

## Executive Summary

This month I had three launches of the MkI Viper. I replaced the PLA canopy with the fiberglass canopy and calculated the center of mass to be at 3.4 cm with the thrust vector at 3.5 cm. The MkI Viper cleared the rail guide, continued to about 30 feet before pitching up, did a few flips, and landed ~ 15 feet from me.

After careful review of the videos from this month, I surmise that the thrust vector and center of mass are aligned. Also, I believe it has become an issue of air drag. The Viper clears the rail guide and begins to pitch up as it is gaining velocity. I plan on initializing the flaps in the down position to counter the air drag on top.

## Technical Stuff

This month I had three launches of the MkI Viper. After replacing the PLA canopy with the fiberglass canopy, I calculated the center of mass to be at 3.4 cm with the thrust vector at 3.5 cm. The first launch cleared the rail guide and continued for about 30 feet before pitching up, flipping a few times, and then crashed into the wall still under thrust (first picture). Unfortunately, I did not get any video of the launch.

The second launch cleared the rail guide and again continued to about 30 feet before pitching up, did a few flips, and landed ~ 15 feet from me. This time I got [video](#) of the launch (second picture).



On the third launch, I had to tighten the solenoid valve (small leak) which put the solenoid at the 12 o'clock position (as opposed to the 10 o'clock on the previous launch). As such, the MkI Viper began to yaw to starboard after leaving the rail guide then pitching up. The crash site was to the right of the test stand. For some reason (operator error maybe), the solenoid valve closed. This kept the oxidizer tank pressurized. When I picked it up, the tank exploded. No injuries as I had fiberglass panels around the tank. However, it destroyed all the major components resulting in a major rebuild.

I believe I have a firm grip on the CM calculations. During the rebuild, I'll keep good track of the individual masses and their CM. I will recalculate the CM for the system and compare it with launch. After careful review of the videos from this month, I believe it has become an issue of air drag. The Viper clears the rail guide and begins to pitch up as it is gaining velocity.

Next month, it is a major rebuild of all major components including the paraglider. If I get to launch, I plan on initializing the flaps in the down position to counter the air drag on top. If I get to apogee with all the propellant expended, then I can deploy the paraglider and observe how the rocket glider glides.