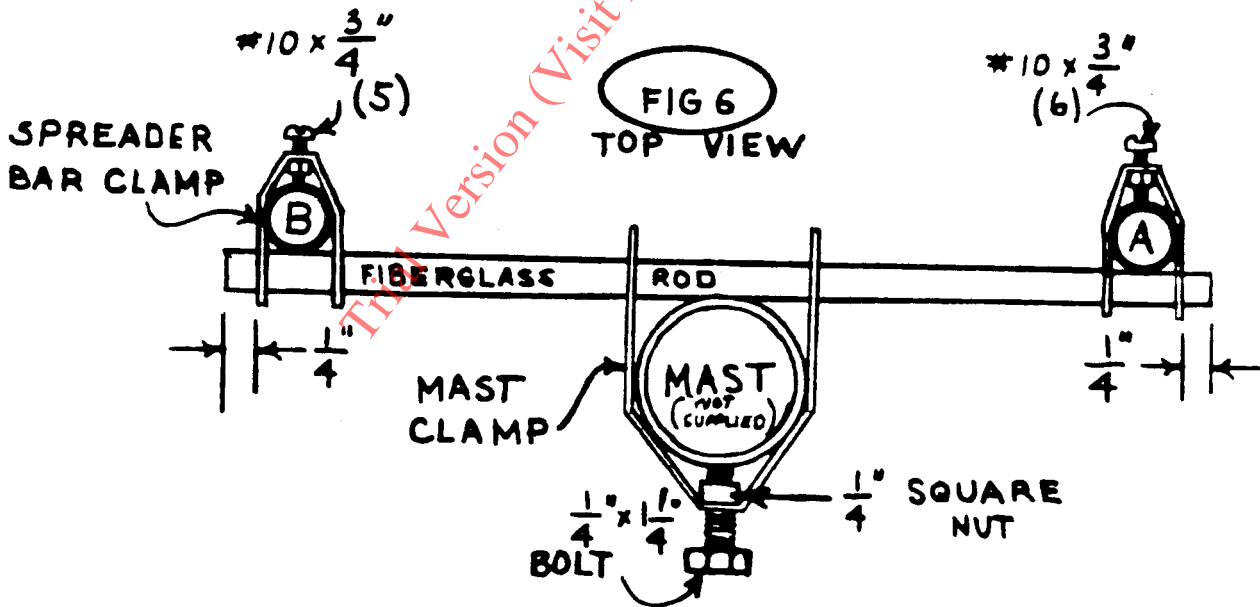
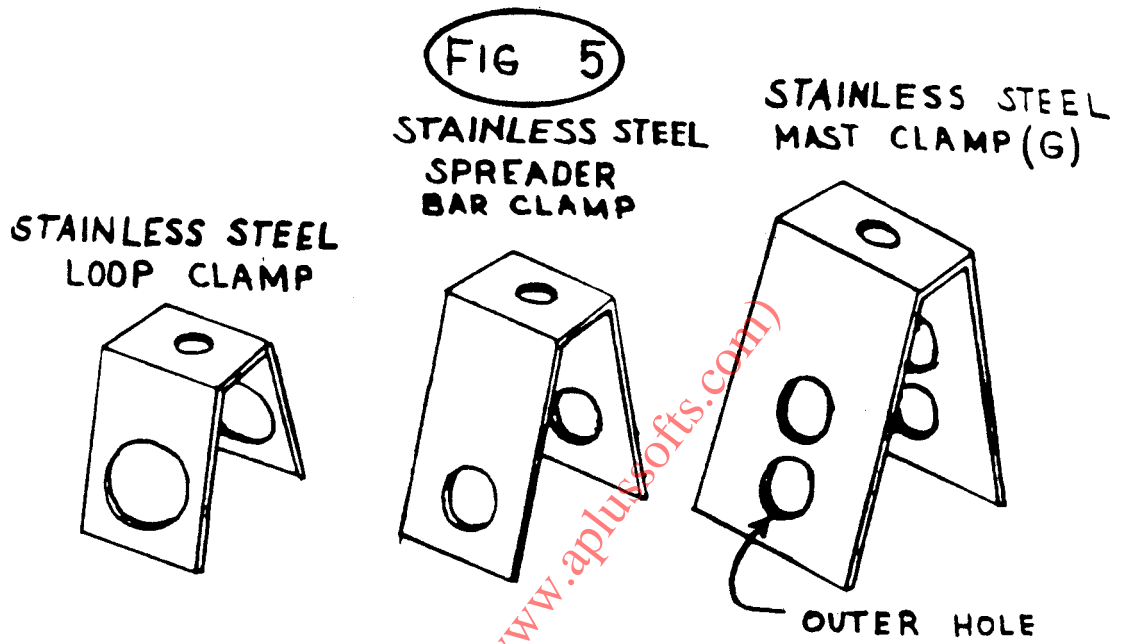


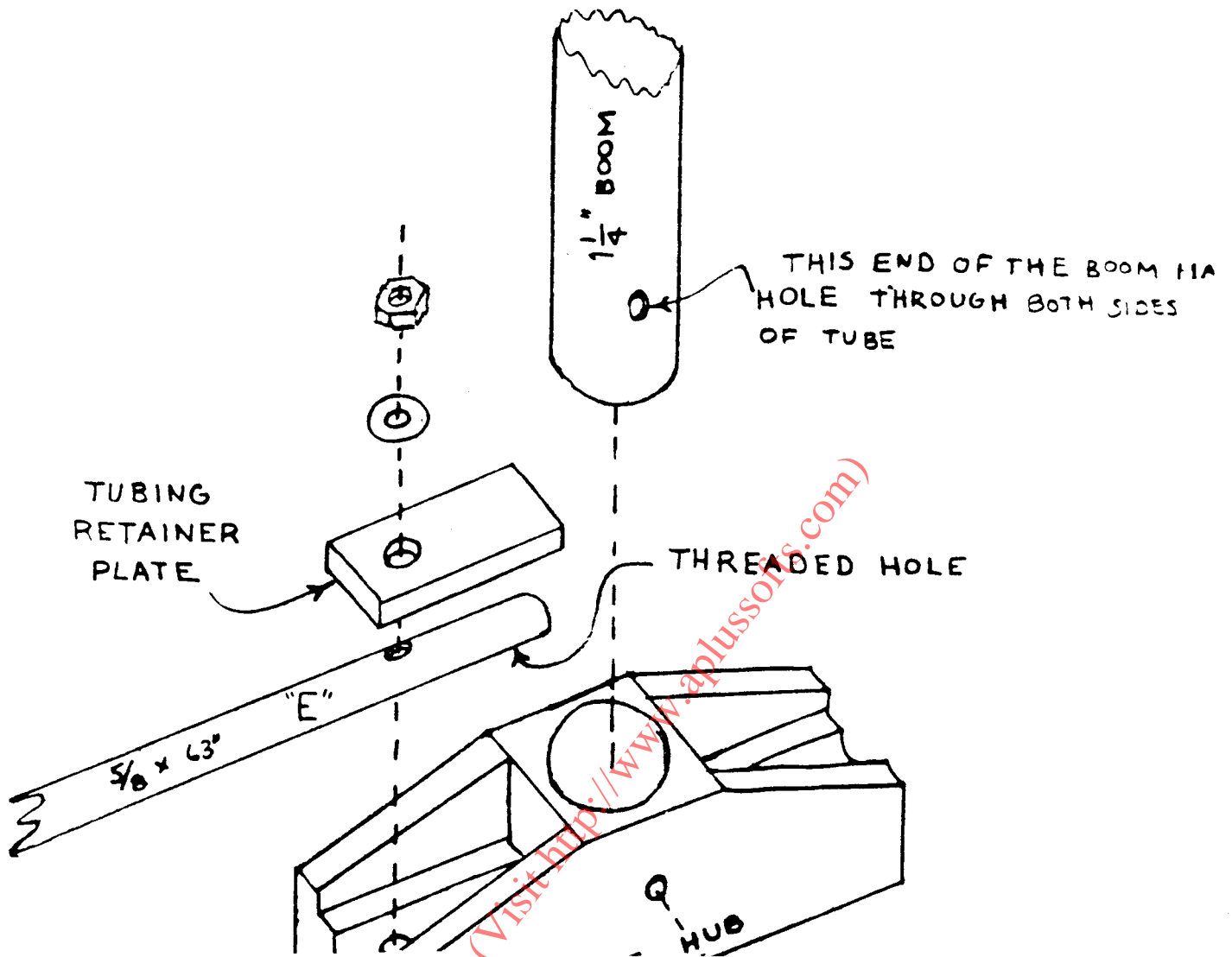
FIG 2

Trial Version (Visit <http://www.applsofts.com>)

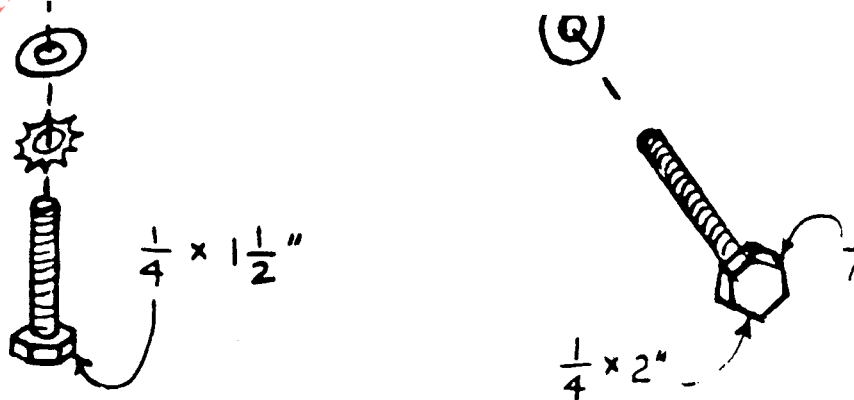


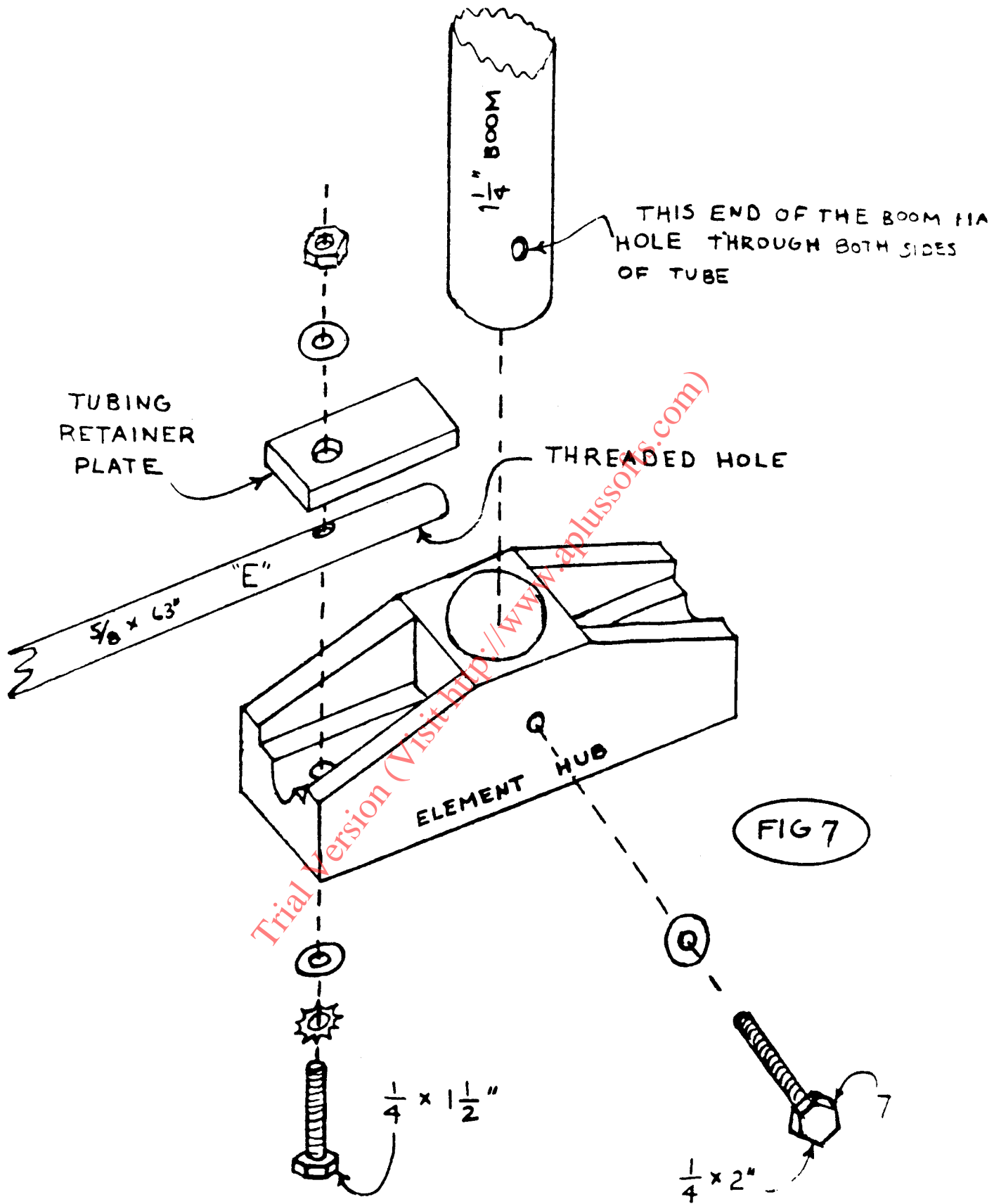




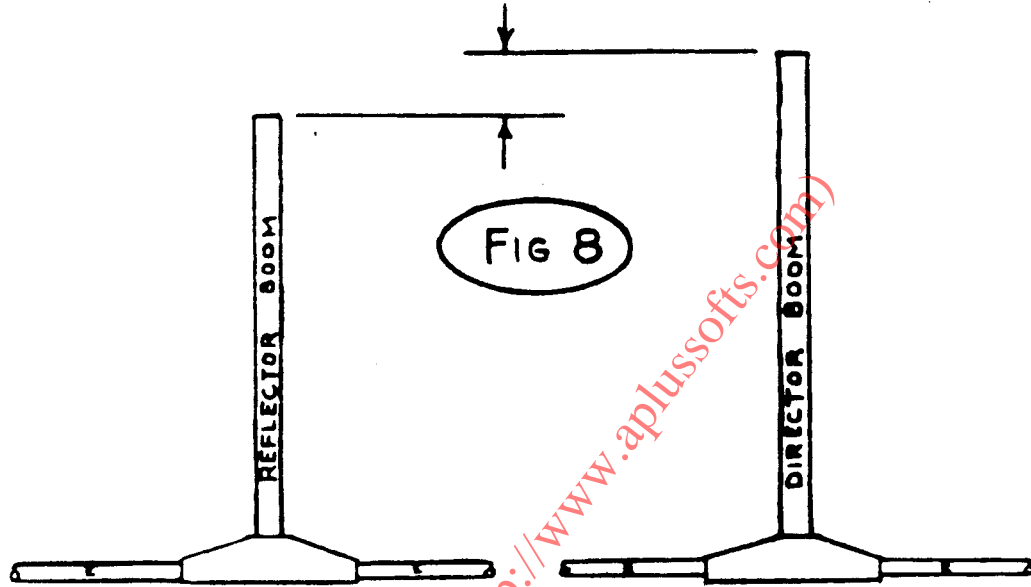


TAKE THE TWO 1-1/4" BOOM SECTIONS, PUSH THE ENDS, WHICH ARE COLOR CODED RED, INTO EACH HUB. LINE UP THE HOLES SO BOLT NUMBER 7 WILL SLIP THROUGH. USE A 1/4" FLAT WASHER UNDER THE HEAD OF THE BOLT. ON THE OTHER SIDE, USE A FLAT WASHER AND A STAR WASHER UNDER THE NUT. THE FLAT WASHER SHOULD BE NEXT TO THE PLASTIC HUB. TIGHTEN.

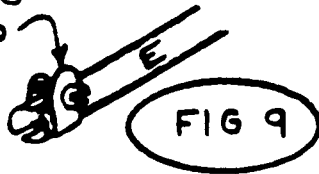




DIRECTOR ASSEMBLY APPROX.  
2" TALLER THAN REFLECTOR ASSEM.



TUBING  
CLAMP



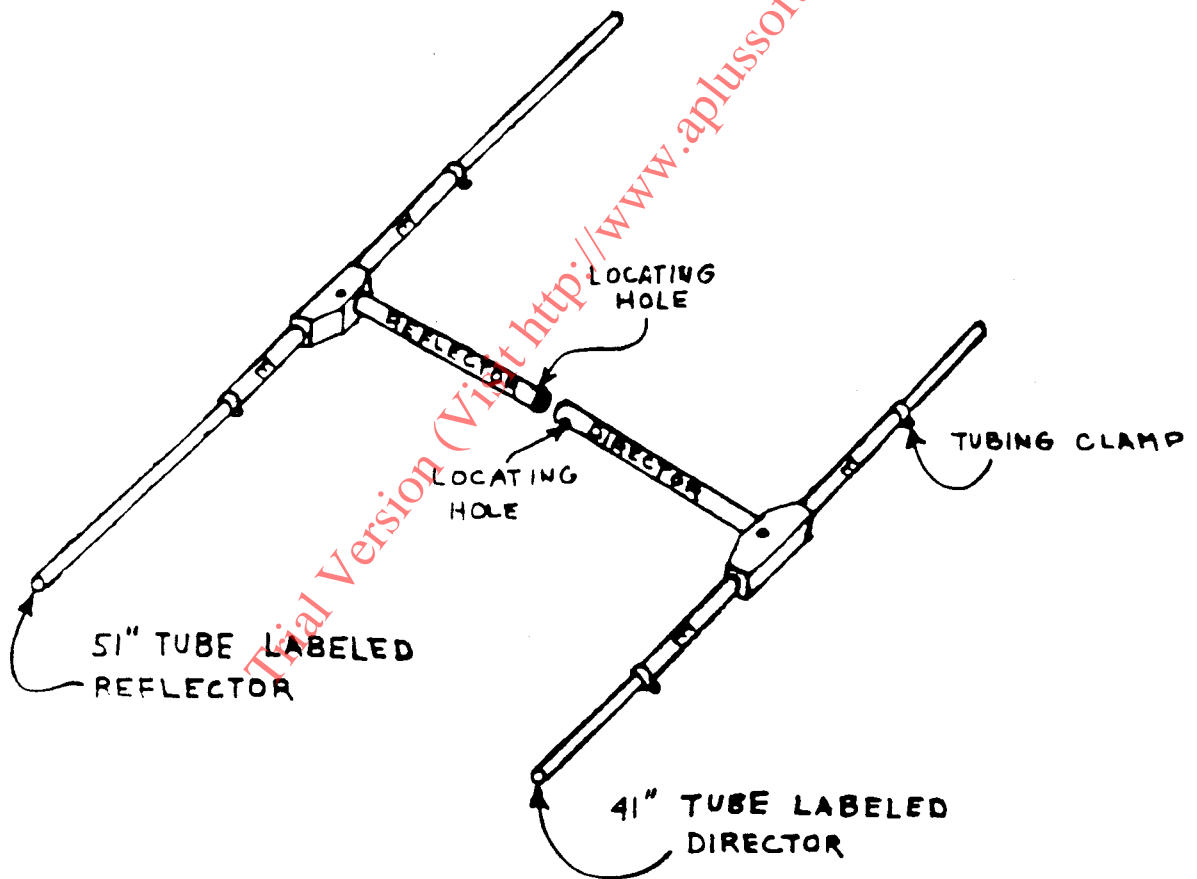
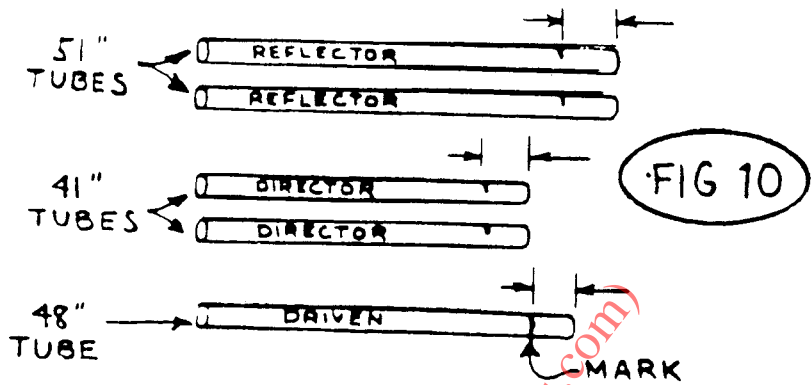


FIG 11

FIG 12

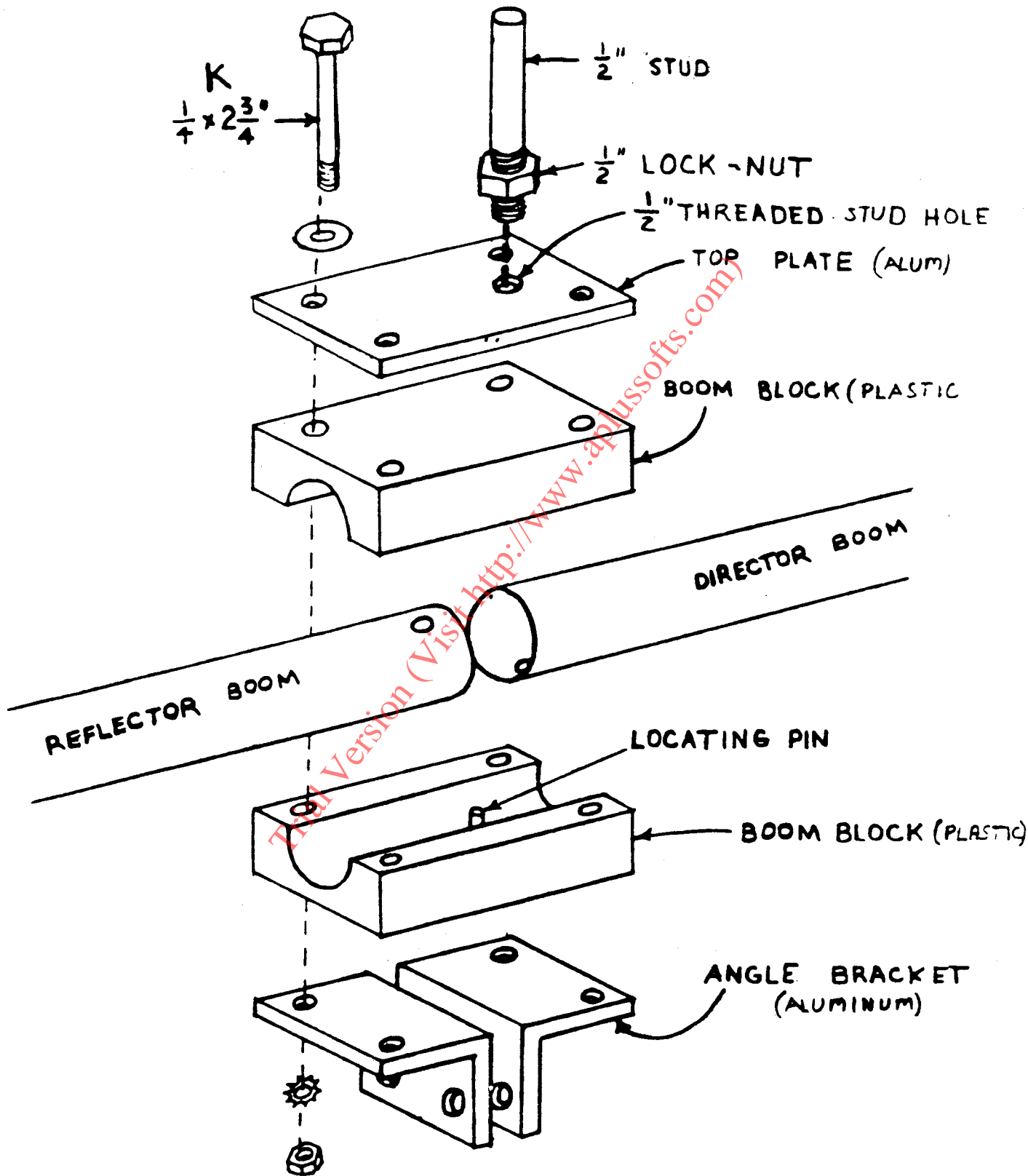
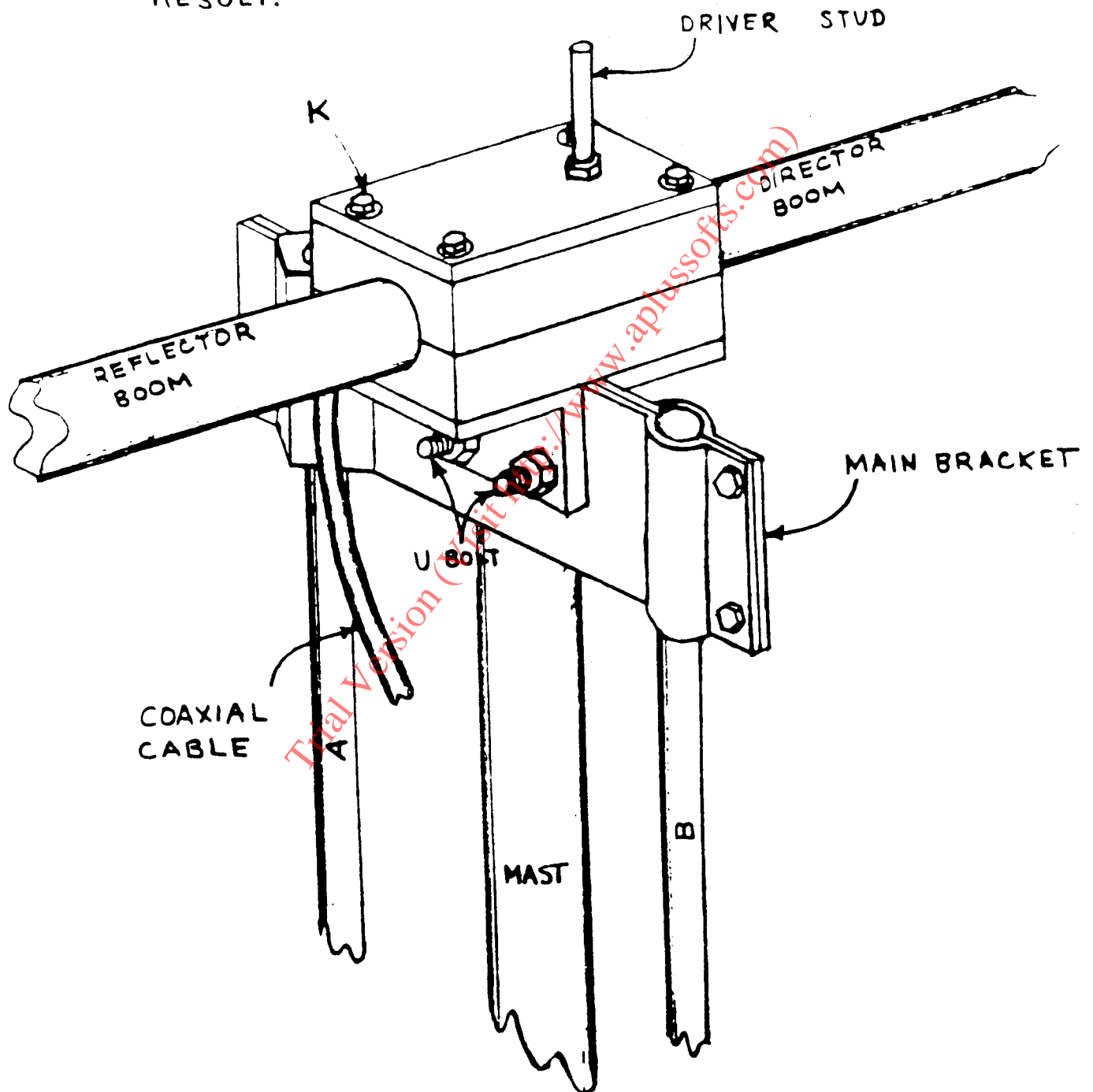
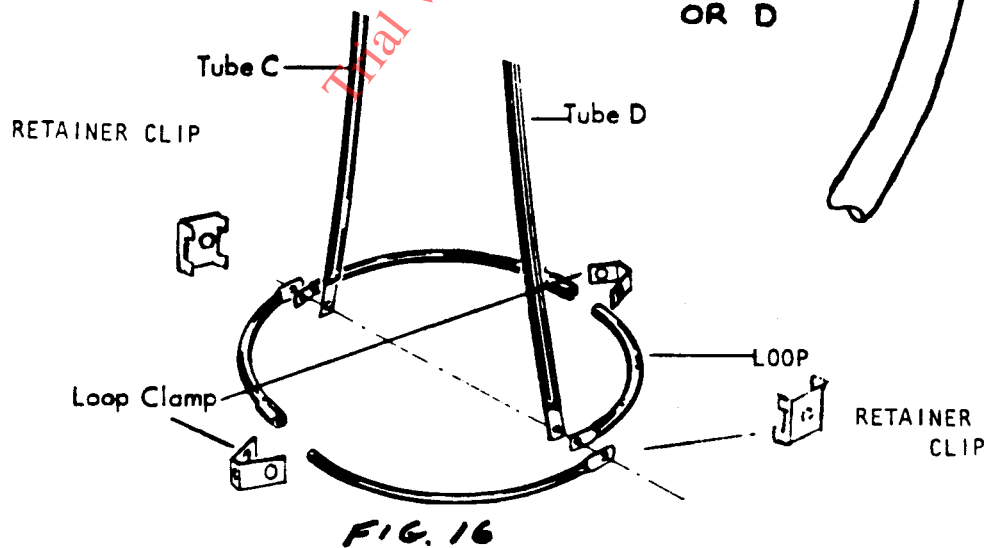
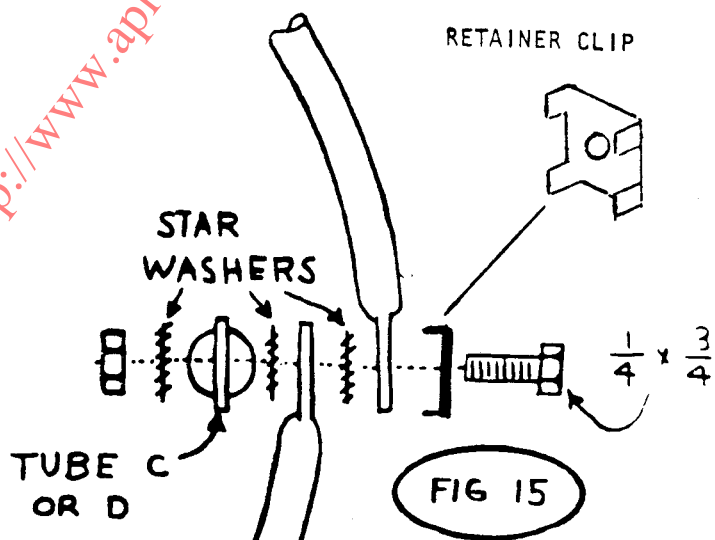
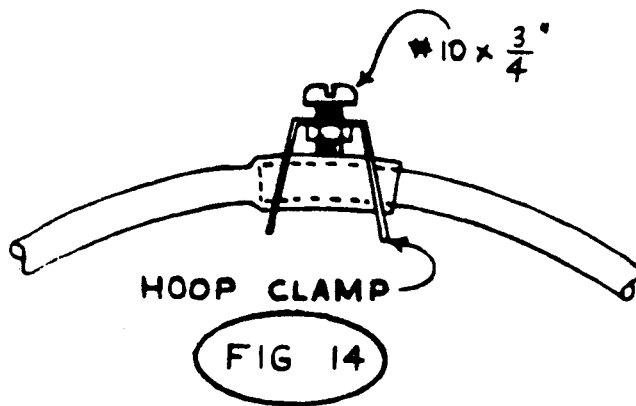


FIG 13

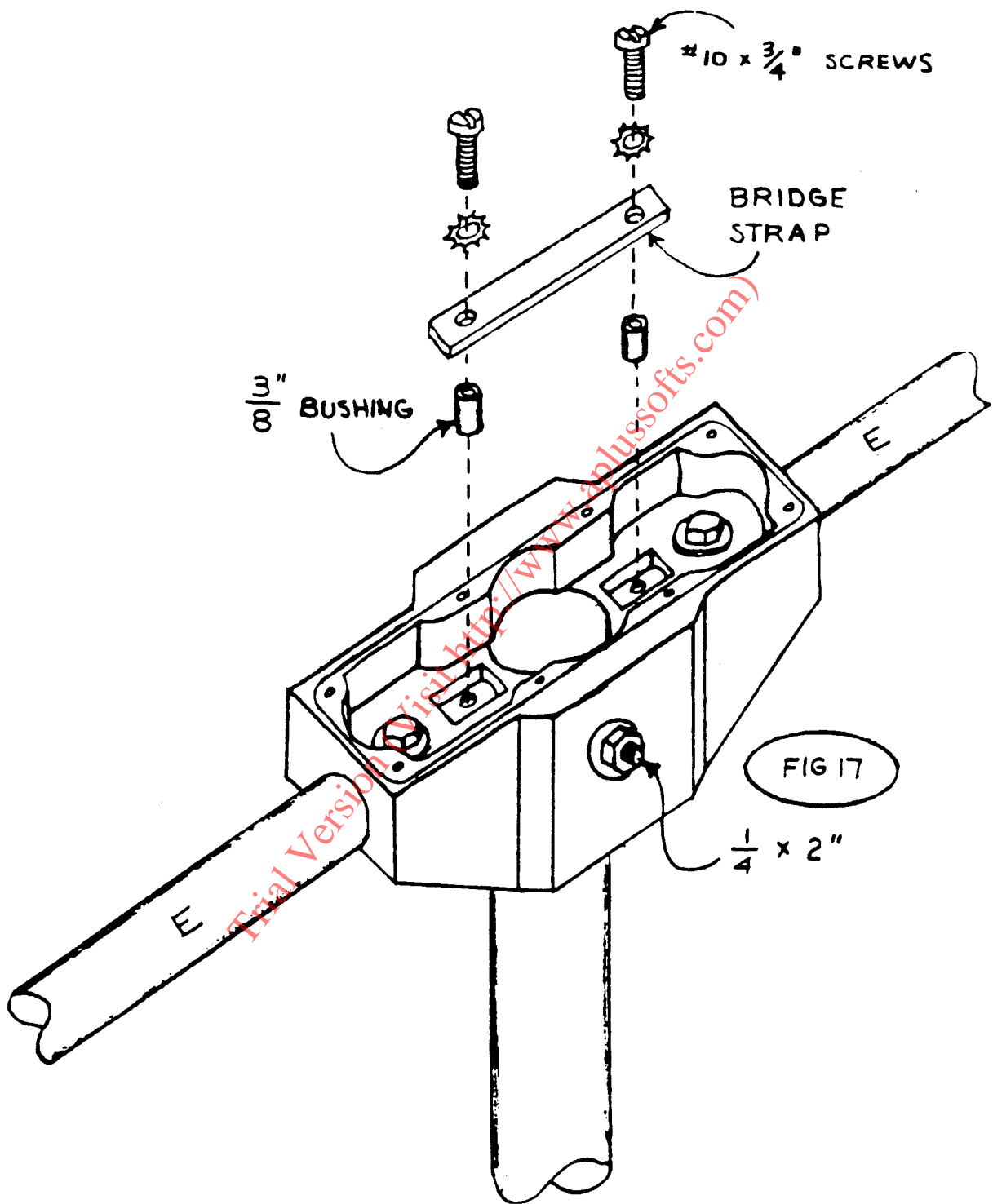
## IMPORTANT NOTICE!

IT IS IMPORTANT THAT THE DRIVER STUD, DIRECTOR BOOM, MAIN BRACKET, AND MAST ARE POSITIONED IN RESPECT WITH ONE ANOTHER AS SHOWN IF THIS IS NOT OBSERVED, POOR PERFORMANCE WILL RESULT.









## AV 150 TROUBLESHOOTING TIPS

### PLEASE MAKE THE FOLLOWING CHECKS WITH TAPE MEASURE AND OHM METER

1. Director must equal  $16'6\frac{1}{4}"$  and must show conductivity top to bottom.
2. Reflector must equal  $18'6\frac{1}{4}"$  and must show conductivity top to bottom.
3. Driven must be  $77\text{-}5/8"$  tip to plate and show conductivity to lower portion.
4. Booms should not show conductivity from one to another.

Dimensions may be  $\pm \frac{1}{4}$  tolerance. If all these items check and problem continues,

5. The spacing from the center of the director element to the center of the driven element should be  $62\frac{1}{4}"$ . The measurement should be taken near the hub.
6. The spacing from the center of the reflector element to the center of the driven element should also be  $62\frac{1}{4}"$ .
7. Check coaxial lead with ohm meter.
  - a) From center of coax connector to shell of connector should show a "short circuit" with hoop assembled on antenna.
  - b) From center to shell of coax connector should show no continuity with hoop removed.
8. If in step 7a an "open circuit" is indicated instead of a

short circuit (hoop installed on antenna)

- a) Remove your coax from the special 6 foot matching line and with a continuity checker, make the following test:

From the center of the female connector of the matching harness to the threaded part of this connector must show conductivity ("short circuit") with the hoop of the antenna installed. Flex the ends of the matching section gently as you are testing. This may reveal a possible intermittent connection.

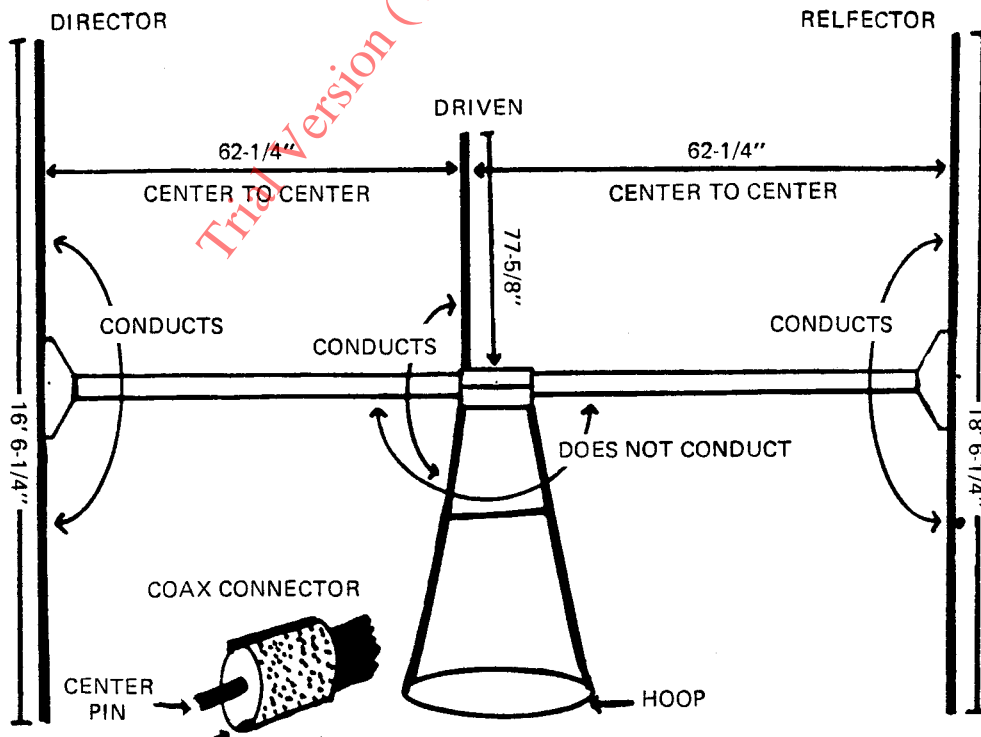
If after this check, there is still no continuity, remove the 6 foot matching line from the antenna. Check the continuity between the center of the female SO-239 connector on the antenna and the threaded portion of this connector. If there still is no continuity, the internal lead from the SO-239 connector to the "split sleeves" is broken.

NOTE: The 6' matching section should show "open circuit" by itself when it is removed from antenna.

If in step 7b a "short circuit" is indicated instead of an open circuit (hoop removed from antenna)

- a) Remove the coax and special matching line and check them individually for "shorts".

IF AFTER TRYING THE ABOVE CHECKS YOU STILL HAVE TROUBLE, PLEASE CONTACT OUR ENGINEERING DEPARTMENT. (312) 543-9350



### ANTENNA TESTING VARIABLES

From time to time, many CBer's are heard to make the remark that a particular antenna is not living up to the advertised performance figures such as gain, S.W.R., or front-to-back ratio. These statements are usually founded on their personal field tests; often based on comparisons between one antenna and another. The disparity in the results between the tests of the CBer and the factory usually stems from the conditions under which the tests were run. The following is a sort discussion of some of the variable conditions that do occur and how they affect antenna performance.

#### EFFECT OF OTHER ANTENNAS

When two antennas are mounted near each other (even if they are used for different frequencies), a coupling usually results which in some way alters their operation. This coupling is even more pronounced when the antennas are mounted less than one wavelength apart. So, if another antenna is less than 36 feet from your CB antenna, there is a good chance that it changes its performance in some way.

#### THE EFFECT OF METAL STRUCTURES

Not only antennas, but water towers, power lines, buildings, or any material of a metallic nature has the ability to misdirect transmission. Sometimes these obstacles will act as directors and sometimes as reflectors - causing the signal to increase or decrease in the intended direction.

Complaints of poor front-to-back ratio or lower than expected gain can usually be traced to this above circumstance - especially in beam-type operation.

#### SIGNAL INTENSITY

The signal strength of a remote transmitting station can never be assumed to be of the same strength as in previous transmissions. Signals of incoming stations should be recalibrated to the antennas being compared. For this reason, you cannot take down one antenna, put up another one a week later, and expect to make accurate measurements. If the stations being used are using beam type antennas, a slight change in the beams' directions can also be critical. Contacts with mobiles are even less valid. A movement of five feet sometimes makes measurable differences in mobile communications.

#### S METER CALIBRATION

Depending upon the CB set, an S meter is calibrated so that one S unit is equal to 6 db. Therefore, an antenna responsible for 1 S unit gain over another has also about 6 db gain over that other antenna. Some S meters, however, are calibrated at only 3 db per S unit and others at 3 or 4 at the low end, and 6 or 7 at the top of the scale.

Another problem encountered with S meters is the ability to measure high strength inputs. Some bounce back at a powerful signal and appear erratic in operation even reading lower on the scale with an increased signal.

### COAX AND CONNECTORS

The quality of the coax and connectors and especially the soldering of the coax to the connector can affect S.W.R. and gain. Many times an unsuspecting CBER will buy a low grade coax and lose 2 or 3 db after paying good money for an expensive transceiver and antenna. A quick check for good coax and connections can be run by substituting a dummy load on the antenna end of the coax. If all is right, the S.W.R. with the dummy load should be a 1 to 1 match.

### CRYSTAL VARIATIONS

Mr. A. and Mr. B. are neighbors and they are comparing the performance of their antennas by their ability to transmit to Mr. C. about 20 to 30 miles away. If Mr. A. has a crystal slightly high on frequency, he might show a weaker signal to Mr. C. even though his operation has more power. This would make A's antenna seem inferior to B's. This problem can be eliminated by Mr. C's having a tunable receive on his transceiver to match A's variation.

### ANTENNA HEIGHT

Whenever antennas are being compared, they should be installed at the proper distance above the ground and preferably in an open field. This operation is not even legal for CB'ing when using a horizontal beam because the proper distance above ground for this mode of transmission is 36 feet or more. Only the test of a vertical antenna may be run at a legal height of 20 feet in an open field.

### TIME VARIATION

Any test of antennas should be performed with a time variation of about 15 minutes or less to eliminate variations due to tropospheric shifts and other changes that affect performance.

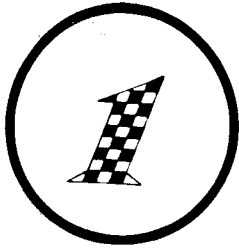
### GUY WIRES AND SUPPORTING STRUCTURES

Guy wires should preferably be of the non-metallic type using ski tow rope or other plastic lines. If metallic guy wires are used, they should be broken up at uneven intervals along their length to avoid interference and possible high S.W.R. In many cases, a manufacturer intends his antenna to be mounted on a metal mast or tower and in some cases, the mast or tower is used as a radiating element.

### PROPER CONSTRUCTION

If they could, manufacturers would ship all antennas fully assembled in order to eliminate mistakes in construction often found in antenna installations. Even the best instructions are sometimes mis-read and an antenna condemned only because of an error in assembly. If an antenna does not perform up to par, contact your local distributor or dealer, and if he can't help you, call the manufacturer. Chances are that somebody will get it working.

These are by no means all of the possible variations to consider in antenna measurements; however, they are some of the most important and understanding them will certainly be to the CBER's benefit and may save time in finding a trouble source.

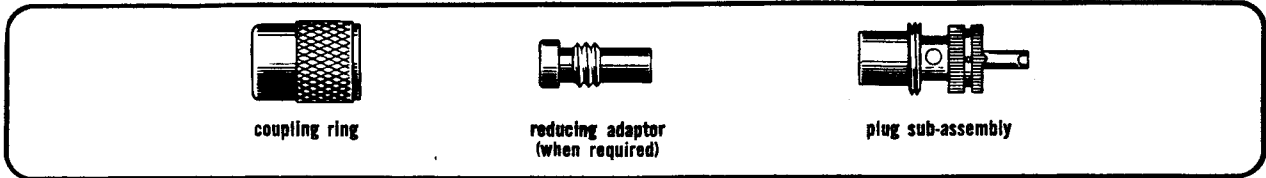


**coaxial connectors**

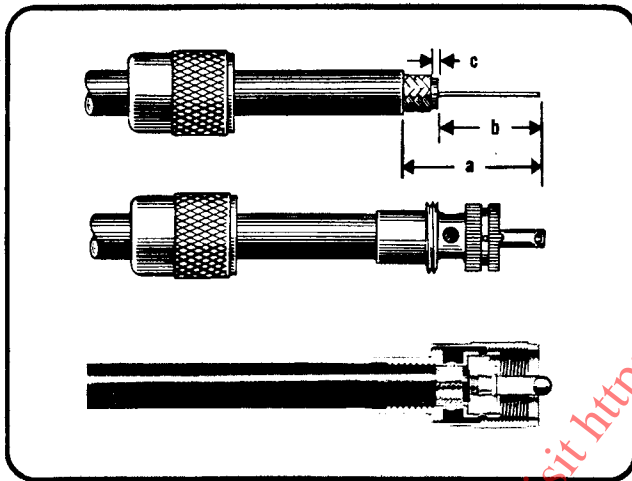
**assembly instructions**

GOOD SOLDERING AND TINNING ARE IMPORTANT TO PROPER ANTENNA IMPEDANCE WHICH EFFECTS PERFORMANCE - BE CAREFUL - FOLLOW DIRECTIONS.

**avanti**



**FOR USE WITH LARGE DIAMETER COAX - RG-8/U**

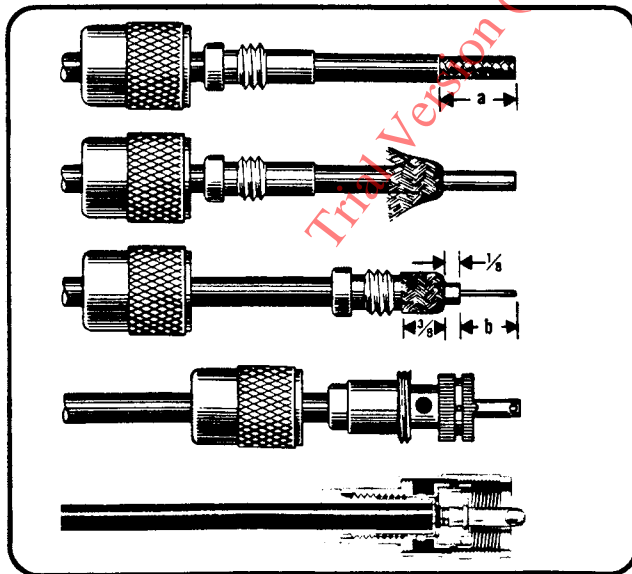


Cut end of cable even and strip jacket, braid, and dielectric to dimensions shown in table. Tin exposed center conductor and braid.

| stripping dims. ( $\pm 1/4$ ) | a     | b   | c   |
|-------------------------------|-------|-----|-----|
|                               | 1 1/4 | 5/8 | 1/6 |

**straight plugs.** Slide coupling ring on cable. Screw the plug sub-assembly on cable. Solder assembly to braid through solder holes, making a good bond between braid and shell. Solder conductor to contact. Do not use excessive heat. For final assembly, screw coupling ring on plug sub-assembly.

**FOR USE WITH SMALL DIAMETER COAX - RG-58/U AND RG-59/U**



Cut end of cable even. Remove vinyl jacket to dimension a in table below. Slide coupling ring and adaptor on cable.

| stripping dims. ( $\pm 1/4$ ) | a   | b   |
|-------------------------------|-----|-----|
|                               | 3/4 | 5/8 |

Fan braid slightly and fold back as shown.

Position adaptor flush with cable jacket. Press braid down over body of adaptor and trim to 3/8". Bare conductor to dimension b. Tin exposed center conductor.

Screw plug sub-assembly on adaptor. Solder braid to shell through solder holes. Use enough heat to create bond of braid to shell. Solder conductor to contact.

For final assembly, screw coupling ring on plug sub-assembly.