Thunderbolt Mk II
Chapter IV
Fabricating the Cross-Member Assembly

Version 1.11

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Introduction

This chapter provides instructions on building the Cross-Member Assembly. This assembly includes the Cross-Member Tube and the Left and Right Knuckle Bulkheads. To perform this section, a Muffler tube bending machine must be used to bend the 2" tubing.

Required Materials

The following materials are required for this chapter:

- 2" diameter tubing 25" length with a wall thickness of ~.065 to .079 inches using 7005 aluminum.
- 2 ea. 8.0" x 4.25" x.180" thick 5052 aluminum
- 5356 Aluminum welding rod
- 2 ea. Seat Base Tubes (P/N 40001)

Available from Hell-bent Cycle Works are all the materials listed above. These parts are cut/machined and ready to weld.

Required Tools

The following tools are required to conduct this section:

- 13"to 17" Drill Press with Vise
- 2" SAE Hole Saw
- 7/8" SAE Hole Saw
- 3/8" SAE drill bit (.375")
- Hack saw, metal band saw, or Shear
- Misc. files, emery cloth and de-burring tool
- 6" Dial Caliper
- Bending Brake

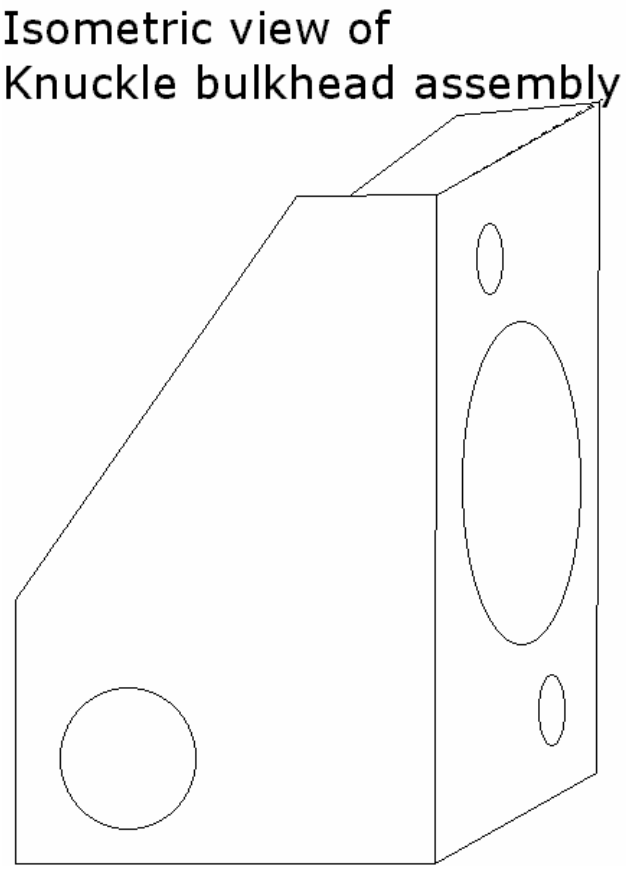
Objective

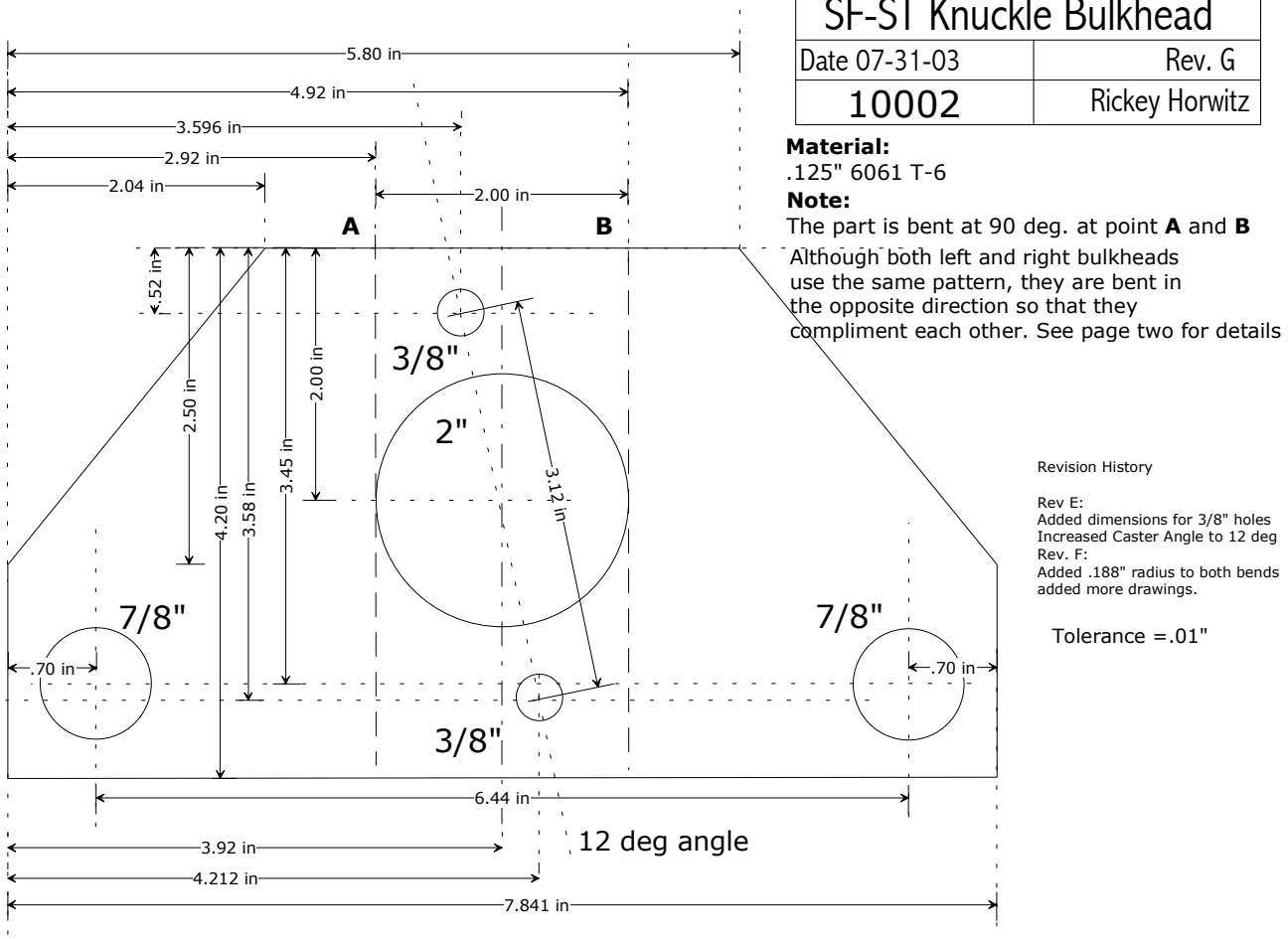
This section covers the following accomplishments:

- Bend and Trim the Cross-member Tube.
- Fabricate the Knuckle Bulkhead sheet-metal parts as called out in the drawings.
- Set-up and weld the Bulkheads to the Cross-member tube.
- Inspect the complete assembly for accuracy using the acceptance criteria.

Fabricating the Knuckle Bulkheads

Material Required
2 ea. 8.0" x 4.25" x.180" thick 5052 Aluminum





See Appendix A for full-page drawing

Note

Depending on the tools used, the two 3/8" holes on the bulkhead may be drilled after the assembly has been properly formed. The offset of the holes represent the 12˚Caster.

- Although both left and right bulkheads use the same pattern, they are bent in the opposite direction so that they compliment each other.
- When bending this part, it is best to heat up the part with a blowtorch to anneal the aluminum. This will prevent it from cracking.
- Both bends are 90 degrees.

Depending on the tools used, the two 3/8" holes on the bulkhead may be drilled after the assembly has been properly formed.

The finished part should resemble the photo below:

Fabricating the Cross-Member Tube

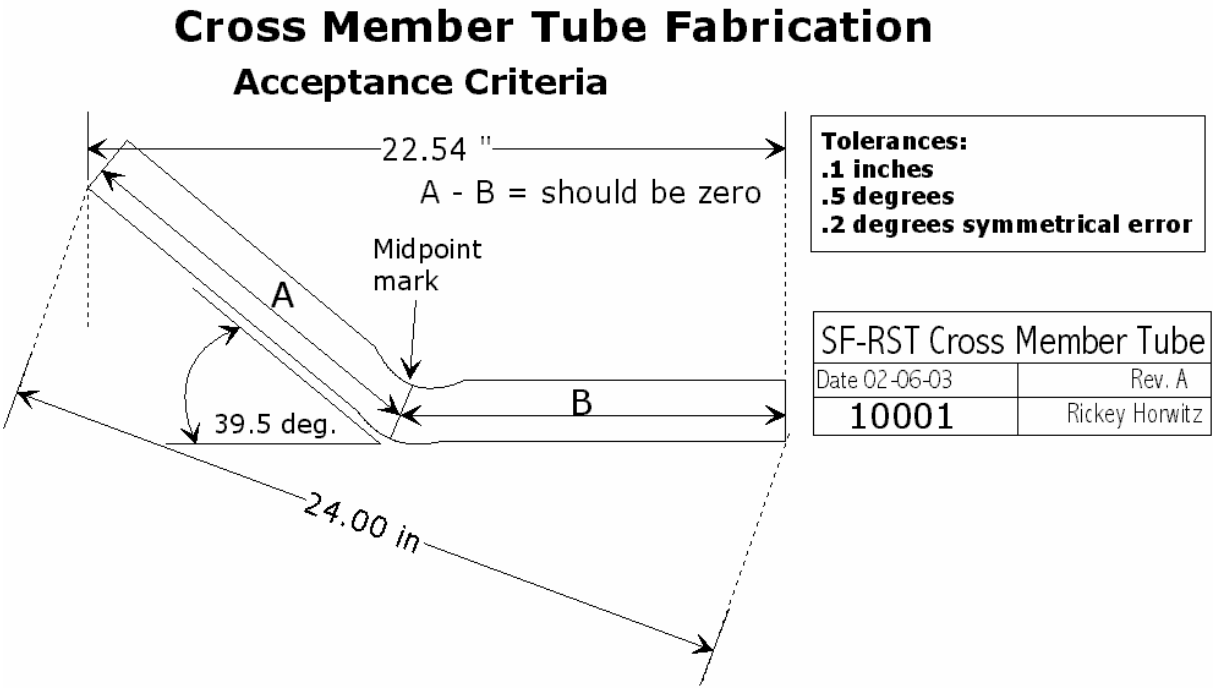
Parts/Materials:

2 inch diameter x ~.063 -.079” 7005 Aluminum tubing, 25.00 inches in length.

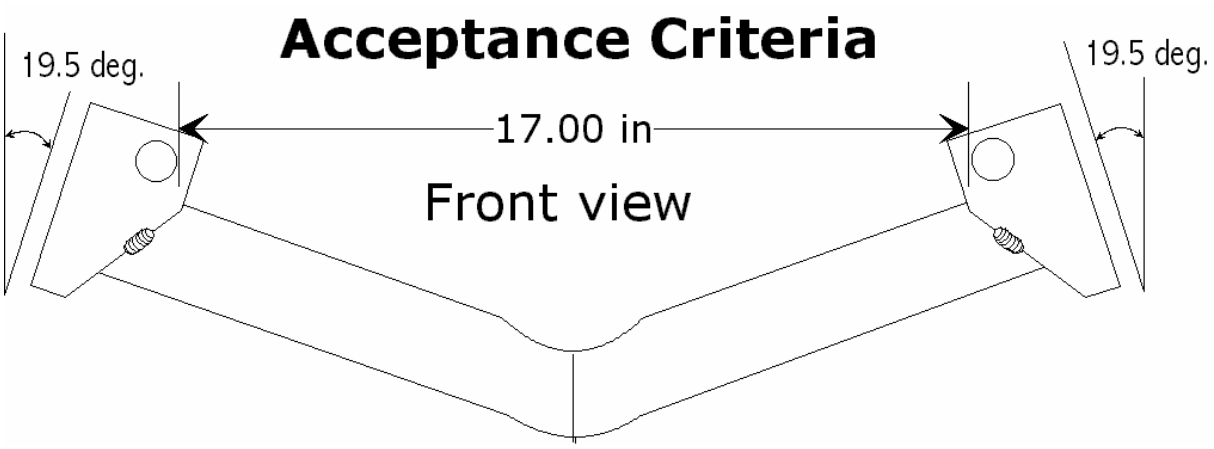
Instructions

- Using a Sharpie pen, place a line at the mid point (12.5 inches) of the tube. This line should encompass 360 degrees around the tube.

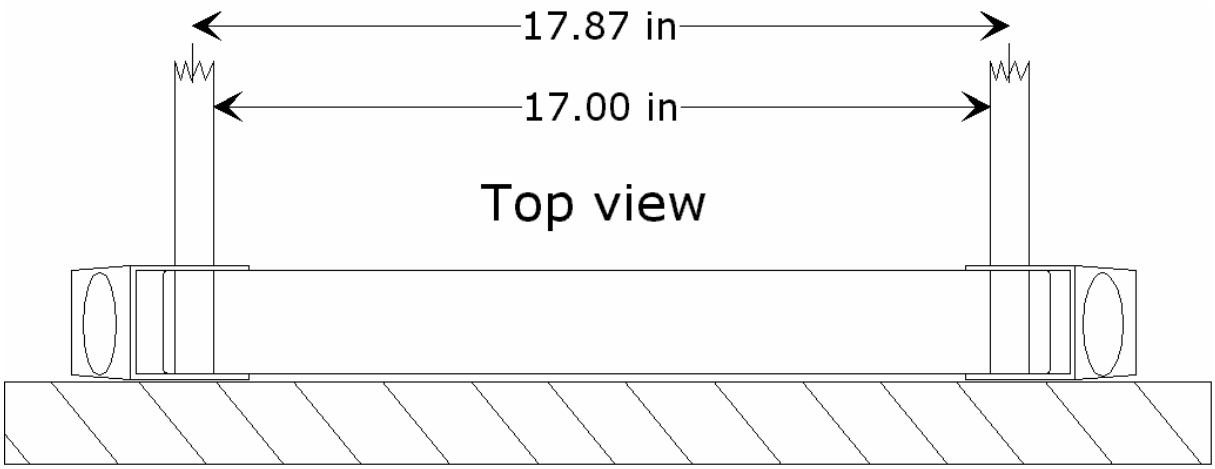
- Using a muffler tube bender select the 2-inch diameter, 4 to 6 inch radius dies.
- Bend the tube at 39.5 deg. Since a fractional degree is difficult to maintain +/- .5 degrees
- Remove the formed tube and check it using a compass or go/no-go gage. Re-bend as needed.
- Using the mid point line (drawn earlier), measure and mark 12.4" at both ends.
- Trim both ends at 90 degrees at both 12.4” marks.
- Using the acceptance criteria in the illustration below, check the part for accuracy and conformity.



Instructions
Fit both left and right bulkhead assembly to the Cross-member tube as shown in the Acceptance Criteria drawing below.



- Place the assembly down on a flat even surface so that both bulkheads remain flush on this surface.
- Using the two Seat Base Tubes (P/N 40001), install into each of the Knuckle Bulkheads. These 16" tubes are cut in Chapter VIII.
- Using the seat tubes as alignment indicators, adjust both Knuckle Bulkheads so that the tubes run parallel at both planes. Refer to the illustration below:



- Using the dimensions shown above, ensure that the alignment matches. Both tubes should be parallel with each other, and should maintain a 90° relationship to the bench at both planes.

Cross-Member Assembly Welding Instructions

We are going to weld together the components built or specified in this chapter. At this moment, we should have the following parts fabricated ready to fit and weld.

1 ea. Cross-Member Tube, P/N 20005
1 ea. Left Knuckle Bulkhead, P/N 20008
1 ea. Right Knuckle Bulkhead, P/N 20011

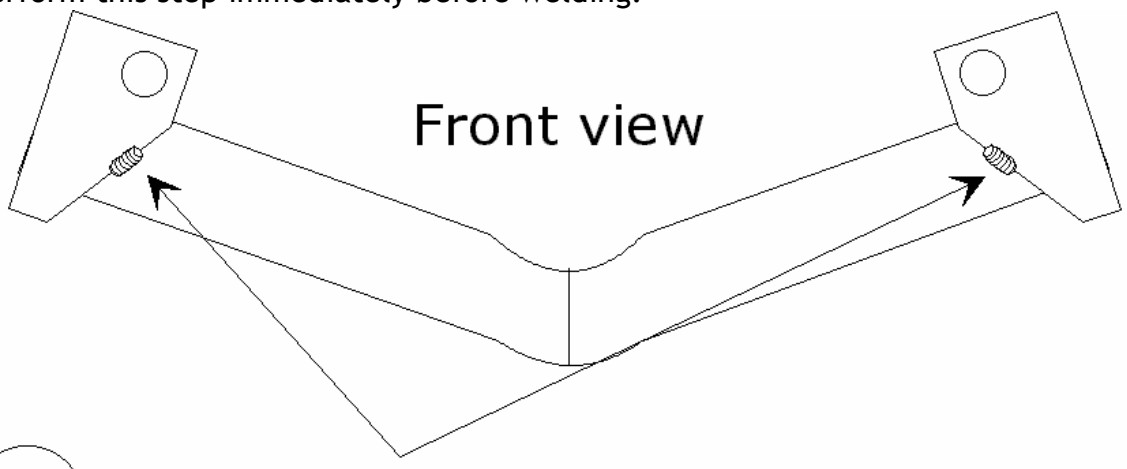
Assumptions
You know how to TIG weld. You have plenty of welding supplies on-hand including Argon and 5356 Welding Rod.

Caution
The bench top may be combustible. During welding, it is possible that this surface can burn or catch on fire. Ensure that a fire extinguisher is on hand at all times.

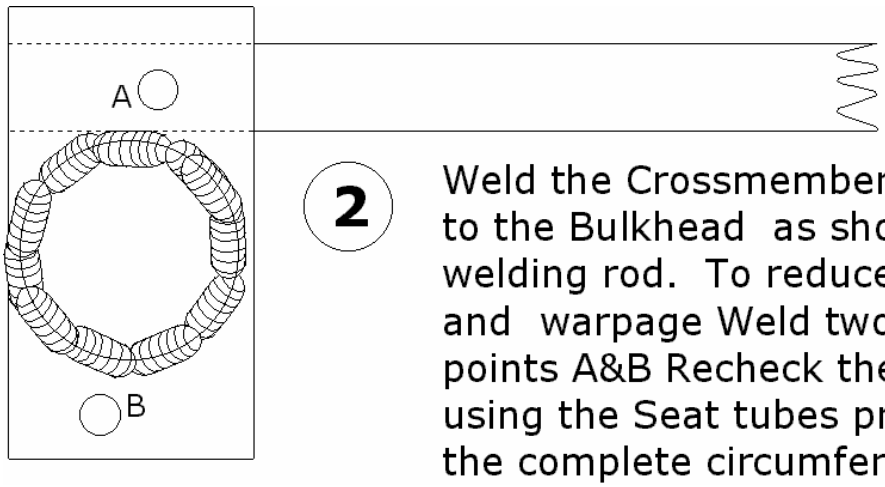
All Safety precautions have been observed. No combustibles near or around the welding area expect for the Jig Fixture.

Note
The illustrations call out for 5156-filler rod. This should be 5356-filler rod.

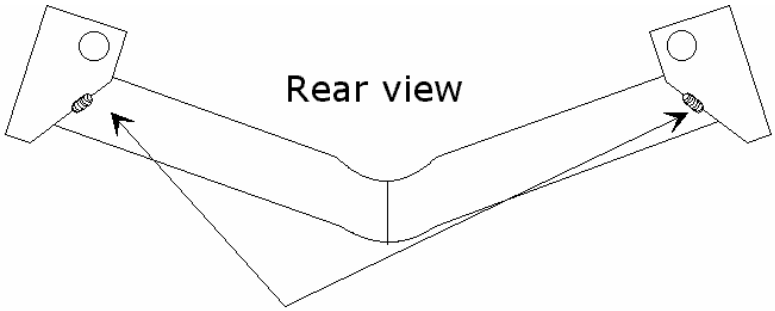
Preparations
Ensure all joints are flush and are free of contamination. All tube ends and Bulkhead surfaces must be prepared prior to welding by scrubbing with a wire brush. An oxide forms on aluminum after an hour. Therefore, it is important to perform this step immediately before welding.



1 Assembly should be placed flat on table. Weld a .5" -.75" (13-19 mm) bead at these two points. using 5156 welding rod.



2 Weld the Crossmember tube to the Bulkhead as shown using 5156 welding rod. To reduce distortion and warpage Weld two tacks at points A&B Recheck the alignment using the Seat tubes prior to welding the complete circumference.

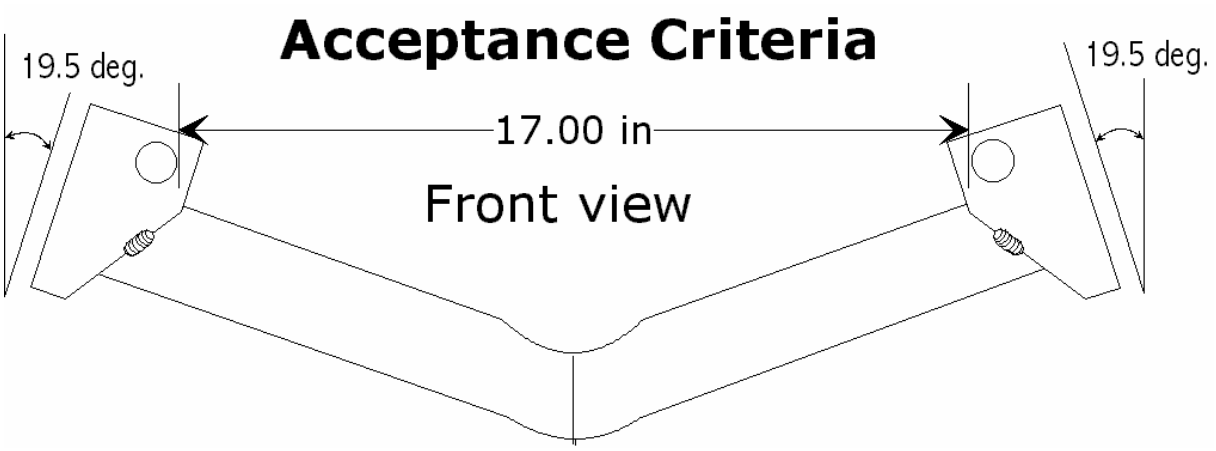


3 Assuming that the alignment is correct at step (2), Rotate the assembly so that the rear side is exposed. The two beads welded in step (1) will prevent the assembly from lying flat. Weld a .5" -.75" (13-19 mm) long bead at these two points using 5156 welding rod.

Final Inspection

Re-insert both Seat Base Tubes. Ensure that both tubes are parallel with each other and maintain a 90° relationship with the bench top.

Refer to the acceptance criteria below to ensure that the assembly is built properly



Conclusion

At this point, we should have a completed Cross-Member Assembly.

