

The second major construction step in the sequence of wing building is preparation of the rear spar.

The rear spar is a Z channel aluminum bar that connects the end flanges of the ribs. It is the part where the ailerons and flaps are attached to the wing.

The rear spar has some reinforcement parts that need to be constructed, trimmed and drilled to the rear spar.

At the inboard end, a reinforcement fork and additional reinforcement plate are attached to the end of the rear spar. This is the place where the back of the wing will be attached to the fuselage so it will carry a high stress load. The reinforcement plates are also nicknamed the 'waffleplate' because there are so many rivets for the attachments. These plates come oversized in the kit. They are meant for an RV8 and have to be trimmed down. I made a true size copy of the plan for this and overlayed the cutout on the part. Then marked the part to be cut away. I removed the first rough parts with the bandsaw. Then used the large 3M Scotchbrite wheel to polish it down to the true dimensions. Here is the before and after :



The second reinforcement plate goes in the middle of the rear spar. The size is ok here but you need to cut an odd shaped hole out of it where the aileron pushrod passes through.

I started by overlaying with another 1/1 copy on the part and marked the contour with a sharpie pen.

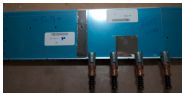


Then located the center points of the circles as starting point for drilling with the unibit step drill. This doesn't have to be all that accurate. You will have to file and sand away to correct shape anyway.



After doing the first one, I realized I was a bit stupid going over all that hassle with the paper mockup for the hole. I only took my rear spars out at this time and realized that the hole in this piece is already drilled out at the factory.

The better way is illustrated below. Clamp the flanges together and measure the 50 inch and 3/4 from the outboard side of the rear spar. The cleco clamps work really nice for this. Make sure there is a nice and clean contact between both flanges.



Then, flip it over and mark the contour with the sharpie pen. It's really that easy... and I felt a little stupid about first going through all that trouble with the paper.



The cutting process was again by using the unitbit to take away most of the material. Then I used a dremel tool with sanding drum to make it precisely according to the contours.

After clamping it back to the rear spar, the holes fit nearly perfectly. A little touch left and right and we are done with this part.



Buddy builder Fred came by to do some work and relax in attendance of his helicopter training course in Florida. In this picture he is match drilling the aileron reinforcement plate to the rear spar.

Ok FAA, I admit. I will not have built the plane by myself for the full 52%, it's only 51.9%. But I was Pilot in Command... so the hours count, don't they ?



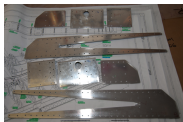
All holes drilled and clecoed. Lot's of rivetting waiting !



The same match drilling is done for the outboard aileron reinforcement plate.



After many hours of deburring, edge prepping, matchdrilling and deburring again, this is the result of all reinforcement parts for both wings. These are almost ready for priming.



One little detail is still missing which is marked in the plans as: "Once the reinforcement fork is rivetted on the rear spar, it is not possible to dimple the holes in the top flange of the rear spar. So dimple them now."

This sounded very easy and looked like a 10 minute job for both wings.

As usual in airplane construction, things are always a little more complicated then they seem at first sight.

Ask yourself this: How can I drill the holes correctly so they will match the skin after I drilled and dimpled the spar flange.

Well, the answer is simple. Cleco the main skin on the rear spar and matchdrill the skin to the rear spar first.

Ok, I got that ...

To make sure, you verify first the plans.

Then you realize that there is not only the skin, but also a doubler plate that has to be inserted between the spar flange and the main skin...

So you try to find in all your stuff and between all the other skins that doubler plate, until you find the small print text that says: make doubler plate out of AS0....

So instead of drilling some holes and dimpling, we first have to make the wing walk doubler plates. Here we go again for a couple of hours of measuring and cutting fun.

I found the mother material in the box between the skins. The plate is way too large to start with so first measure the dimensions as per the plans.



I used the aluminum snips and cut away leaving a generous amount of material. I have had bad experiences with the snips in the past so I'm always carefull when using them. Then used the scotchbrite wheel to bring it to true size. 1 wing walk doubler done, another one to go...

Once both were cut, I measured carefully (multiple times) for the position of the wing walk doubler under the skin. Then clamped it together and attached it to the main spar to verify the position. The wing walk doubler ends just in front of the main spar, so it does not overlap with the front row of holes in the top wing skin. I adjusted slightly and marked the position and the rivet positions through the holes of the wing skin.

Removing then the wing walk doubler allowed me to measure for minimum edge distance on the holes. There is plenty of room. The wing walk doubler streches out quite a bit behind the rear spar (inch or so) and also on the sides the distance is more then enough.

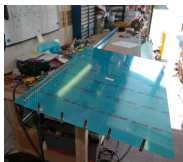
Then, I clamped all of it together again, gave it a last check on the main spar and drilled the holes in the wing walk doubler through the holes of the main skin. As usually, don't push the drill, let it go and find it's way and hold it perpendicular to the work going in and

out.



Now that you have the wing walk drilled over the length with the skin, you can align the rear spar under the skin and cleco it to both skins.

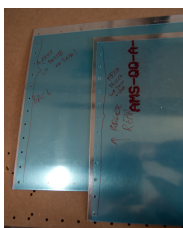
Then for each hole, remove the cleco, matchdrill the spar and replace the cleco until you reach the length of the reinforcement fork on the rear spar.



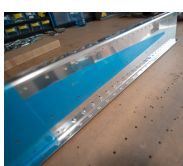
Same thing for the other wing



You now have yourself 2 wing walk doublers matchdrilled with spar and skin on 1 edge. I will put those aside now until after the skeleton building until I match the skins to the skeleton.



Then deburred all drilled holes and dimpled the holes on the inboard sides of the rear spar.



Wasn't that hard, but took a lot of time for just a bit of dimpling.

This completed the preparation work of all parts of the rear spar.

I will wait with priming just as with the main spar components until I finished the main skeleton ribs. In that way, I have to prime only once in one big batch. The cleanup after priming takes a lot of time so the best way to do this is in big batches.