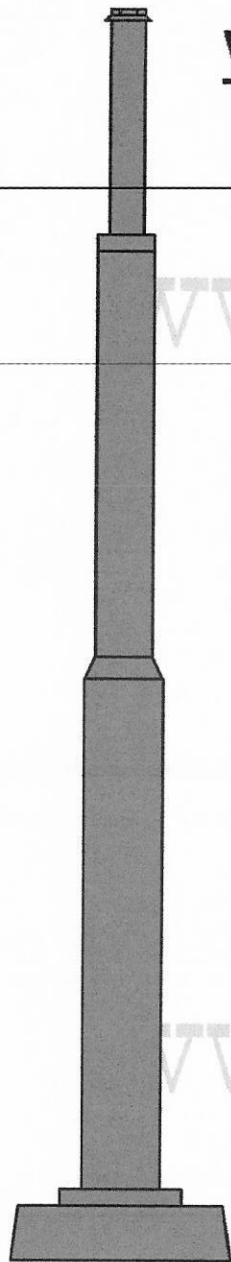
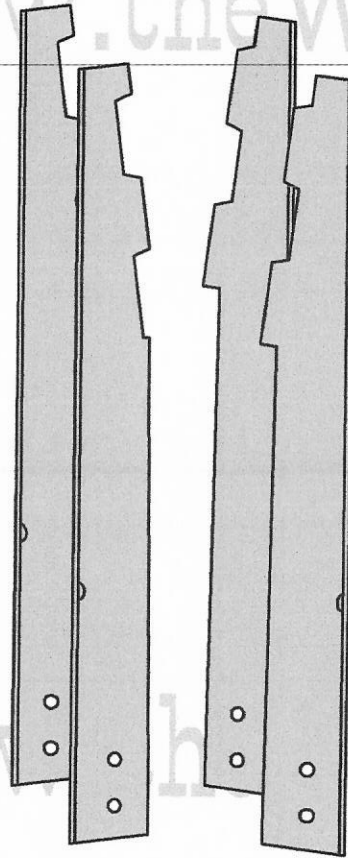


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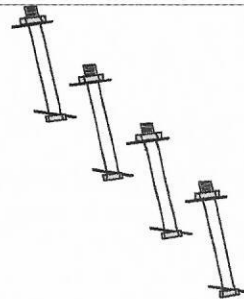
Catalog of Parts



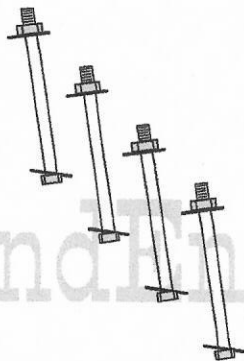
Mast Pipe (1)



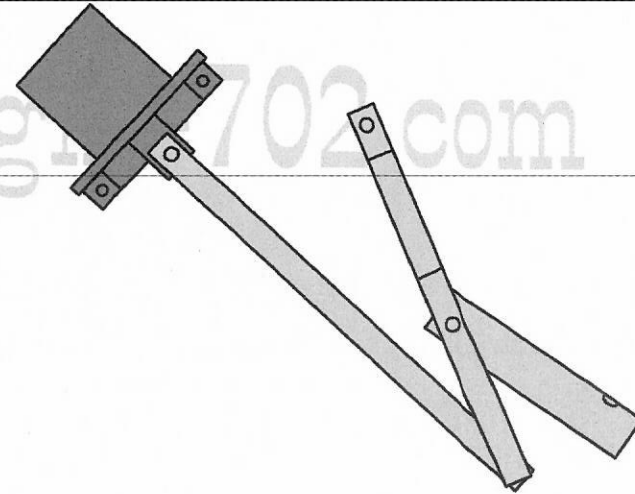
Angle Iron Legs (4)



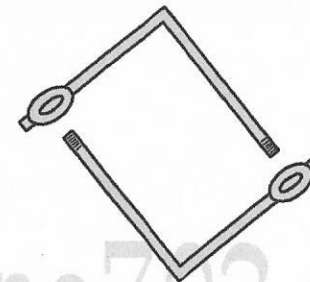
Short Bolts(4)
Flat Washers (8)
Nuts (4)



Long Bolts(4)
Flat Washers (8)
Nuts (4)



Furling Device

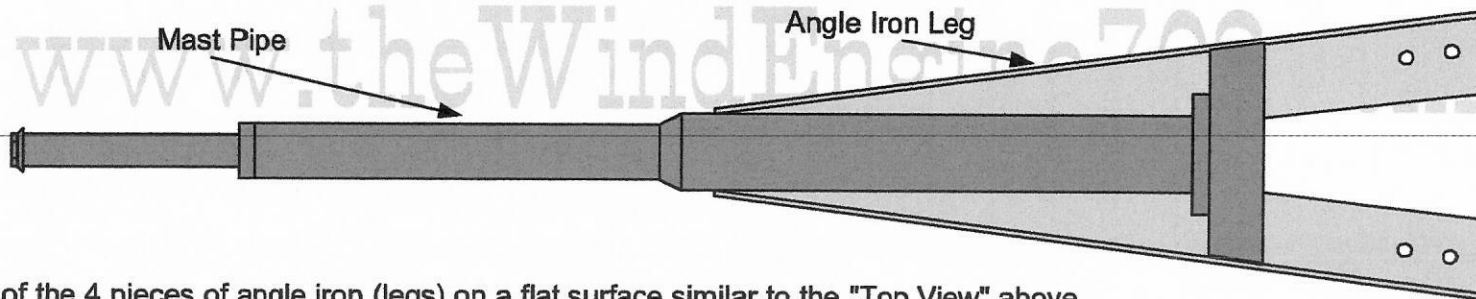


Diamond (1)

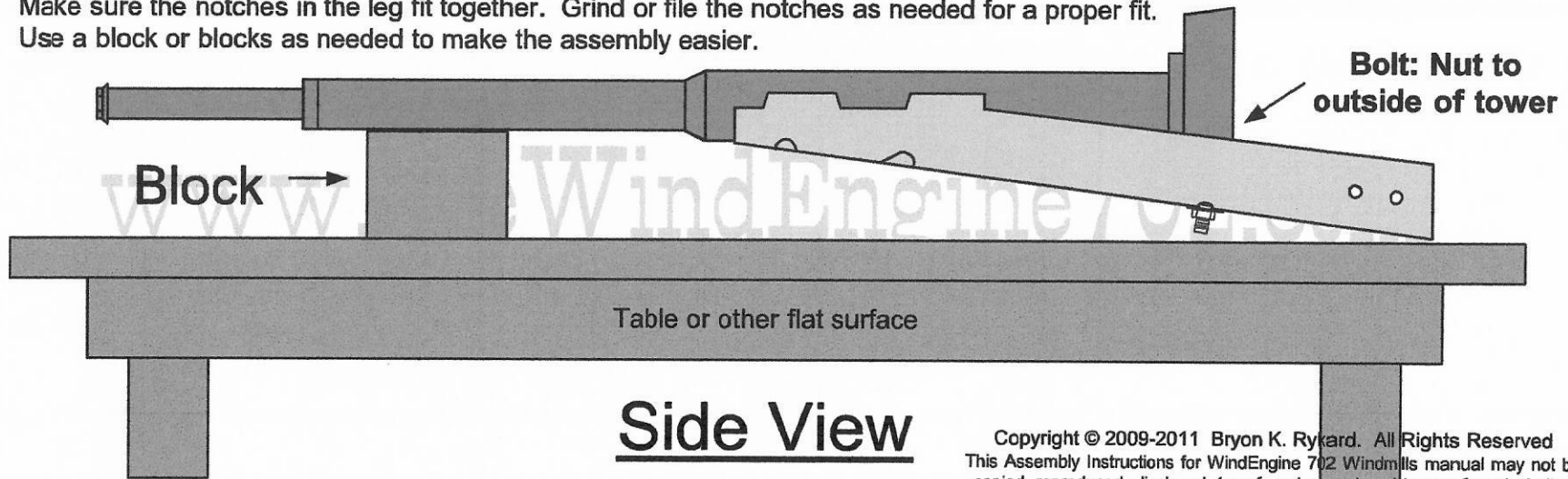
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Top View



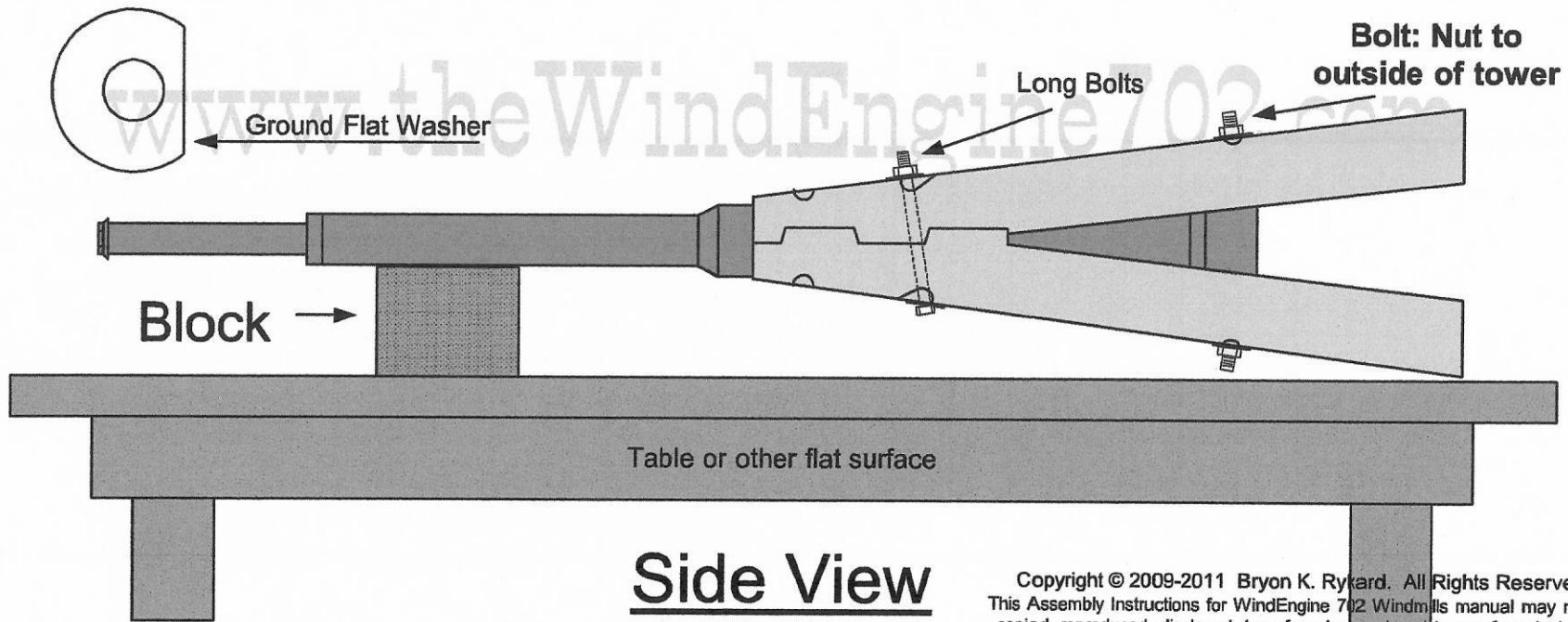
- Lay 2 of the 4 pieces of angle iron (legs) on a flat surface similar to the "Top View" above.
- Place the Mast Pipe on the 2 legs, aligning the holes in the bottom of the mast pipe base with the holes in the legs similar to the "Top View" above.
- Place the appropriate short bolt through the base of the mast pipe and on through the hole in the leg.
The nut is to be on the outside of the tower.
- Place a flat washer and a nut on the bolt. Repeat for the second leg.
- Hand tighten each nut.
- Make sure the notches in the leg fit together. Grind or file the notches as needed for a proper fit.
- Use a block or blocks as needed to make the assembly easier.



Side View

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- Lay another of the 4 legs on top of the Mast Pipe aligning the hole in the bottom of the mast pipe with the hole in the leg similar to the "Side View" below.
- Place the appropriate bolt through the base of the mast pipe and on through the hole in the leg.
The nut is to be on the outside of the tower.
- Place a flat washer and a nut on the bolt. Repeat for the last leg.
- Hand tighten each nut.
- Make sure ALL of the notches in the angle iron fit together. Grind or file as needed for a proper fit.
- **Your Assembly should resemble the drawing below.**
- When you have the notches fitting together, completely tighten the 4 nuts/bolts. Careful not to strip!
- Grind 8 of the flat washers until each one resembles the example below.
- Place 1 of these ground washers on a long bolt, hammer the bolt from the bottom of the appropriate hole in one leg to the top of the hole in the corresponding leg. This may take more than one attempt. Align the ground edges of the washers with the edge of the leg. Place a ground washer and a nut on the end of the bolt -- just start the nut. Repeat for the last 3 bolts.
- When all the long bolts are in the stub tower, Tighten them very, very tight. Careful not to strip!



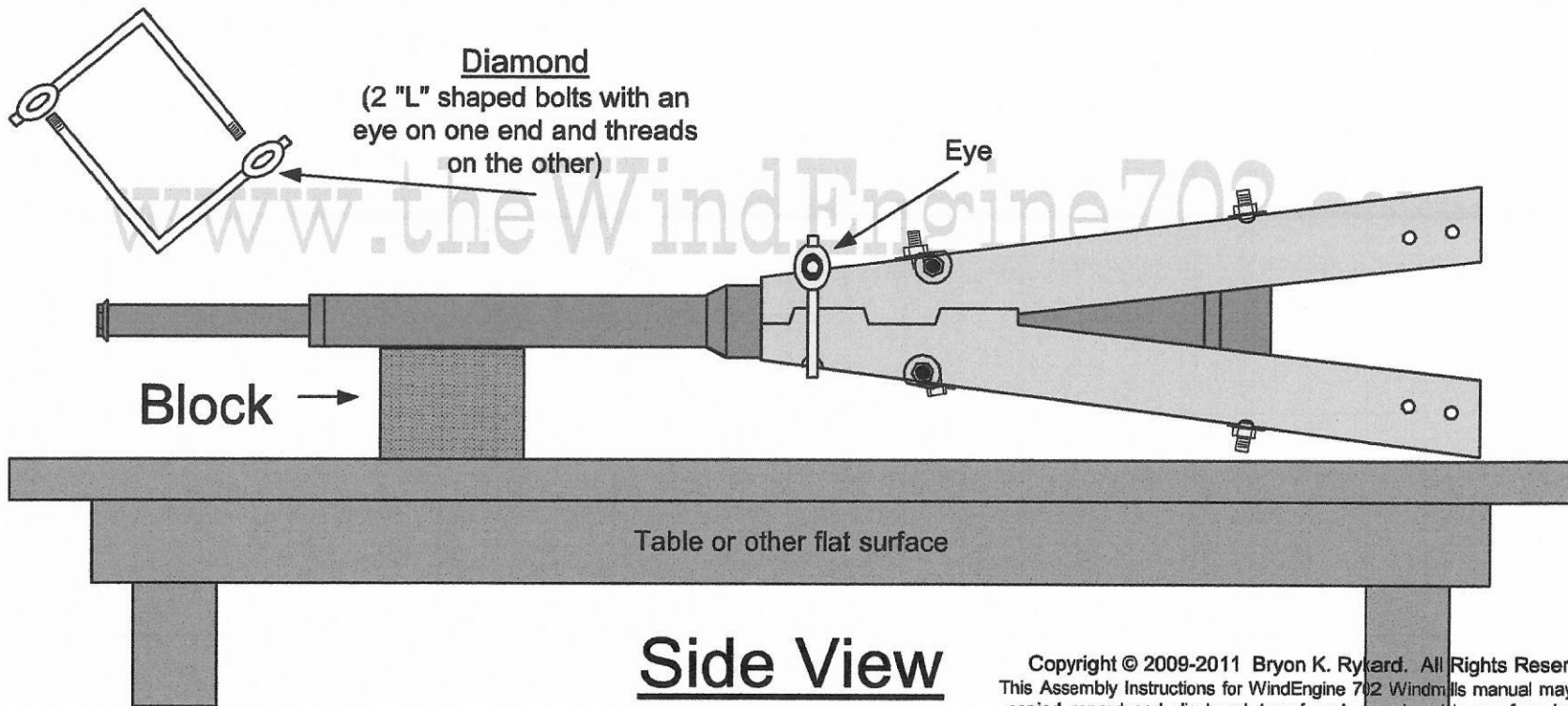
Side View

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- The next step is to put the Diamond piece (2 "L" shaped bolts with an eye at one end and threads at the other) on the appropriate notches near the top of the stub tower.
- Place the Diamond on the tower as show below. Make sure the eye is in the position shown (This is necessary for the assembly of the furling device in a following step).
- Place one "L" shaped bolt against the stub tower and maneuver the other "L" shaped bolt opposite the first. Insert the threaded portions of each bolt into their "eyes" at the same time. Some adjusting of the bolts may be necessary.
- Once these bolts are in place, put a flat washer and a nut on the end of each "L" shaped bolt.
- Tighten the nuts evenly. When they are tight (be careful not to strip), use a hammer and strike all 4 sides of the stub tower ON the diamond, forming the diamond to the sides of the stub tower.
- Tighten the nuts again. Repeat until a tight fit is achieved.
- **Next: Assemble the Furling Device onto the stub tower**



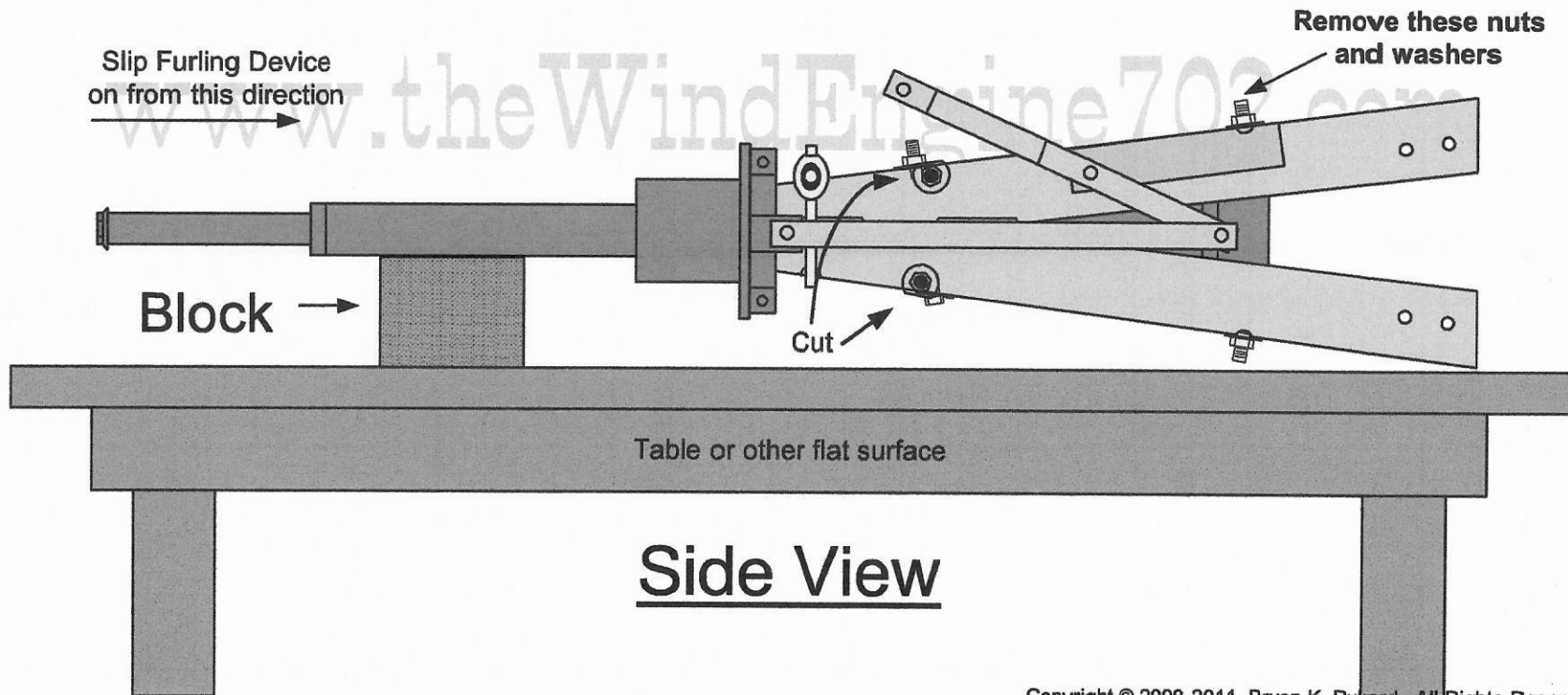
Side View

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- With the stub tower positioned as in the drawing below, remove the nuts and washers from the two bolts facing up. See Drawing
- Position the Furling Device as shown in the drawing and slip it over the top of the mast pipe and on down towards the top of the legs.
- Align the holes in the short pieces of angle iron that are attached to the Furling Device with the holes where the nuts were just removed (pull the bolt back through the hole, align the holes, push the bolt back through the hole).
- Once the Furling Device is in place, put the washers and nuts back on to the bolts and re-tighten (take care not to strip the bolts).
- With the Furling device in place, you will want to use a saw and cut off the ends of the long bolts (as indicated) that protrude in the path of the Furling Device's upper arms (if assembled as in the drawing, the end of the long bolt on the bottom and the top).
- Some adjusting of the Furling Device may be necessary for its proper movement.



Side View

Assembly

NOTE: the use of a large tapered punch or drift and multiple pairs of locking jaw pliers will aid in the assembly of the tower.

Stub Tower (see separate manual for the assembly of this part).

- The stub tower needs to be assembled before continuing.

Position the assembled stub tower:

- Position the assembled stub tower on a flat surface. See Figure 4 for details. NOTE: If the surface you are using is not completely flat, you can use blocks and shims support the tower pieces for assembly.

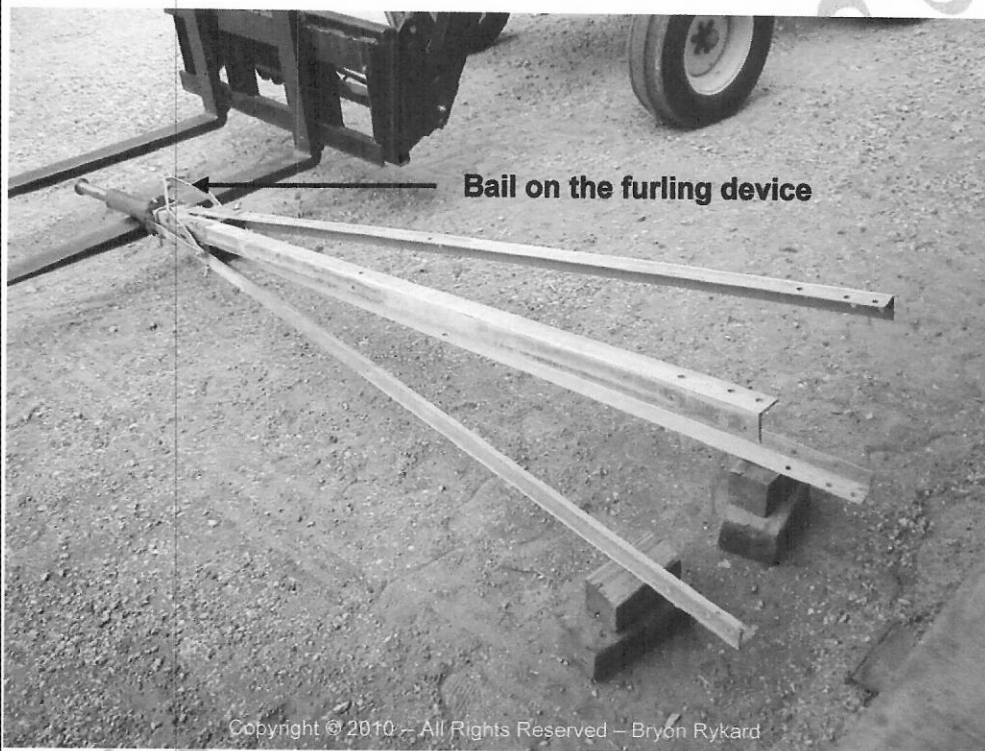


Figure 4: The stub tower positioned for assembly

Stub Tower orientation:

- The bail on the furling device should be facing UP. This will place the leg that will hold the steps on top and closest to you (as shown in the image in Figure 4). The Corner Posts that hold the steps will need to be attached to this Corner Post when the time comes.

Preparation

- Un-band and lay out all the tower parts.
- Due to the galvanization process, there are runs, blobs, and other obstructions that can prohibit the successful assembly of the tower. These blobs and obstructions need to be removed before assembly. Follow these instructions for the successful preparation of these parts:
- Layout all the Corner Posts in the same orientation (same number and spacing of holes in the same direction). NOTE: There are 2 Corner Posts to which will have the steps attached. Orient the Corner Posts as shown in Figure 1. There is a hole midway between each end of the corner posts, when laid out this hole should align on all corner posts – reverse as needed to orient all pieces in the same direction.



Figure 1: The “TOPS” of the corner posts

- Use an angle grinder with a coarse aluminum oxide disk for the following tasks. This process insures a tight fit between the parts.
- Remove any runs, drips, or blobs from the OUTSIDE of the TOP of the Corner Posts. These will come in contact with the inside of the bottom of the Corner Posts on the stub tower.
- Remove any runs, drips. Or blobs from the INSIDE of the BOTTOM of the Corner Posts of the stub tower.
- Remove any runs, drips, or blobs from the INSIDE of the BOTTOM of the Corner Posts. These will come in contact with the outside of the tops of the anchors.
- Remove any runs, drips, or blobs from the OUTSIDE of the TOP of the Anchors.

Preparation (continued)

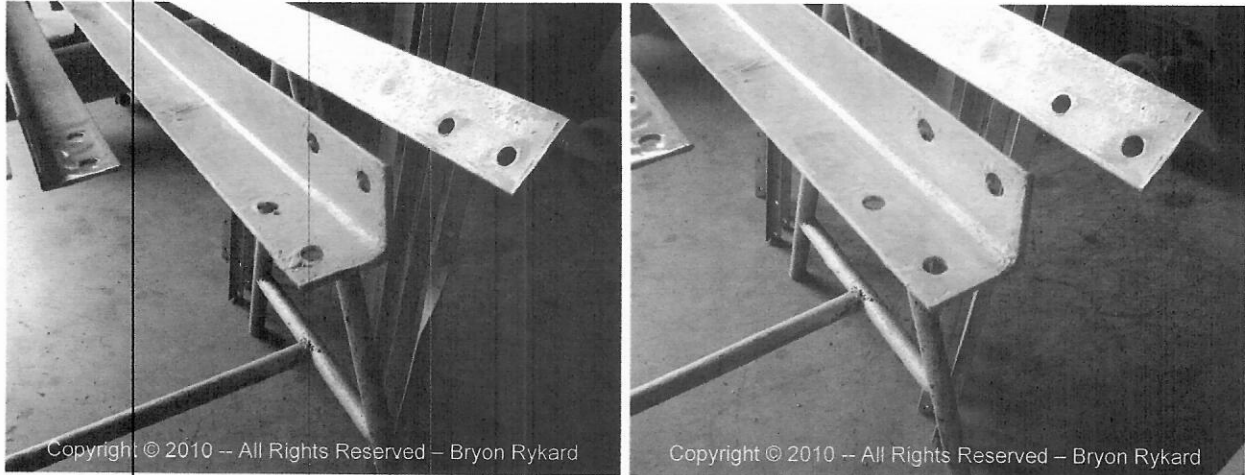


Figure 2: The BOTTOM of the Corner Posts before grinding and after

- See Figure 2 for the difference between Corner Posts before they have had the drips, runs, and blobs removed.



Figure 3: The tops (left) and bottoms (right) of the corner posts.

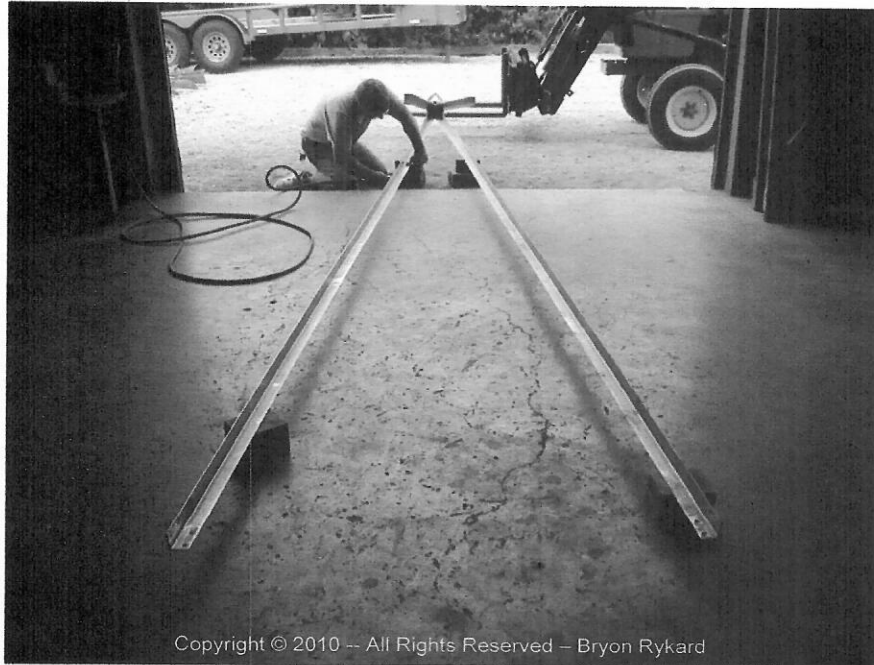
- Follow this same process for all the angle iron parts on the tower.
- Using a 7/16" drill bit, drill out ALL the holes in all the tower parts. All corner posts (including all the holes for the steps) all "X" bracing, and girts.

With these steps completed you are ready for assembly!

Assembly (continued)

Assemble Stub Tower to Corner Posts:

- Attach 1 Corner Post to each leg of the stub tower as shown in Figure 5 using 8 of the shorter of the 2 lengths of 3/8" bolts/nuts.



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Figure 5: Attach Corner Posts to the stub tower

- Tighten all 4 bolts/nuts in a manner to make a consistent connection between the stub tower and the Corner Post. Repeat for the second corner post.

Assemble Shortest Girt and Shortest "X" bracing:

- Lay out the following pieces in preparation for assembly to the tower:
 - > 1 of the shortest angle iron horizontal girts
 - > 1 of the next longer angle iron horizontal girts
 - > 2 of the shorter flat strap "X" braces
 - > 2 of the longer flat strap "X" braces
- Place the shortest horizontal girt between the Corner Posts aligned with the single holes just down from where the corner posts attach to the stub tower. One flat side of the girt goes against the inside of the Corner Posts and the other flat side of the girt should face "UP" (towards the stub tower).
- Insert the longer of the two 3/8" bolts into the holes in the ends of the girt and through the corner post. **NOTE: ALL BOLTS ON WINDMILL TOWERS HAVE THE BOLT HEADS ON THE INSIDE OF THE TOWER; NUTS ON THE OUTSIDE OF THE TOWER.**
- Slip an end of the shorter of the two "X" braces over the end of a 3/8" bolt you just inserted.
- Slip a large flat washer over the end of the 3/8" bolt on which you just placed the "X" brace.
- Thread a locking nut onto the 3/8" bolt. Only tighten until the locking mechanism engages. You will need this slack for assembly of the rest of the pieces.
- Repeat the previous 3 steps for the other "X" brace.

Assembly (continued)

Assemble Second Shortest Girt and Longer "X" bracing:

- Place the next shortest horizontal girt between the Corner Posts aligned with the single holes halfway between each end of each corner post. Orient the girt the same as the previous one.
- Using the longer of the two 3/8" bolts, attach this girt to the corner post. The bolt goes through the pieces in the following order: girt, corner post, end of a longer "X" brace, end of the shorter "X" brace, flat washer, and then a locking nut. Only hand tighten these nuts.
- Repeat the previous 2 steps for the other end of the girt.
- See Figures 6, 6a, and 6b for the finished assembly of these pieces.

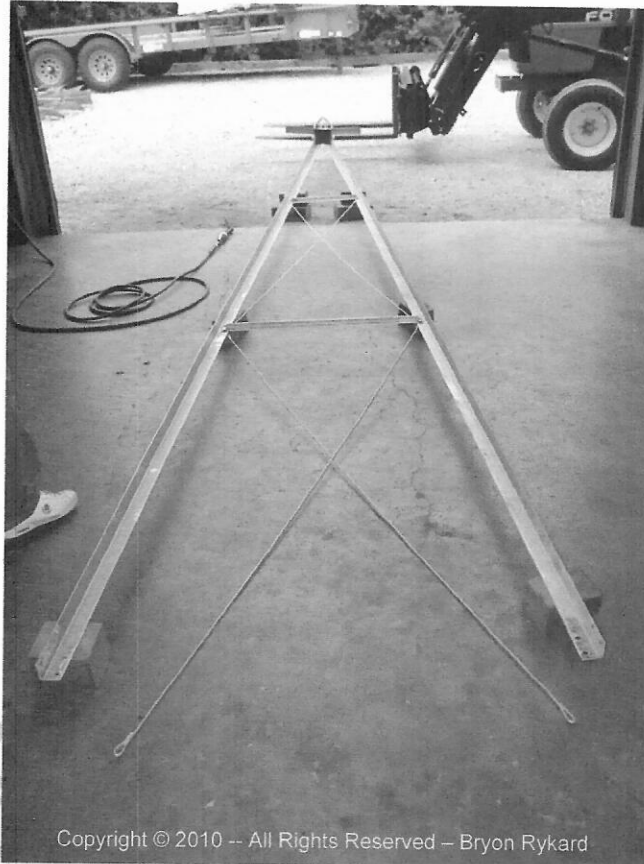


Figure 6: Tower with the 2 girts and 4 "X" braces assembled

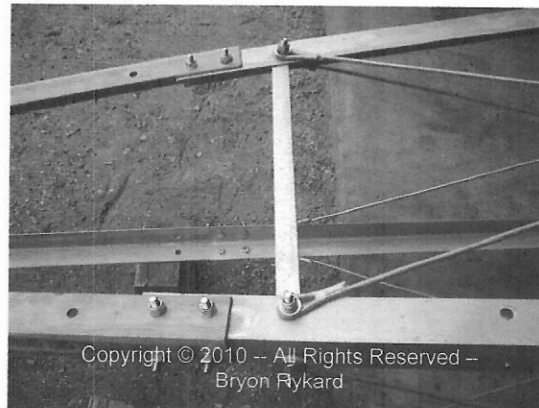


Figure 6a: Close up of the assembled topmost girt and "X" bracing (top view)

NOTE: These are round rod braces in lieu of the flat strap braces on most WindEngine Towers

Assembly (continued)

Assemble Second Shortest Girt and Longer "X" bracing: (continued)



Figure 6b: Close up of the assembled girt and short and long flat strap "X" bracing (top view)
NOTE: These are round rod braces in lieu of the flat strap braces on most WindEngine Towers

These next steps are where having two people is most necessary!

Assemble rest of the upper girts and "X" bracing:

- Get the second shortest girt, and a corner post with the extra holes for the steps.
- Temporarily attach the girt in the hole midway between each end to the previously assembled Corner Post that is next to the leg with the extra holes for the steps. This girt should be attached perpendicular to the ground.
- Next attach the corner post with the extra holes for the steps to the girt just attached to the previously assembled corner post. Take care to place it in the proper hole midway between each end. On the leg with the extra holes for the steps, this is identified by the three holes close together – use the middle hole.
- While holding this corner post in place (balanced on the girt), attaché the corner post to the leg of the stub tower with eight of the short 3/8" bolts/nuts. Completely tighten the nuts.
- Perform the previous 3 steps on the last corner post and attach the last second shortest girt to the two legs not on the ground. Your assembly should resemble Figure 7.

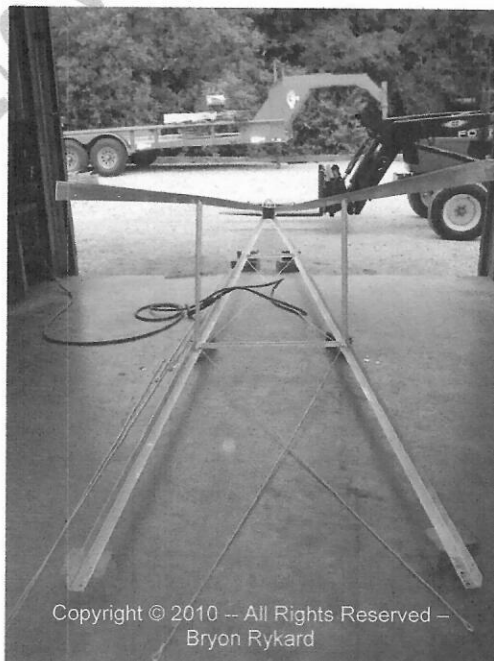


Figure 7: 4 corner posts attached to the stub tower and all connected by the second shortest girt.

Assembly (continued)

Assemble rest of the upper girts and "X" bracing: (continued)

- Follow the procedure for attaching the shortest girt and shortest "X" bracing on page 9 for each of the remaining sides of the tower.
- Follow the procedure for attaching the second shortest girt and longer "X" bracing on page 10 for each of the remaining sides of the tower.

Assemble lower Corner Posts to upper Corner Posts:

- Obtain 2 more corner posts (**without** the extra holes for the steps)
- Attach these corner posts to the previously assembled corner posts lying on the ground. This extends the tower to its full length. Use 8 of the short 3/8" bolts. Completely tighten these nuts. Your assembly should resemble Figure 8.



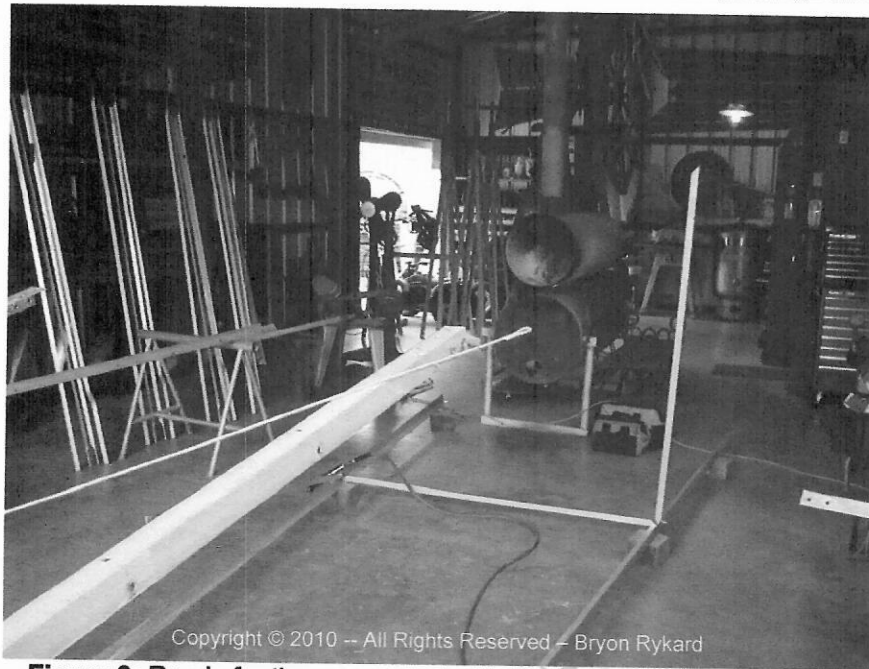
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Figure 8: All the upper corner posts, girts, and "X" bracing assembled with 2 lower corner posts.

- Attach the longest girt to the just assembled corner posts. Use the holes in the corner posts midway between each end. Completely tighten these nuts.
- Similar to attaching the upper corner posts, you will need the LONGEST girt and the corner post with the extra holes for the steps
- Attach the longest girt to the hole midway between each end of the previously assembled corner post that is next to the leg with the extra holes for the steps. Just like before, this girt should be attached perpendicular to the corner post. Completely tighten this nut. Your assembly should resemble Figure 9 on the next page.

Assembly (continued)

Assemble lower Corner Posts to upper Corner Posts: (continued)



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Figure 9: Ready for the corner post with the extra holes for the steps.

- Next attach the corner post with the extra holes for the steps to the girt just attached to the previously assembled corner post. Take care to place it in the proper hole midway between each end. On the leg with the extra holes for the steps, this is identified by the three holes close together – use the middle hole. Use one of the short 3/8" bolts/nut.
- While holding this corner post in place (balanced on the girt), attaché the corner post to the upper corner post with eight of the short 3/8" bolts/nuts. Completely tighten the nuts.
- Perform the previous 3 steps on the last corner post and attach the last second shortest girt to these two legs just assembled.

Assemble Angle Iron "X" bracing:

- Next you will need the next to the longest girt, 2 upper "X" braces (flared or flattened at the end – one with a twist and one without), and 2 lower "X" braces (folded over and flattened at the end – no twists).
- Place the girt between the Corner Posts aligned with the single holes just beneath the 4 holes that attach the upper corner posts to the lower corner posts.
- Using the longer 3/8" bolts, place the bolt through the hole in the end of the girt and the hole in the corner post.
- Orient the angle iron "X" bracing on the ground in preparation for attaching to the tower. Standing at the base of the tower, the upper angle iron "X" brace with the twist, is attached to the left hand corner post, the upper angle iron "X" brace WITHOUT the twist is attached to the right hand corner post. See Figure 10 on the next page.

Assembly (continued)

Assemble Angle Iron "X" bracing: (continued)

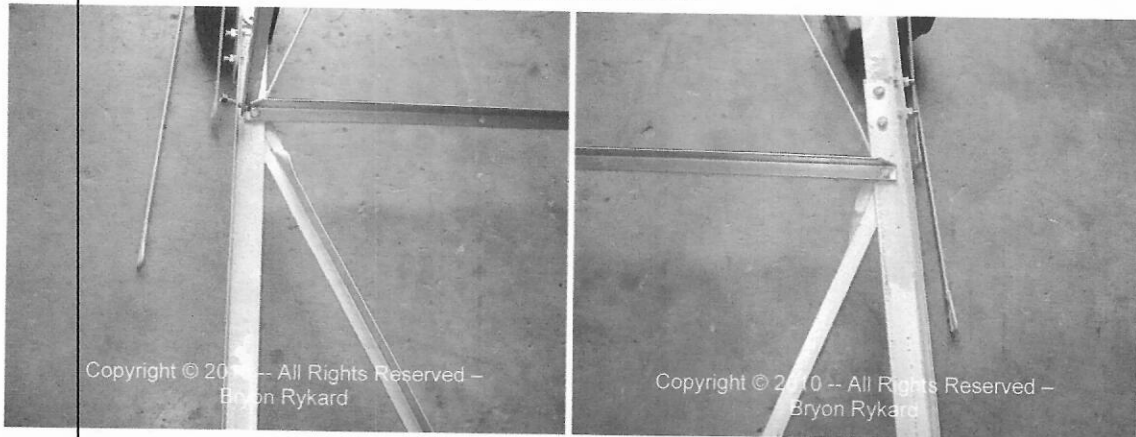


Figure 10: Proper placement of the angle iron "X" braces.

- Place the upper angle iron "X" braces as shown in Figure 10. Begin with the one WITHOUT the twist (right). Slip it over the bolt that is through the girt and corner post, then the flat strap "X" brace, then a large flat washer, and finally the nut. Hand tighten the nut
- Slip the upper angle iron "X" brace with the twist (left) over the bolt that is through the girt and corner post, then the flat strap "X" brace, then a large flat washer, and then the nut. Hand tighten the nut. Make sure the "X" braces cross like in Figure 10.
- Attach the lower angle iron "X" braces as shown in Figure 10. Leave the bolt that goes into the middle of the "X" until the bottom of the lower angle iron "X" braces have been attached. Hand tighten these nuts.
- Attach the bottoms of the lower angle iron "X" braces to the outside of the base of the tower. The short 3/8" bolt goes through the upper of the two holes in the tower and then the "X" brace. Hand tighten these nuts. See Figure 11 on the next page.

Assembly (continued)

Assemble Angle Iron "X" bracing: (continued)



Figure 11: bottom of the Lower Angle Iron "X" bracing attached to the tower.

- Attach the rest of the angle iron "X" bracing using the same layout as described in Assemble Angle Iron "X" bracing beginning on page 13.
- Put a short 3/8" bolt/nut where the angle iron "X" bracing crosses on all 4 sides of the tower -- hand tighten.

Assembly (continued)

Tightening the nuts:

- Spray WD-40 or other lubricant on all long 3/8" bolts that go through girts, corner posts, and "X" bracing. This will aid in the tightening of the nuts and reduce the amount of binding of the "X" bracing as the nuts are tightened.
- Start with the bolts next to the ground on the next to the longest girt and tighten them completely with a 9/16" ratchet. Get them as tight as you can without stripping or breaking the bolt. Tighten all the nuts at this point in the tower.



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Figure 12: Begin tightening the nuts at this point of the tower.

- Next, go to the top of the tower and the shortest girt. Tighten all the nuts at this point in the tower.
- Move down to the next girt, Tighten all the nuts at this point in the tower.
- Next, tighten the nuts where the angle iron "X" bracing crosses the longest girt and the ones where the angle iron "X" bracing crosses each other.
- Lastly, tighten the nuts on the bottoms of the lower angle iron "X" bracing.
- NOTE: When you install the tower, you will remove these bolts/nuts and attach the anchors to this point of the tower. See the "Installation Tips/Requirements" in the back of the Head assembly manual.

Attaching the Platform:

- There are 4 "L" shaped platform bolts in a package attached to the red platform. Remove them from the package in preparation for the assembly of the platform to the tower.
- Just above the holes for the top step, there is a hole in the crotch of each corner post on the stub tower. Insert one of the platform bolts in each hole from the inside of the tower to the outside.
- Slip the red platform over the mast pipe and furling device until it is resting on the corner posts of the tower just above the platform bolts. **Make sure to place the corner of the platform with the largest amount cut off over the leg with the steps.**
- Turn the platform bolts to face the holes in the platform and start working them into the holes. You may need to use a hammer on the platform bolts to get them all the way in.
- Put a flat washer over the platform bolt and a nut. Tighten the nuts securely.

Assembly (continued)

Attaching the Steps:

- Remove the nuts from all of the steps.
- Beginning at the base of the tower, insert the step in the holes provided. You can start on the left or the right, it is your preference. You may have to grind a bit off of the flared part of the step where it goes into the hole due to the interference with the bottom of the lower angle iron "X" brace.
- Tighten the nuts securely. Take care not to strip the threads on the step.

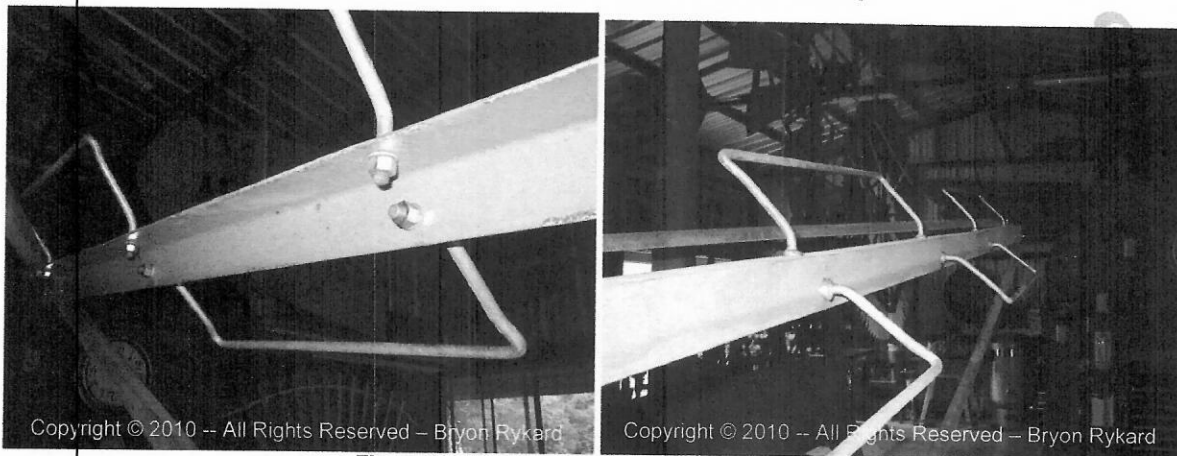


Figure 13: The steps attached to the corner post.

- Don't forget to grease the mast pipe (top of the tower) before assembling the head onto the tower. Grease is provided in the crate.