

# S-21 Outbound Progress Report 15

12-10-17

## Cruise Speed and Aileron Testing

On the trip to and from Deland, FL we had ample time to get to know the larger ailerons and the 141 wing. Prior to departure, I bumped up the pitch on the 75" Whirlwind STOL prop to the point that take off RPM was around 4800. This is something I don't recommend (it is better for the engine to be turning at least 5000+ on takeoff). However, how fast could this wing go with 100 HP and the Raven fuselage? Before departing on a trip halfway across the country I did several speed runs using my phone app to find average  $V_c$ . It came out to 116 MPH, which means in level cruise it would be even higher. The trade off was only a small increase in take-off roll. And no loss in rate of climb. The 141 wing climbs great, just let it build speed right after takeoff. The rate of climb was still pushing past 1000 FPM at near gross with the DA at 3200'. We saw no issues with the steeply pitched prop and near gross weight to and from Deland. The demos I gave showed off decent STOL and very impressive cruise speeds. We averaged well over 125 MPH on the trip to Deland, despite not having significant tailwinds. The return trip was a pleasant surprise, averaging right at 115 MPH often into 15 MPH head winds. The extra speed was handy since a winter weather system pushed us west to Texarkana. That is a nice airport, great service, but not without the typical high prices.

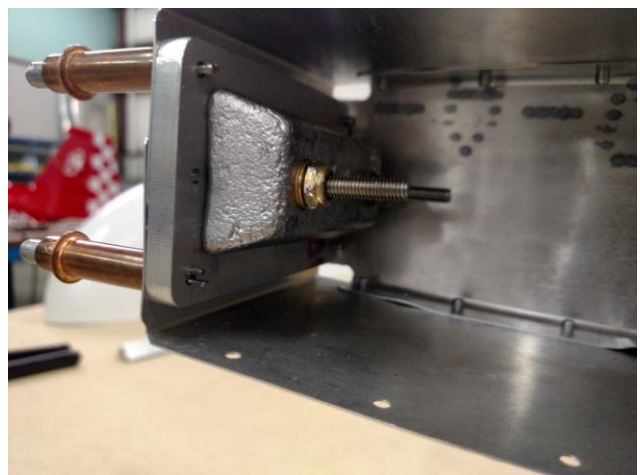
Having such fun ailerons kept me smiling the whole trip. During demos it was nice to see the same response from other pilots. The control pressure with the AP is 2 pounds and without it, a mere pound. The larger span aileron also offers more control at low speed, not that it was lacking, and even more confidence in strong crosswinds. Overall, if all Outbounds are rigged properly, the handling of this plane should be something pilots will be very happy with.

## Elevator Construction

The Outbound elevator assembles from a top and bottom panel and a pre-formed trailing edge. The leading edges of the skins may or may not come pre-rolled. If not, it is a simple task to use a length of PVC pipe and a large flat table to roll into shape. To make this an easy builder task, the skins will be two piece, not one piece, as shown in the photos. The elevator comes with a built-in mount for the electric trim servo and a thermal formed cover. We have provided a large trim tab, so there should be no speed or flap setting shy on trim power.



The ballast weights bolt as far forward as possible to reduce the overall weight gain. 2.5 pounds will be the typical weight to counter balance to 100%.



### Horizontal and Vertical Stabilizers

The horizontal stabilizer is one-piece, making assembly and install easy. Everything comes as pre-fabricated as possible and should take only a few hours to assemble. The spars are C channels with internal nesting channels forming a very stout but light structure. It attaches to the tail cone with four bolts in a wide bolt pattern to fan out loads. We made adjustable incidence blocks, which we may use to optimize the incidence angle. The chance of that varying between huge differences in engine weights is likely. Special thermal formed tips complete the refined finish.

The Vertical Stabilizer is built along the same lines as the horizontal and also features a nice thermal formed tip. We prefer the ABS tip parts over carbon or glass as they are light, hold up very well, and are much nicer to work with. They also take paint very well, no pin holes and rarely any issues with surface quality.



### Lexan Doors

Lexan doors are stock, and they assemble considerably faster than the current S-20 door. We use .090" Lexan trim strips for the bottom. This material holds up very well and accepts urethane paints. You have the option of leaving the door all clear or painting sections or all of the bottom half.



We are progressing rapidly to a flying prototype. It will fly on the 100 HP 912 ULS, and after obtaining the SLSA status we may swap out that engine for a Titan (depending on when it arrives). A second prototype is also underway which will become our demo showing off the Titan 340 engine.



Stay tuned, things are about to get really exciting. RJS