

Outbound Progress Report 26

3-1-19

Windshield Skylight Update

There I was...Here is an account of what happened last Friday while doing routine performance checks.

During a speed run at 7500' ASL the plexi-glass windshield and skylight mating strip pulled up enough to damage the windshield. The windshield shattered inward, and the skylight bent up enough to cause slight buffeting over the elevator. I pulled power back to idle and took stock of the situation and performed the following actions: Sink rate 500, power idle, airspeed 70 MPH, stick back to about 50% up elevator, aerodynamic buffeting over the tail noted and not alarming, no movement noted at the tips of the stabilizer, but causing a need for more up elevator, very cold air in cockpit, heater on full, heading direct to HYS.

Looking up I noticed the mating strip was deformed, bent up in the middle about 2.5". This was the source of the tail buffet and loss of some pitch authority. Adding power and trim I was able to achieve zero stick force. Once the plane was trimmed hands off, I moved the ballast weight off the floorboard to the aft of the baggage compartment, as I was conducting climb and speed testing with a forward CG. I added a bit more power to check the sink rate. I leveled off at 3000' and made the pattern for RNY 34 at Hays. There was no issues with yaw or roll and pitch was fine once I slowly added power. The landing was a smoothie with full control. Having that high aspect elevator and stabilizer was good fortune. It inadvertently proved the S-21 has a very ample pitch authority even with turbulent airflow over a good portion of the horizontal tail plain.

Some of you may know what it is like to fly a high wing or low wing plane when the center section becomes compromised and changes the airflow over the tail. In my early days I tried flying an S-4 without the center cover just to see if it could be done. It flew but, it took a LOT more power and speed.

The center section between the wings on high or low wing aircraft contributes significantly to the total lift. The disruption in the smooth airflow over the top of the fuselage will almost always impact pitch and sometimes yaw control and stability. It is nice to know that an S-21 can remain in control.

We have created a simple mod that includes adding a 1" square aluminum tube to the matting strip. The mod has passed static testing and we are installing it in our demo plane for dynamic testing. I can safely assume if a bird strike takes out the windshield, continued controlled flight is manageable, provided you do not get a mouthful of Canadian goose!

RJS