6C

# ASSEMBLY INSTRUCTIONS

## ANTENNA MODEL T6

**MI: 030927 (Secure this number someplace, for possible future need)**

## SPECIFICATIONS:

| | |
|---|---|
| FORWARD GAIN | 5.1 dBd |
| F:B RATIO | 15-25 dB (Rises with frequency) |
| FREQUENCY COVERAGE | 13-30 MHz |
| NOMINAL MAXIMUM SWR | 2:1 |
| FEED WITH | 50-52 Ohm Coax Cable |
| POWER CAPABILITY | Legal Limit+ |
| ALUMINUM ALLOY | 6061-T6 |
| HARDWARE | Stainless Steel |
| WEIGHT | 29 Lbs |
| WIND AREA | 6.2 SQ FT |
| WIND LOAD @ 80 MPH | 100 Lbs |
| SUGGESTED MAST | 2” OD Max. |
| LONGEST ELEMENT | 38 ft |
| TURNING RADIUS | 20 ft |
| MAXIMUM WIND | 100 MPH |
| NUMBER OF ELEMENTS | 6 |

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# 6P

## PARTS LIST ANTENNA MODEL: T6 MI: 030927

| P/n | DESCRIPTION | | QUAN |
|---|---|---|---|
| | ALUMINUM TUBES: | | |
| 01 | 1.500" square x 72" | Boom Section 1 | 2 |
| 02 | 1.500" square x 72" | Boom Section 2 | 2 |
| 03 | 1.000" round x 23.1" | | 2 |
| 04 | .875" round x 36" | | 2 |
| 05 | .875" round x 25.6" | | 2 |
| 06 | .750" round x 24" | | 4 |
| 07 | .625" round x 36" | | 4 |
| 08 | .625" round x 34.3" | | 2 |
| 09 | .625" round x 5.8" | | 2 |
| 10 | .500" round x 48" | | 8 |
| 11 | .500" round x 28.6" | | 2 |
| 12 | .500" round x 9.9" | | 2 |
| 13 | .375" round x 72" | | 12 |
| 14 | Boom splice inserts – 8" | | 2 |
| 15 | Mast insulator reinforcement washers (thick) | | 4 |
| 16 | U-Bolts ss | | 2 |
| 17 | Plastic boom-mast insulator | | 1 |
| 18 | Large flat plastic spacers | | 2 |
| 19 | Flat plastic spacers | | 4 |

| P/n | DESCRIPTION | QUAN |
|---|---|---|
| 20 | **BOLTS**: 3/8-16 x 3.5" | 4 |
| 21 | ¼-20 x 2" (Element #1 only) | 2 |
| 22 | 10-24 x 2.5" | 8 |
| 23 | 10-24 x 1-1/2" | 10 |
| 24 | 10-24 x 1-1/4" | 10 |
| 25 | 10-24 x 1.0" | 10 |
| 26 | 6-32 x ¾" | 12 |
| 27 | 10-24 x ½" Hex (& wrench) | 10 |
| 28 | **NUTS**: ¼-20 Nylock ss | 2 |
| 29 | 3/8-16 Nylok ss | 8 |
| 30 | 10-24 Nylock | 58 |
| 31 | 6-32 Nylok ss | 12 |
| 32 | WASHERS | 8 |
| 33 | U-Shaped shorting stub | 1 |
| 34 | Choke Plate with Tie Wrap | 1 |
| 35 | Instructions | |

## T6 BOOM LAYOUT MI: 030927

| BS# | FROM END OF TUBE w/NUMBER | HOLE SIZE | FUNCTION |
|---|---|---|---|
| **1** | 2.0" | 1.000" | Element #1 |
| | 4.0" | .1875" | Large Flat Spacer |
| | 6.0" | .1875" | Large Flat Spacer |
| | 43.1" | .875" | Element #2 |
| | 64.0" | .375" | Boom-Mast Insulator |
| | 67.0" | .375" | Boom-Mast Insulator |
| | 69.0" | .1875" | Splice |
| | 71.0" | .1875" | Splice |
| **2** | 1.0" | .1875" | Splice |
| | 3.0" | .1875" | Splice |
| | 4.4" | .625" | Element #3 |
| | 30.0" | .1875" | Flat Spacers |
| | 31.4" | .625" | Element #4 |
| | 53.3" | .500" | Element #5 |
| | 68.0" | .1875 | Flat Spacer |
| | 71.0" | .500" | Element #6 |
| | 71.7" | .1875" | Coax Cable Attach |

## ASSEMBLY INSTRUCTIONS ——— MODEL T6

**This antenna has two booms, one will be placed atop the other and these booms are machined so that the elements pass directly through them. There are intentionally tight tolerances here, typically 1 or 2 thousandths of an inch, DO NOT FILE OUT THE HOLES MACHINED IN THE BOOMS. Rather, if you must, use a fine emery cloth applied to the element itself.**

You will need the usual assortment of small hand tools to assemble this antenna as well as quality black electrical tape. We recommend the use of a mixture of WD-40 and lock graphite, or similar compound, to lubricate each and every tubing joint and screw hole during assembly, the end of each element being placed into the boom and the boom splices.

**SALT AIR?** You need to seal each tubing joint with minimal amounts of tape, heat-shrink, Etc. Use absolutely no more of these materials than is needed, excess on the outside of the tubes can cause an unwanted shift in the velocity of propagation along the tube. Completely cover the protruding stainless steel boom hardware with a sealant to avoid corrosion and resultant galvanic action that can cause electrical noise.

### GET ORGANIZED

Organize the tubing into groups, first by tube OD and then by length and check all against the parts list to make sure it's all there.

### ASSEMBLY

The following steps are doubles, do each one twice and in exactly the same way. Place the BOOM SECTIONS (BS) so that the BS 1, Etc., marked on the tube is facing up and, relatively, to your left. These will be done in sequence, from BS 1 through BS 2. The distances noted in the **INTO WHAT** column are from the numbered end of the BS tube. See **FIGS. 1, 2 & 3.** RIGHT & LEFT are relative, the object is to alternate directions.

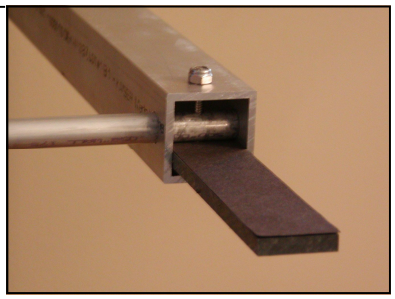
**CAUTION: Here is where you need to be precise and follow the directions implicitly.**

| STEP | WHAT GOES | INTO WHAT | | FASTEN WITH |
|---|---|---|---|---|
| | *****NOTE: Insert the end where there is an identifying mark machined above the hole. This identifies that this end of the tube is to be inserted into the BS.** | | | |
| **1** | 1.000" x 23.1" tube | BS 1 | to the RIGHT at 2.0" | ¼-20 x 2" bolt & nut |
| | Do not tighten down these ¼" nuts. You will need to remove them later. | | | |
| | All following hardware installations are to be installed tightly. | | | |
| **2** | .875" x 13.6" tube | BS 1 | to the LEFT at 43.1" | 10-24 x 1.5" bolt & nut |
| **3** | .625" x 34.3" tube | BS 2 | to the RIGHT at 4.4" | 10-24 x 1.5" bolt & nut |
| **4** | .625" x 5.8" tube | BS 2 | to the LEFT at 31.4" | 10-24 x 1.5" bolt & nut |
| **5** | .500" x 28.6" tube | BS 2 | to the RIGHT at 53.3" | 10-24 x 1.5" bolt & nut |
| **6** | .500" x 9.9" tube | BS 2 | to the LEFT at 71.0" | 10-24 x 1.5" bolt & nut (SEE BELOW) |

**RIGHT-LEFT-RIGHT-LEFT-RIGHT-LEFT FOR EACH BOOM! EXACTLY THE SAME FOR BOTH BOOMS!** The point is, they alternate in direction **in each boom separately,** and this is, perhaps, the best way to get that across.

**STEP 6**: Before doing Step 6, get the Choke Plate which is a 6" length of flat PVC with one hole drilled through it. Insert the end with the hole into Boom Section 2 and underneath where the .500" x 9.9" tube will be inserted. Then take the 10-24 x 1.5" bolt and insert it through Boom Section 2 AND through the Choke Plate up through the .500" tube and then out the other side of Boom Section 2. Tighten down with nut provided. The picture to the right is provided to clarify the installation of the Choke Plate.

This is to be ONLY installed on ONE Boom Section 2. It doesn't matter which.



**ASSEMBLE THE BOOM SECTIONS ONE-TO-ANOTHER –** Retain the position of the BS with the numbers marked thereon facing upward and, relatively, to your left. Again, do each of the following steps twice.

********** Proceed with steps 7 through 8 using supplied Allen Wrench. **********

| STEP | WHAT GOES | ----------INTO WHAT--------- | FASTEN WITH |
|---|---|---|---|
| 7 | Splice inserts | BS 1 **inside** the right end | 10-24 x ½" Socket HD Cap Screws & nuts |

Position the ½" Socket HD Cap Screws on the tip of supplied Allen Wrench and insert it upward through the larger hole (1/2" or 3/8") in the bottom of the boom, continuing upward with it through the smaller hole in the top of the boom until the Socket HD Cap Screw protrudes upward, and outside of the boom. Secure it here with the 10-24 nyloc nuts.

| | | |
|---|---|---|
| 8 | Join the BS1 to BS2 together at these splices | 10-24 x ½" Socket HD Cap Screws & nuts |

**WIND NOISE:** To lessen or prevent wind generated noise from the antenna, cover the holes in the boom with a good quality black plastic electrical tape. Included are the holes through which you placed the element holding bolts, between the booms. Looking down and into these holes, you will see the head of the element holding bolts.

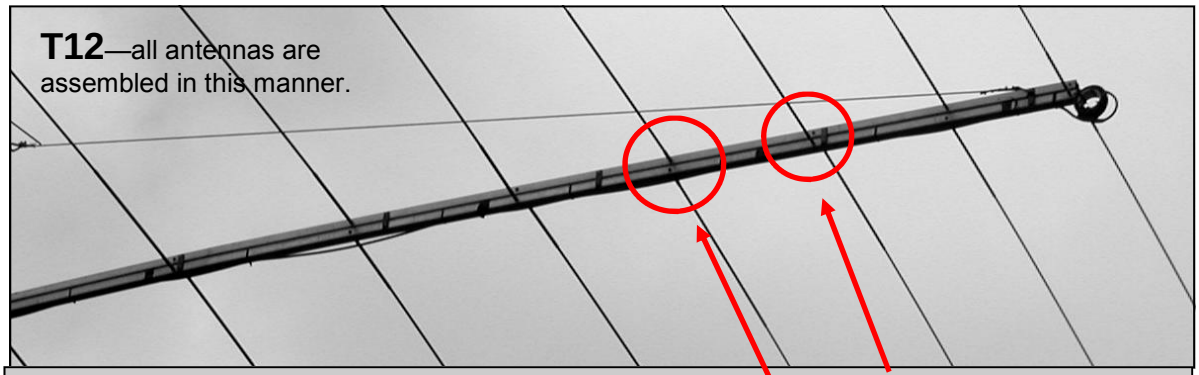
You should now have a pair of identical 12 ft booms. Turn one of these booms upside down so that the numbers marked thereon face downward.

**THESE NEXT STEPS ARE SINGLES:** Do them only to the boom with the numbers facing down. Install the spacers so that they point up from this boom.

| STEP | WHAT GOES | ----------INTO WHAT--------- | FASTEN WITH |
|---|---|---|---|
| 9 | Large flat spacers | BS 1 at **A** | 10-24 x 2.5" machine screw & nut |
| 10 | Flat Spacers | BS 2 at **B** | 10-24 x 2.5" machine screw & nut |
| 11 | Flat spacers | BS 2 at **B** | 10-24 x 2.5" machine screw & nut |

12 Pick up the other boom, the one with no spacers installed. Keep the numbers marked thereon facing upward and install it atop the boom with spacers, sliding the top boom onto and between the spacers. Same machine screws as above

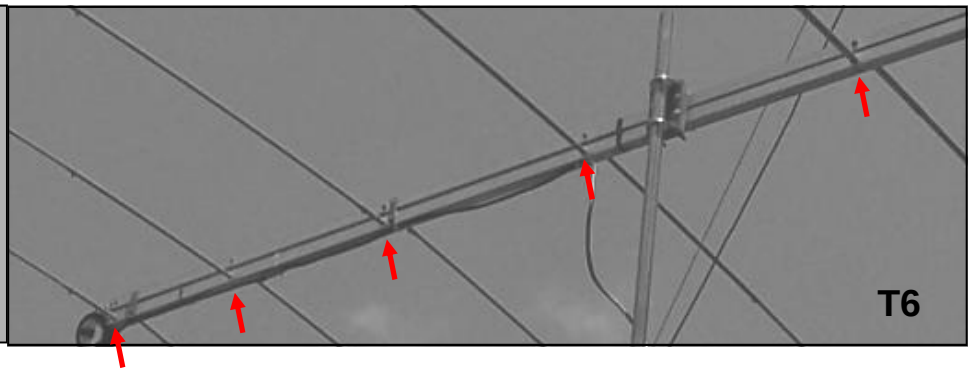
**13 DO A RE-CHECK OF YOUR ASSEMBLY WORK:** See **FIG. 3.** The elements in the top boom alternate, first to one side and then to the other. Odd numbered elements go, say, right, and even numbered elements go the opposite direction. The elements in the lower boom MUST, then, go in a direction opposite those in the upper boom. You **MUST** understand this concept.




Notice how the elements alternate between the top and bottom booms.

This is an example of a **WRONG** install. Look carefully and you will see ALL the elements lined up on the bottom boom. See the difference between the two examples? The correct install is elements alternating—top/bottom/top/bottom, etc. like the top picture.

Your SWR will be *whacko* if your antenna looks like this!



**THE ELEMENTS:** Start with the smallest element, #6, at the front of the antenna. These are double steps, do each twice, once for each side of the antenna. See **FIG. 1**

| STEP | WHAT GOES | ----------INTO WHAT--------- | FASTEN WiTH |
|---|---|---|---|
| 14 | .375" x 72" tube | .500" x 9.9" tube, Element # 6 | 6-32 x 3/4" machine screw & nut |
| 15 | .375" x 72" tube | .500" x 28.6" tube, Element # 5 | 6-32 x 3/4" machine screw & nut |
| 16 | .375" x 72" tube | .500" x 48" tube | 6-32 x 3/4" machine screw & nut |
| 17 | Results of step 16 | .625" x 5.8" tube, Element # 4 | 10-24 x 1.0" machine screw & nut |
| 18 | .375" x 72" tube | .500" x 48" tube | 6-32 x 3/4" machine screw & nut |
| 19 | Results of step 18 | .625" x 34.3" tube, Element #3 | 10-24 x 1.0" machine screw & nut |
| 20 | .375" x 72" tube | .500" x 48" tube | 6-32 x 3/4" machine screw & nut |
| 21 | Results of step 20 | .625" x 36" tube | 10-24 x 1.0" machine screw & nut |
| 22 | Results of step 21 | .750" x 24" tube | 10-24 x 1-1/4" machine screw & nut |
| 23 | Results of step 22 | .875" x 13.6" tube, Element # 2 | 10-24 x 1-1/4" machine screw & nut |
| 24 | .375" x 72' tube | .500" x 48" tube | 6-32 x 3/4" machine screw & nut |
| 25 | Results of step 24 | .625" x 36" tube | 10-24 x 1.0" machine screw & nut |
| 26 | Results of step 25 | .750" x 24" tube | 10-24 x 1-1/4" machine screw & nut |
| 27 | Results of step 26 | .875" x 36" tube | 10-24 x 1-1/4" machine screw & nut |
| 28 | Results of step 27 | 1.000" x 23.1" tube, Element # 1 | 10-24 x 1-1/4" machine screw & nut |

**STOP AND COMPARE. DOES IT LOOK LIKE THE PHOTOS AND DRAWINGS IN THIS MANUAL?**

29 Remove the nuts holding Element #1 in place, slip the shorting stub onto the bolts and re-apply the nuts, leaving the shorting stub to protrude to the rear of the antenna. Reach into the element tube with long-nosed pliers to hold the machine screws in place during this step.

**The COLLINS BALUN (A common mode current choke)**

Use 12 ft of only RG-8 or RG-213 coax cable for this. More is OK. The balun works best if the coil turns are side-by-side as opposed to bunched. It also works as well as any available ferrite device. The coil is 3" or so ID. Wind 4 turns side-by-side with another 4 turns wound directly atop the first 4.
The input and output thus end up on the same side. Alternatively, you can wind 8 side-by-side turns in one layer, using the same coil ID.

Allow only 2-4 inches of cable between the balun and the antenna. One can often find plastic pipe fittings in a hardware store to serve as a coil form.

30 Install the Boom-Mast Insulator at **C** on the booms.
Parts sequence is: Head of Bolt – Washer – BMI – Boom –
Mast Insulator Reinforcement Washers (thick washers) – Nut 3/8-16 x 3.5" bolts, Etc.

**CAUTION – CAUTION – CAUTION**
**Make sure that the threads of these bolts are very clean and well lubricated.**

31 Install the **Collins Balun** (**CHOKE**) at the front of the Antenna, at the smallest element, in front of the antenna and onto the already installed Choke Plate using the supplied Tie Wrap. Wrap the Tie Wrap over and through the inside of the CHOKE and then down and around the Choke Plate. Tighten the Tie Wrap firmly. Now install the Choke to the Boom Sections. Take the Center Conductor and install it on the top boom. Take the Braid and install it on the bottom boom. Secure both the Center Conductor and Braid to the Boom Sections using the supplied 10-24 x ½" machine screws & nuts.

**THE COAX CABLE BACK TO THE CENTER OF THE ANTENNA, AND THE MAST, IS ATTACHED TO AND DIRECTLY BENEATH THE LOWER BOOM.**

32 See **FIG. 5** Mount the antenna to your mast at the BMI using 3/8-16 U-Bolts, washers & nuts

**CAUTION – CAUTION – CAUTION**
**Make sure that the threads of these U-Bolts are very clean and well lubricated.**

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## FIG. 1

### TUBE SIZES AND LENGTHS USED TO MAKE THE ELEMENTS

PLEASE NOTE: The actual lengths of most tubes will be a bit shorter than the lengths in the below table.

| | TUBE SIZES | | | | | |
|---|---|---|---|---|---|---|
| **ELEMENT** | **1.000"** | **.875"** | **.750"** | **.625"** | **.500"** | **.375"** |
| 1 | 23.1" | 36" | 24" | 36" | 48" | 72" |
| 2 | | 25.6" | 24" | 36" | 48" | 72" |
| 3 | | | | 34.3" | 48" | 72" |
| 4 | | | | 5.8" | 48" | 72" |
| 5 | | | | | 28.6" | 72" |
| 6 | | | | | 9.9" | 72" |

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## FIG. 2

### ELEMENT PLACEMENT v. BOOM SECTION

| ELEMENT | DISTANCE FROM LEFT END OF BOOM | BOOM SECTION |
|---|---|---|
| 1 | 2.0" | 1 |
| 2 | 43.1" | |
| 3 | 4.4" | 2 |
| 4 | 31.4" | |
| 5 | 53.3" | |
| 6 | 71.0" | |

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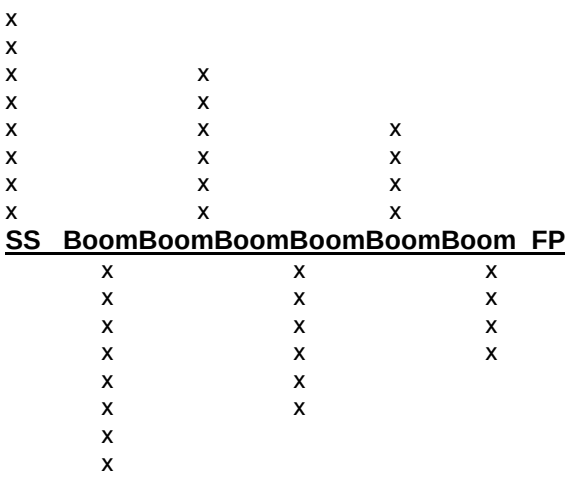
## FIG. 3




This is what half, of the antenna should look like, only one of the two booms. The other half should have elements pointing in the opposite direction.

**SS = Shorting Stub**
**FP = Feed Point**

**Elements to Boom Assembly**

Refer back to Fig. 3, insert the larger end of the proper element into the proper hole in the boom and secure the element into place with a 10-24 x 1 12" through the 3/8" hole, through the element and out the smaller hole. Then, secure it with the nylok nut, don't dent the boom too much.

**Fig. 4**

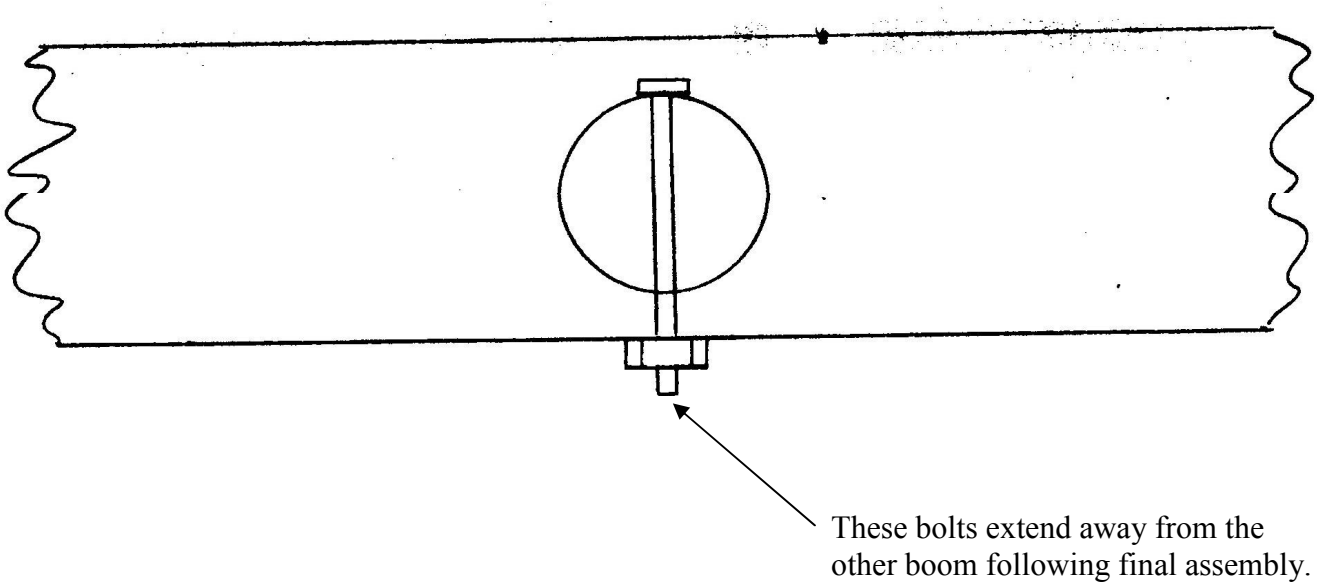



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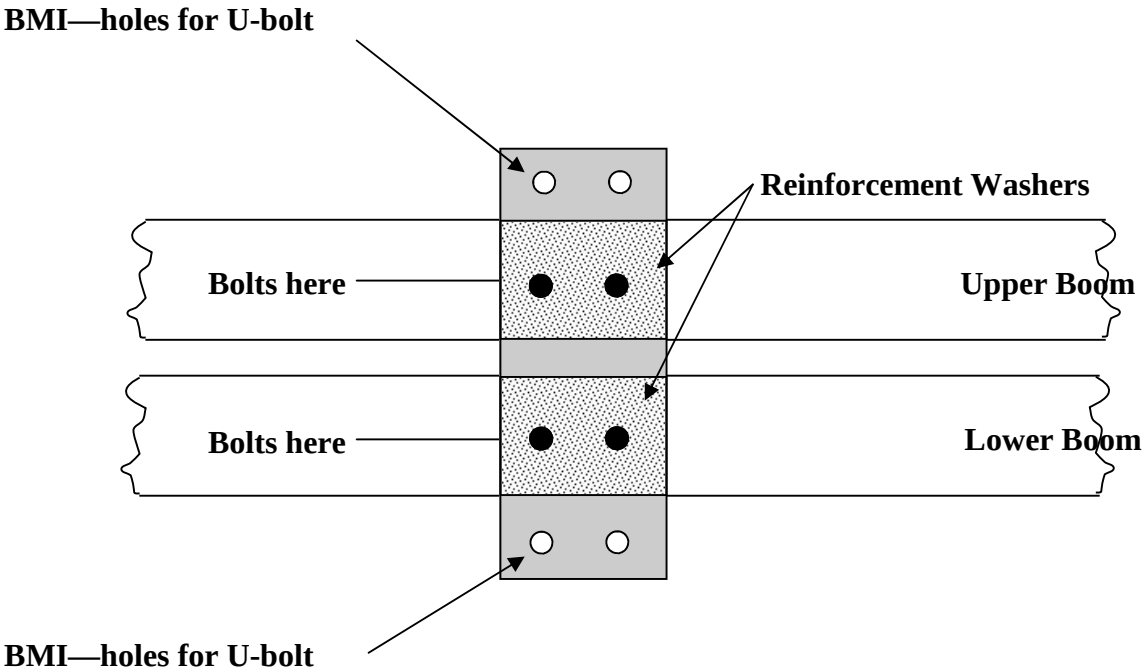
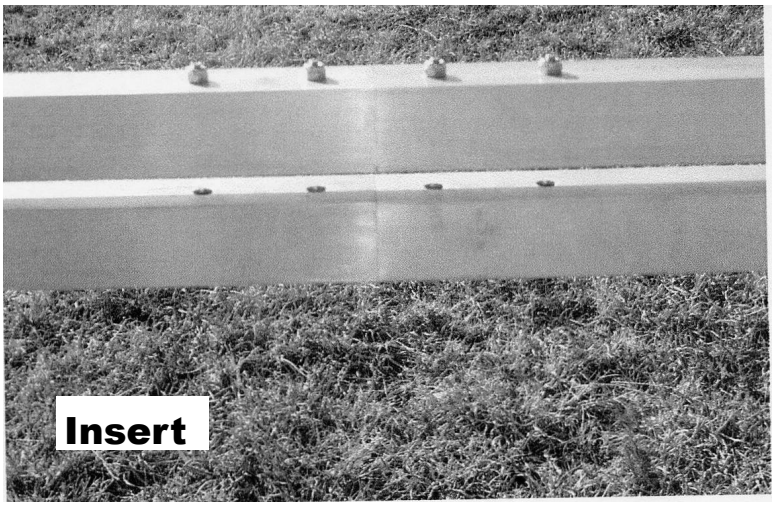
**Fig. 5**

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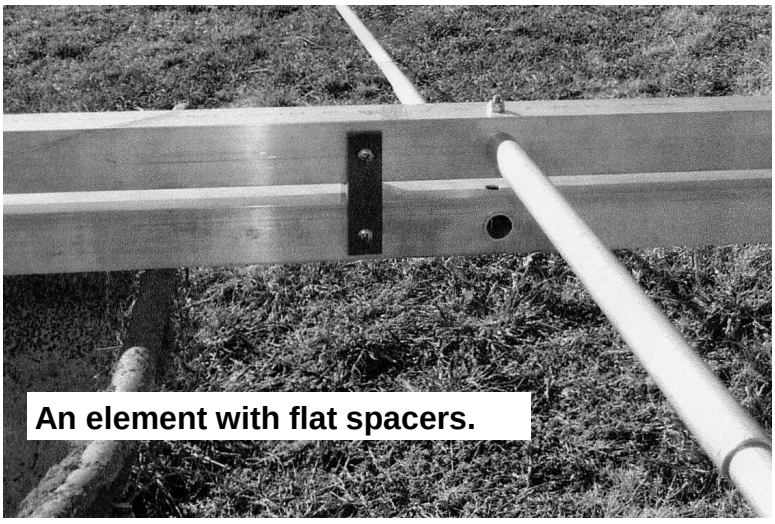
An element with flat spacers.


The Boom-to-Mast insulator and
an element.-U-bolt