

## Wing Assembly

**! CAUTION** When drilling any holes in the spar, it is very important to drill only holes that are specified in the prints and no others. Hole placement is important. Additional or misplaced holes **could severely weaken the wing structure**. If uncertain about hole location, contact Titan Aircraft.

The wing rib forward flange hole layout (where the rib mounts to the spar) needs to be correct because the rib holes will be match drilled into the spar. The hole layout is depicted on print number **T51-02-INS-0385**. Lay out the hole pattern with a #30 drill.

Lay out the rib locations on the spar as depicted on print number **T51-02-INS-0386**. Dimensions are to the wing rib webs with the exception of the #1 rib that will attach to the spar web stiffener #1. Align each rib with the layout marks and match drill the holes into the spar with a #30 drill. Cleco the ribs in place until all ribs are fit. Disassemble and deburr. Rivet ribs in place using the correct rivets. See the rivet callouts on print **T51-02-INS-0386**.

NOTE: Rivet callouts sometimes allow either SD41BS rivets or SD42BS rivets. At those locations either rivet length may be used. Depending on availability at the time, kits will be supplied with SD41BS rivets, SD42BS rivets, or both.

Fit the aft spars to the wing ribs as depicted on print **T51-02-INS-0387**. Five equally spaced rivets will hold the aft spar to each wing rib (35 rivets total, each wing). Use the MW02-14 aft spar wing fitting to locate the holes for the #1 and #2 rib locations. Use the MW02-43 aft spar doubler plate to help locate the holes for the #4 rib location. Both the aft spar wing fitting and the aft spar doubler will attach to back of the aft spar (outside the wing). Make sure the ribs remain parallel. Drill #30 holes and cleco all ribs in place.

Fit the MW02-63 RH aileron stub rib and the MW02-64 LH aileron stub ribs to the #7 rib as shown. Refer to print **T51-02-INS-0388**. The stub ribs fit over the #7 wing rib and under the aft spar. Match drill #30 each stub rib with the holes in the aft spar at rib #7. Drill two #30 holes to attach the stub rib to the #7 wing rib.

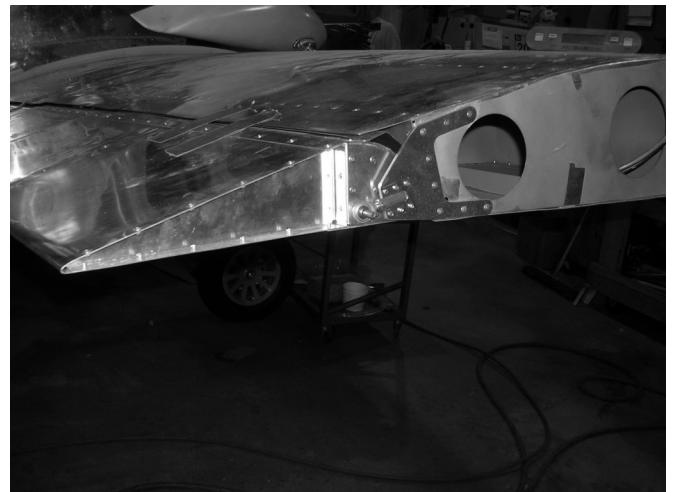


Photo shows aileron and outer aileron hinge in place.

Rivet the aft spar and aileron stub ribs in place with the rivets called out on prints **T51-02-INS-387** and **T51-02-INS-0388**.

Fit the upper and lower stringers as depicted on print **T51-02-INS-0388**. The stringers will have to be trimmed at the ends to fit the #1 and #7 wing ribs that are not slotted. Bonding the stringers in place will make assembly much easier. A small dab of Uralane adhesive at each rib/stringer intersection will work fine. Make sure the ribs are straight and 90° off the main spar.

Use a large square to check the square ness between the main spar and the lower wing rib flanges. The upper wing rib flanges are curved and won't allow an accurate check for square ness. Clamp the stringers in place and allow to cure overnight.

Fit the intermediate webs as shown on print **T51-02-INS-0388**. Do not drill holes in the darkened areas on the print. The flap stub ribs will be attached in those areas later in the process. Drill #30 holes and rivet the webs in place.

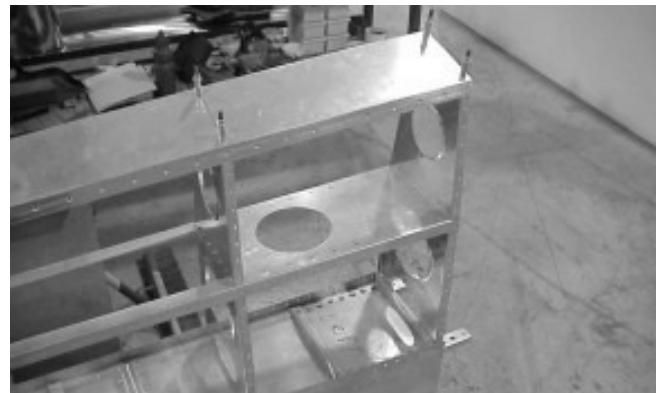


Photo shows the large intermediate web (MW02-137 & 138) in place and stringers (MW02-141.)

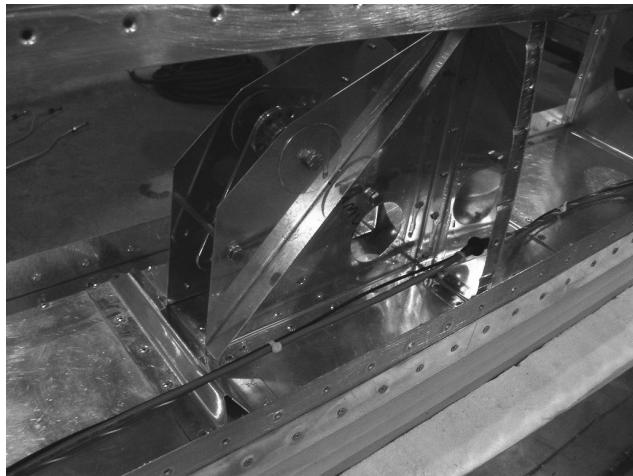
Fitting the lower skin at this time will stabilize the

structure. Lay out the hole pattern as depicted on print **T51-02-INS-0541**. The inboard skin edge is cut 90° from the spar line at the factory. Use this corner of the skin to set the wing structure at 90°. If the bonded stringers are holding the structure slightly out of line, a small amount of force can straighten the structure. The Titanium Silicone is a little flexible, if the structure is out of alignment beyond the flexibility of the Titanium Silicone, the stringers will have to be re-bonded.

Start drilling at the spar line and work aft. Drill #30 holes and cleco the skin to the structure as you drill.

After all the skin rivet holes are drilled, remove the skin with outside surface up. Lay out the flap bracket slots as depicted on print **T51-02-INS-0542**. Cut the slots and deburr. Cleco the skin back to the wing structure. (Do not rivet at this time.)

Match drill and assemble the flap brackets to the flap stub ribs with clecos as depicted on print **T51-02-INS-0543**. Disassemble each flap bracket assembly and re-assemble it inside the wing structure. Center the flap brackets in the slots. Using a square, set the flap brackets 90° to the lower wing surface, as well as vertically. Drill and cleco the flap stub ribs to the aft spar, intermediate webs, and lower skin.



Aileron bellcrank assembly mounted in the wing.

Assemble the aileron bellcrank assemblies as depicted on print **T51-02-INS-0544**. The left side is shown on the print. The right side is a mirror image of the left side. Make sure the bolt heads are up.

Install the aileron bellcrank assemblies so they are centered on the spar. Drill #30 holes. Rivet & bond to the #4 rib and spar web.

Match drill the aileron bellcrank bracket stiffeners to the aileron bellcrank brackets using a #30 bit and rivet in place.

Remove the lower wing skin from the right wing so the pitot tube can be installed. Measure in from the root end of the spar along the lower rivet line 5 feet, this should be the center of the pitot tube. Rivet the pitot tube in place as shown on print **T51-02-INS-0545**. Enlarge the forward tooling holes in the required ribs to 3/8". A step drill such as a Unibit works well for enlarging holes in thin sheet metal. Install the grommets and the soft 1/4" aluminum tubing through the grommets. Leave the aluminum tubing a few inches long at the root end. This will be trimmed to the proper length when the wing panels are attached to the center section. Connect the 1/4" aluminum tubing to the Pitot tube with blue urethane tubing.

Lay out the rivet pattern on the upper wing skin as depicted on print **T51-02-INS-0546**. Unlike the lower skin, the upper skin will align with the tip end of the wing panel at the spar. There will be some extra skin length at the root end. The extra material will need to be trimmed carefully when the wing is installed on the center section. There will also be several inches of skin overhang beyond the aft spar. Leave that extra material until the flaps and ailerons are installed. Trimming will be necessary at that time.

Like the lower skin, start at the spar line and work aft. Drill #30 holes and cleco the skin to the structure. Leave the upper skin in place while bonding and riveting the lower skin to the wing structure.

Remove the lower skin. Dampen a rag or paper towel with acetone or MEK and clean the mating surfaces. **Use extreme caution with solvents near the leading edge EPS foam.** Sand the surfaces that are going to be bonded.

Using a 1/8" dimple tool, dimple the holes in the wing skin with the exception of the row that will attach to the #7 rib. Dimple rib flanges #1 through #6, aft spar, stringer, and main spar strip. Clean again with acetone or MEK.

Mix enough Uralane adhesive to cover the ribs, stringers, aft spar, main spar skin strip, and all other non-moving parts. Spread the adhesive onto bonding surfaces with a tongue depressor or similar spreading tool. Work quickly if weather is warm, the shelf life of Uralane is much shorter in higher temperatures.

Cleco the lower skin back in place. Install rivets as depicted on print **T51-02-INS-0558**. Leave clecos in the skin at the tip where it attaches to the #7 rib. Do not install rivets into rib #7. Later the fiberglass wingtip will be match drilled to these holes. After the Uralane has cured, remove the clecos at the tip.

Repeat the dimpling process for the upper skin. The upper wing skin can be left clecoed until the wing panel is attached to the center section. This will make trimming much easier. After a desirable fit is accomplished the upper wing skin can be bonded and riveted in place.

Before installing the outer wing panels to the center section, check the fit of the 3/8" main wing bolts (AN176-20 close tolerance bolt). Make sure they slide into the outer wing panel main spar fittings and make sure they slide into the 3/8" holes at the center section main wing fittings. These holes were reamed at the factory and should fit very closely. The bolts should not be a press fit, but should also not have any looseness.

Inspect fittings to make sure they have no sharp edges or burrs. If there are any sharp edges or burrs, lightly wet sand the affected area with #400 or finer sandpaper. Clean the fittings with a soft cloth and compressed air after any sanding.

Temporarily install a wing in the center section by sliding the outboard wing main spar fittings into the center section main spar sockets. **Be sure to lubricate the fittings with some grease to prevent galling the fittings.** This is a tight fit. Several people may be needed to steady the structures. Slide the wing all the way in so the bolt holes align. If the wing won't go all the way in, look closely to see where the interference is. Sometimes small spots of adhesive, foam or aluminum may need to be trimmed or filed. **CAUTION: Make sure not to scratch or gouge the wing fittings!** Wrapping the fittings in tape prior to trimming or filing can prevent scratches. When the holes are aligned, install the 3/8" main wing bolts (AN176-20 close tolerance bolts) without nuts for now. If the bolts don't fit, the wing is probably not all the way in. **Do not use a tapered punch or similar tool to align the fittings!** Using a tapered tool damages the fittings. The wing needs to be in all the way to get the bolts in. If the bolts fit when the assembly was apart, they will fit when the assembly is together

1032 lock nut)

- Center (AN176-20 close tolerance bolt, (4) AN960-616 washer and AN365-624 lock nut)

- Outboard (AN3-16A bolt, AN960-10 washer and AN365-1032 lock nut).



The photo above shows the outboard wing fitting going into the center section. (Ends with red tape are on the inside of the wings.)

By _____	Date _____
Checked _____	Date _____
Approved _____	Date _____

## Matting Wings to Center Section

All bolt holes for the wing fittings will need to be cleaned from any debris. Be sure to grease all bolts and fittings before attempting to install the wing into the center section. All bolts used to attach the wing to the center section must have the bolt heads facing aft.

When matting the wing to the center section the following hardware is required and there are 2 per wing.

- Inboard (AN3-16A bolt, AN960-10 washer and AN365-