

DEMONSTRATION FLIGHT OF A SP POWERED ROCKET

The demonstration flight was held at the annual RATS launch hosted by Bill Davidson and the Garden State Tripoli club. Saturday October 26th was the first day



Figure 26: Motor Preparation Demc

of the launch and the sky started out a bit overcast with a slight wind blowing. The first flight of the day was to be Stuart Leslie's PML Callisto with a 3-grain 38mm KNO₃/sorbitol propellant. Before launching however, a demonstration of the motor assembly was conducted, illustrating that the process was identical to loading a commercial Aerotech RMS reload. Based on previous static tests, the assembled motor was designated an H191.

Flight 1

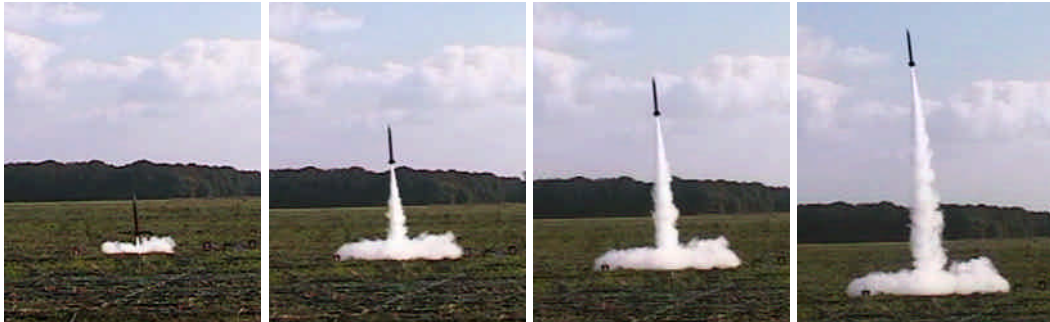
H191 KNO₃/sorbitol - 3 grain 38mm in a PML Callisto with altimeter and two stage recovery. The rocket jumped off the pad quickly (see the analysis of the flight data in figures 27 and 28 for a comparison to an Aerotech H-242 reload flown previously with this rocket) and provided a nice flight to 2400 feet. The altimeter separated the rocket at apogee and the main chute deployed at 400 feet with the rocket landing about 50 feet from the pad. Most everyone present was impressed with the motor and noted that it sounded quite a bit different than AP based motors. It produced a "smooth swish" vs. a "roar". The flight nicely matched the Wrasp prediction and it appears that the thrust was the same as the test stand data.



The rocket was recovered in excellent shape and the motor removed for examination. The liner and o-rings were still in good shape and the motor had burned cleanly, leaving very little residue in the casing.

Flight 2

I 358 KNO₃/sorbitol - 6 grain 38mm in a PML 1/4 Patriot with altimeter and two stage recovery. This flight started with another perfect boost off the pad. The motor came up to pressure very quickly again. The flight was to 2600 feet and went well until the home-made igniter for the ejection charge decided that it "wanted a little more time" from the homemade altimeter to light up. Unfortunately the altimeter decided that went against it's programming and the result was a ballistic trip back to the ground. At 400 feet (and about 200mph) the altimeter tried to make amends by releasing the main chute and while this saved the rocket from a most certain death, it did cost one fin and a zippered main chute compartment. It will fly again.



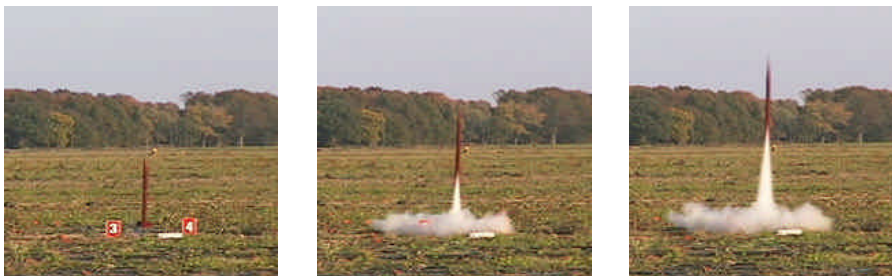
Static Test 1

H210 Sucrose/KNO₃ 3 grain 38mm (Jimmy Yawn motor)

Since my altimeter was not behaving properly after its sudden impact with the ground, we scrapped the original plan to fly one of Jimmy's motors in my rocket with altimeter. I had done some tests previously with Aerotech delay elements in these motors and they had worked very well. We verified this by placing a 14 second delay element in Jimmy's motor along with an ejection charge and static fired it. The stopwatch confirmed exactly a 14 second delay time giving us the confidence to fly a rocket without altimeter.

Flight 3

H270 Sucrose/KNO₃ 4 grain 38mm in a PML Arial with motor ejection (Jimmy Yawn's motor and rocket) Performance appeared almost exactly the same as the previous motors. Fast pressurization and shorter burn due to the sucrose provided a little more noise but a perfect flight with parachute ejection at apogee.



Flight Data Analysis

As can be seen from the graphs below, the flight characteristics for these SP flights are similar to the Aerotech Blue Thunder reloads. The acceleration graph is the red line and altitude is shown in blue.



Figure 27: H-191 Sorbitol Motor in PML Callisto

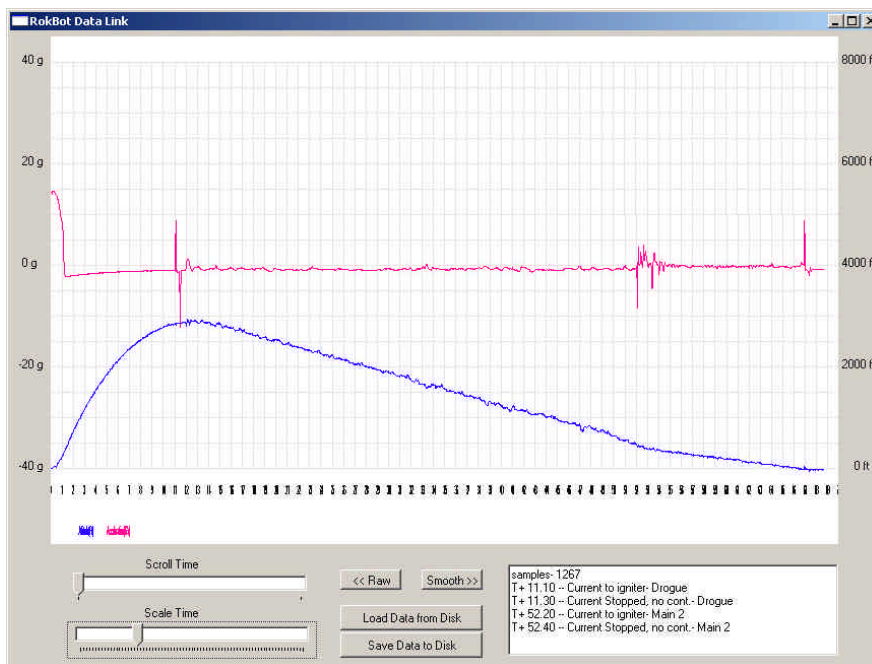


Figure 18: H-242 Aerotech Blue Thunder in PML Callisto

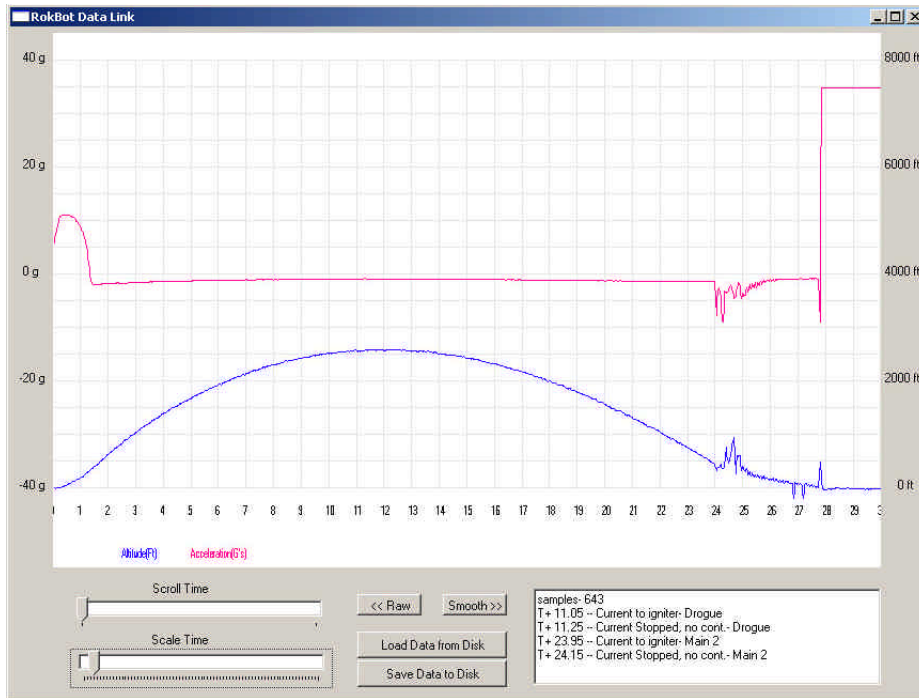


Figure 29: I-358 Sorbitol Motor in PML Patriot- OUCH!

