

Mustang Aeronautics Inc.

1470 Temple City Dr Troy MI 48084
(248) 649-6818 fax (248) 649-0098
<http://www.MustangAero.com>

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Subject: Main Wing Spar Riveting Procedure Addendum

The easiest way of setting the proper wing dihedral is to finish the main wing spars before the center section main spar is riveted into the center section. In the standard kits supplied by Mustang Aeronautics, the wing spars are pilot drilled to set the dihedral but the spars still need to be clamped in place while reaming. There is enough movement during the riveting process that the wing tip position could change. This is one reason for drilling the wing attach holes undersize and reaming to fit later. Before riveting the main wing spars together the builder should be proficient at riveting since the spars are a major structural item. We do provide a generous safety margin by using a larger quantity of smaller rivets. They are easier to drive and a few scattered bad ones should not cause any problems. Use the drop included with the kits to practice riveting. Assembling the center section rear spar first will provide additional practice.

The following procedures are to be used in riveting the main wing spars:

- Put the necessary bevel on the longest capstrips to ensure that they will lay flat on the wing spars and not ride up on the bend radius. Do not worry about taking off too much material on this one capstrip. It is more **important** that they lay flat. The only concern is that no material be removed around the wing attach hole. (this step is completed in the kits)
- Cleco all of the capstrips into place on the pilot drilled wing spar. Pin the wing spar to the center section main spar using the 35/64" pins. Clamp the root end of the capstrips to the spar with a small C clamp reaching in from between the capstrips on the spar root. Do this for the top and bottom. Now remove the pin and wing spar
- With the wing spar free reinsert the pins leaving the clamps in place.
- Drill the rest of the holes laid out on the capstrips. Remember that the first 20" of the wing spars use 5/32" rivets.
- Debur all holes. File, and polish the capstrip edges and wing spars smooth. Prime or alodine the capstrips and wing spars. If a wet wing is being used do not apply a primer to the forward side of the wing spar or the capstrips located on the forward side of the spar.

- Reassemble the wing spars using rivets and clecos to hold the parts together. We use riveter's tape to hold all of the rivets in place. It is very **important** that the supplied steel pins be inserted into the capstrip wing attach holes before riveting. This is necessary to keep the capstrips from shifting. Rivet the wing spars together and then attach the butt angles per the drawings.
- The flanges on the wing spars need to be straightened and checked for the proper angle. The riveting process may cause them to open up.
- Lay the center section main spar flat with the aft side up. Clamp a straight edge to the bottom long enough to reach the tip of the wing spar. A chalk line can be used but is less desirable.
- Pin the bottom capstrips to the center section with the steel pin. Level the wing spar with spacers. Per the write up in the construction manual, elevate the tip of the wing spar 9.75" and clamp in place. The reason we pin the bottom capstrips is that these are in tension under a positive "g" loading and the top ones are in compression. It is therefore more important that the bottom wing attach bolts have a good, full bearing surface.
- It is important that both spars have the same dihedral angle. If the spar tips are not exactly 9.75" above the bottom of the center section spar it is okay. Just make sure that they are both the same. They should be within 1/8" of each other and within 1/2" of 9.75".
- We use NAS close tolerance bolts for the wing attachment but they may still have a few thousandths variance if they are not from the same batch. They are also slightly smaller than 9/16". It is therefore recommended that each bolt be miked and an adjustable hand reamer be used to achieve a close tolerance fit. A "light" drive is the goal. Start reaming undersize and work up to the desired fit. Care must be taken using the adjustable reamers. The blades can bow if tightened too much and will make for an inaccurate hole. When sizing the reamer up be sure to apply the same amount of torque to the nut with each adjustment. Adjustable hand reamers are available through Mustang Aeronautics if unavailable locally.
- Mark the wing bolt for the hole just reamed and insert. Color coding the bolts and holes works well for keeping them matched if necessary.
- Remove the steel pin from the bottom wing attach hole and ream with the wing spar still clamped in position, repeating the above procedure.
- There should not be any slop in the wing spar attachment with the bolts in place. Maximum service limits are 1/8" movement at the wing tip. Note this is movement due to loose attach bolts, not twisting of the spar when a load is applied.
- Oversize bolts are available if the wing attach holes become too big. These bolts currently cost about \$28 each so be careful when reaming!