## **Executive Summary**

This month, I continued my work on the Mk I Viper. The total mass of the Mk I Viper including the propellants is now  $\sim 1.456$  kg which gives me a mass margin of only 44 gm. I attached the paraglider to the fuselage. The wing loading is  $\sim 0.8$  gm/cm<sup>2</sup>. Next month, I'll tweak the design and hopefully, do some drop testing.

## **Technical Stuff**

This month, I continued my work on the Mk I Viper. I decided to divide the fuselage into three sections; a forward section, a mid section, and an aft section. The lightweight carbon fiber sections are joined together at the triangular trusses with small self tapping screws. To accommodate the sections, I had to increase the width of the trusses. As such, the mass of the glider increased by  $\sim 100$  gm. With the fuel and oxidizer, the total mass of the Mk I Viper is now  $\sim 1.456$  kg. This gives me a mass margin of only 44 gm.



Also, I continued work on the cockpit section (photo on the left). The cockpit is part of the mid section. I attached a forward cowling to the forward section and an aft cowling to the aft section. The volume of the cockpit is  $\sim 820$  cm<sup>3</sup> and easily stores the paraglider for launch.

The plan form area of the fuselage is ~ 1,240 cm<sup>2</sup>. With just the fuselage, the wing loading is ~ 1.2 gm/cm<sup>2</sup>. For comparison, the wing loading of a turkey vulture is ~ 1.0 gm/cm<sup>2</sup> and the wing loading of a Cessna 172 is ~ 7.2 gm/cm<sup>2</sup>. So, I could fly the Viper without the paraglider if it is stable enough. I might need the paraglider for stability. As it stands now the plan form area of the paraglider is ~ 645 cm<sup>2</sup> which brings the total to 1,884 cm<sup>2</sup> and the wing loading to ~ 0.8 gm/cm<sup>2</sup>.

Finally, as shown in the picture above, the center of mass of the rocket glider is way forward of the center of pressure of the paraglider. I should move the paraglider forward. I still want the center of mass forward of the center of pressure. This should give it a nose down glide. Next month, I hope to drop test the Mk I Viper.