

Outbound Progress Report 14

10-25-17

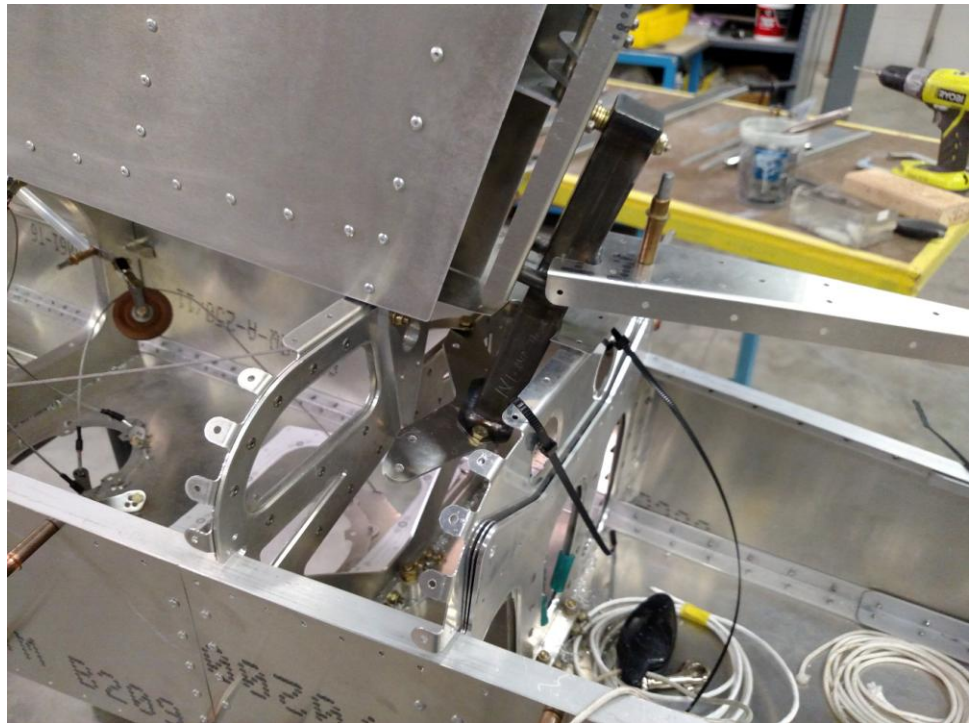
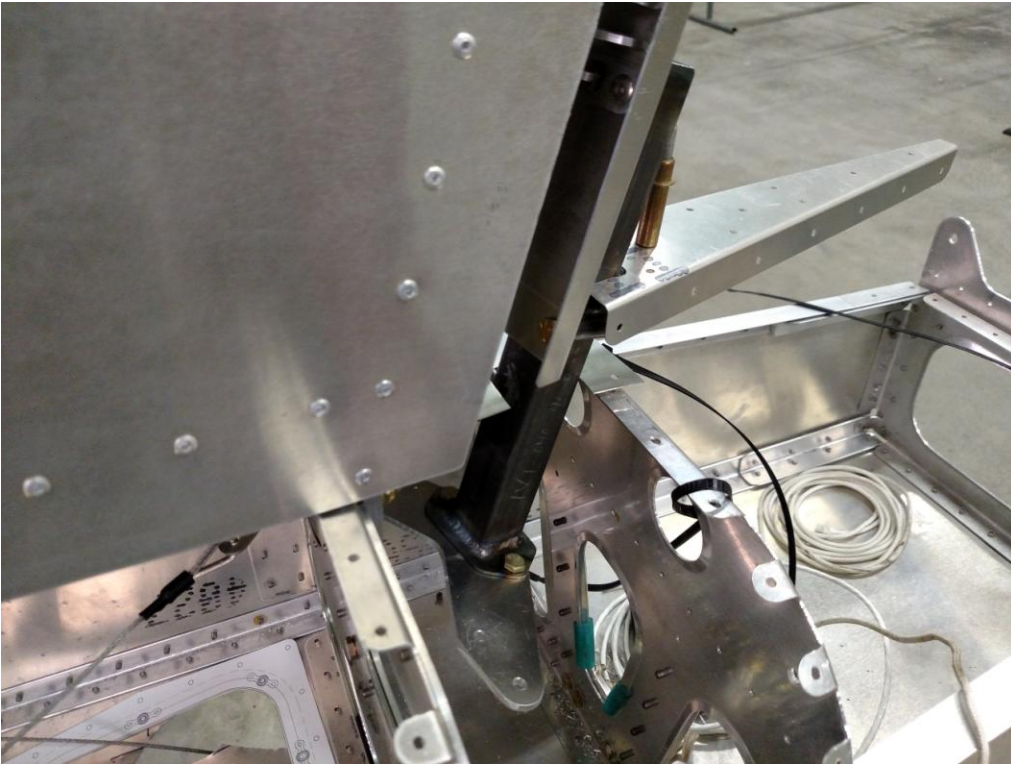
Choosing an Engine:

A new design starts with an engine choice, and for the Outbound that was the Titan 340. No doubt this will prove a very viable and well fitted engine. However, there are several engine options that will compliment the S-21 airframe. Over 50% of the Outbound program is actually flying, since the Raven and Outbound share airframe components from Station 3 forward. Our demo Raven with the 141 wing has only the additional drag of the wire braced tail group. The flight performance of the 141 wing on the Raven with the 100 HP is very good and backs up our predictions of performance using the 180 HP Titan. The S-21 will be a very versatile airframe allowing a large spread of engine weights and horsepower. Here is the current list of engines that will be factory supported, either in full install kits or partial kits. More options may be added in the future.

1. Titan 340 (full install kit)
2. Many Lycoming 320's. Type 1 dynafocal mounts and some variations of intake and accessory case. (partial install kit will include mount, cowling, air box, controls, oil cooler, and possibly baffle kits, and prop spacers if SAE 2)
3. Lycoming O- 233 (full install kit)
4. Rotax 912ULS (full install kit)
5. Rotax 912iS (partial)
6. Rotax 914 (partial)
7. Rotax 915 (partial)

Rudder System:

The outbound rudder system has the option for tail wheel steering. This requires a second set of cables and pulleys coming off the rudder horn. The challenge has been to keep this from becoming an award winning Rube Goldberg design. Our solution is to have the horn with cable attach locations for both the rudder and tail wheel steer cables. In the early design phase we debated about having a free steerable tail wheel, but that was bumped, because relying on brakes only for non-aerodynamic steering can have an expensive failure mode. The system seems to function well, and with the large access hatch in the belly, switching from a tail wheel to a nose wheel should be fairly low in effort and contortions.



Fuselage:

After Oshkosh I barreled into the repair of the fuselage and after a few hours it was ready to close up and was fully restored. However, we decided to take our time and do a full dress rehearsal of all systems aft of station -3. It has been slow but, things are

working out as planned and we should see a completed tail group and fuselage enter limit load testing in the next report.

Wing Tips:

We cast the final tooling and are running wing tips! Wing tips will start showing up in the wing kits. Those shipped prior to the tooling being completed will receive wing tips in the finishing or fuselage kit.



Aileron and Flap Tweaks:

I like a really fun feel to the controls of a plane. The kind of feel that makes you want to crank and bank. The initial aileron feel of the 141 wing was great, but something kept bugging me and after several hours of flying, it was decided to increase the aileron span about 8" and reduce the flaps the same. We noted the flaps being very effective so, 8" lost in span would have little impact however, 8" more inches of aileron would be something we could feel and measure. Flight testing proved this to be right on. We increased the self centering pressure to overcome the auto pilot friction, and there it was, that sweet handling I was hoping for. Now with no AP the stick force in roll is only one pound and two pounds with AP attached. Two pounds is light and fun, yet still

with enough feel and feedback not to be touchy. The bottom line is, the changes did not hurt the excellent flaps, it only increased roll rate, reduced roll stick pressure, and increased self centering.



Fast Building Flaps

At the 2017 RANS Fly-In we held a flap building seminar. About an hour later a pair of flaps were completed. We have been bragging about fast build times, and to the many gathered at the fly-in, it became real. The controls surfaces are just one area where we have approached the design process with a high priority on ease of build. It leaves us with an interesting question as what to build during our seminars. Obviously we need a bigger challenge than a set of flaps! Perhaps we can include some wing and fuselage construction? I would love your input on this topic, email us your thoughts.

Wing fixtures

We will be adding to the manual some plans for building fixtures for painting most of the components of the S-21. These pictures show how we fix the wings into a typical A frame pivot system.





Thanks for tuning in and more to come soon! RJS