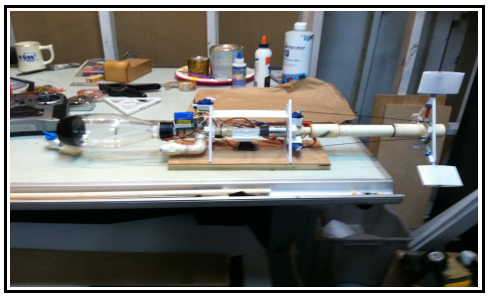
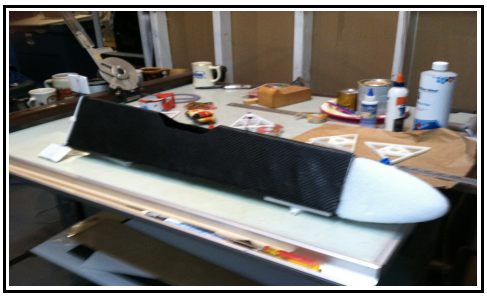
**Executive Summary**

This month I worked on the forward and aft struts for the cockpit, the paraglider box, the battery pack, and the placement of the RC receiver and the servos. I inserted the oxidizer tank and fuel grain (pictured below) into the carbon fabric fuselage. Everything fits and is ready for static testing. The mass is ~1.3 kg including the oxidizer and fuel.





**Technical Stuff**

This month I worked on the forward and aft struts for the cockpit, the paraglider box, the battery pack, and the placement of the RC receiver and the servos. It doesn't sound like much but there was a lot of trial and error and reprinting the PLA parts. After some minor adjustments, I inserted the oxidizer tank and fuel grain into the carbon fabric fuselage. Everything fits and is ready for static testing. The mass is ~1.3 kg including the oxidizer and fuel. I still feel it is necessary to increase the thrust.

I can increase the thrust by increasing the pressure in the oxidizer tank from 130 psig to 140 psig. This would increase the flow rate and the mixing chamber pressure. The problem here is two fold. First, I'm already stressing the opening valve which is rated at 114 psig. Any increase in tank pressure could result in failure of the opening valve, not good. Second, an increase in mixing chamber pressure could result in an explosion, also not good.

I can increase the thrust by increasing the throat diameter from 5 mm to 5.5 mm. I've noticed during the last series of test that a net positive thrust occurs at the end of the run, when the throat erodes to 5.5 or 5.6 mm. This will also increase the mass flow rate. Also, there is a slight decrease in chamber pressure but apparently the increase in throat diameter compensates. The problem here is that ignition may take a little longer. If so, I can insert a variable throat (ref: edzieba, 2021) in the converging cone to increase the resident time in the mixing chamber.

My first approach will be to increase the throat diameter. It is the easiest and safest approach. Both approaches increase the mass flow rate which reduces the run time. My objective is to have enough thrust for enough time to get to enough altitude to deploy the paraglider and make a safe landing. So, I'll be doing some testing over the next few months, weather permitting.

Reference
edzieba, Reply #28, NASASpaceflight.com Forums>>General Discussion>>Advanced Concepts>> HTP/PLA/KMnO4 Hybrid Rocket Engine, 11/05/2021