F-684 Gusset work - 29/12/2014

Category: 3.9. Forward and Center fuselage
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Hits: 2130

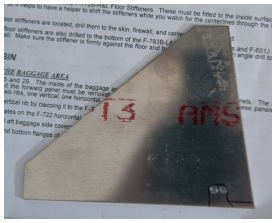
After some time off the project, restarted with construction of the F-684 gussets. These are small reinforcement plates that strengthen the corner of the firewall stifferener angle and the engine mount bracket. This is quite an important part as it carries a lot of stress during flight. The whole firewall forward stuff basically rests on this junction.

It looked like an easy task in the manual but I spend a lot of time getting it right.

These images illustrate the process, I finally remade the angles as I explain further on in the article.

First you locate the two pre-shaped parts from your inventory and deburr the sides. Then you locate the position of the cut-out on the part and measure the position of the two 1/8R radius holes carefully. This notch is made to clear the engine mount bracket. The measurements on the plans were not very accurate for me . If you take the measurement from the plans, the notch comes not low enough. If you move the part down so it clears, the top row that attached to the engine mount gives not enough edge distance on the gusset. (I ended up re-making both parts in the end because of this).

So at this stage, I was still measuring according to plans. Made some small pilot holes and up-drilled to #12 to finalize with a 1/4" reamer (1/8R = 1/4 inch drill remember)



Then, carefully used keyfiles to clean the cuts on the cutout part.

Measured the bend line and bend both sides in opposite direction. The engine mount sits slightly at an angle and also firewall is angle toward the gusset position so both ends need some small bending. Made the initial bend using the small bending brake I got from Harbor Freight Tools and then made the other side in the vise. (no possible to do second bend in the brake due to the previous bend). Important here, as seen in the image below is that only the left side of the part is bend sideways. the bottom side on the image (or top side on the actual plan) is fully bend over the entire length. so the bottom side rest completely against the engine mount, only the part below the cutout rest against the firewall stiffener.

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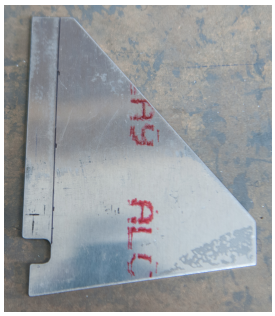

Here is the result of the bending. Not difficult, just measure with the callifper if you have the required height and match with the actual assembly to fine tune. Key here is that both sides rest flat on the surfaces where they will be rivetted.

Another shot of the small bending brake

Clamped to the firewall and bracket and drilled in place.

This sounds more easy then it is ... I spend lots of time figuring out if edge distance would be ok for the positioning I had.

In the end I drew a line on the back side of the firewall stiffener at

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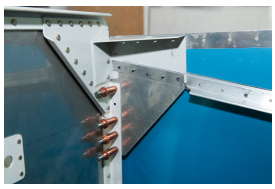
1/8" back of the firewall web as mentioned on DWG 23, top left corner of detail A. (1/8 aft face of firewall to forward edge of F-684) This is the alignment line for the long edge of the F-684 gusset. Then move it up to be parallel to the top line of the F-713 auxiliary longeron.

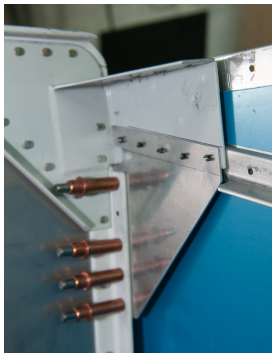
Later on, I found out why my notch was too high on the initial parts I made. My F713 longerons were drilled too high. This made that the top line was also too high, moving the holes a bit lower on the short drilled edge of the gusset. This created a better edge distance on the aft hole but moved the most forward hole to close to the cutout for good edge distance. This is the main reason why I remade the parts.

This is how it looked on the original parts. (the final parts are also visible in a following article).

You can see in the image that the cut out is too high and the botton of the cutout rests near the bottom of the enging mount. In other words, it would have been better in my case to lower the cutout as I still have sufficient edge distance on the top hole of the side that rests against the firewall angle.



The next image shows nicely the reason for the bend. As you can see, in my part, the bend cause the gusset to fit nice and flat against the engine mount bracket. That's how it should be.



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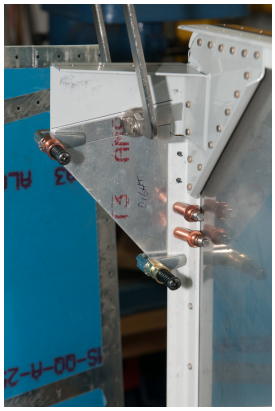
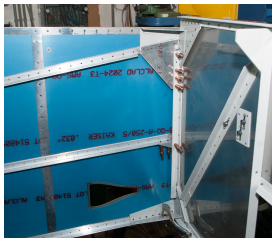
Repeated the same process on the other side. Just one more image to illustrate how I clamped and drilled the part. First I had 3 clamps on the top side to keep the height of the gussett stable while aligned with the firewall help line at 1/8. Then clamped with crock cleco the bottom side to the firewall angle and drilled the holes there. Clecoed and then drilled the top row in the engine mount bracket.



Final result with all drilled



Again... I remade these parts by copying all I have done here just moving the cutout lower for better edge distance and better placement of the cutout.

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