Launch of Tesla rocket in Huntsville, AL. Photo courtesy of Jim Wilkerson

PLAR For Spring Grove Area High School: Team Tesla

●*Team name*: Team Tesla

●*Motor used*:

- Cesaroni - P54-4G C-Star (K740)
  - Size: 54mm Reload
  - Casing: Cesaroni 4-Grain Case
  - Delay: 18 sec
  - Burn Time: 2.5 sec
  - Total Impulse: 1873.9 Newton-seconds
- Motor Length: 404 mm
- Max Thrust: 883.9 Newtons
- Total Mass: 1469.0 g
- Propellant Mass: 846.2 g
- Manufactured by: Cesaroni

●*Brief payload description*:

- Payload Title: Assent Intake Generation System A.I.G.S

This year's payload, for Spring Grove's team TESLA is designed to test the rate at which airflow through a turbine will generate current on the accent of the launch vehicle.

●*Vehicle Dimensions*:

- Length of Vehicle: 85.25 inches
- Diameter: 4.00 inches

●*Altitude reached (Feet)*:

- We were unable to recover our rocket, resulting in the inability to get data on our altitude however our mentor does believe that he was able to hear the first set of beeps from the altimeter leading us to believe that it reached an altitude of at least 5000 ft.

●*Vehicle Summary*:

- Prior to the launch of our launch vehicle we received positive feedback on our launch vehicles design and our fincan system at LLR. Our rockets fins were made from all tem 3d filament an 8th inch thick and 3 screws were securing the fin can to the vehicle via the motor mount rings. The bulkheads and centering rings were made from ½ inch plywood that was routed out on a CNC Router. The Electronics Bay made use of two PerfectFlite StratoLogger altimeters which controlled four total ejection charges. It also used two Aerocon Systems Type 2 key switches to turn on the StratoLogger altimeters that were within the electronics bay.The recovery system also consisted of 1 inch nylon shock cord that was hooked to our drogue parachute as well as being used to hook our main parachute to our ebay for dual deployment

- Mass of Vehicle: 20.61lb
- Length of Vehicle: 85.25in
- Motor Choice: K740 C-Star
- Recovery System: Two PerfectFlite StratoLogger cf's igniting 2.0 grain charges
- Rail Size: 15x15

●*Data analysis & results of vehicle*:

- Based purely on visual data of the launch vehicle, it is nearly impossible to determine the cause of the main parachute deployment at apogee. If the rocket is ever recovered, we should be able to investigate the electronics bay and determine the cause.

●*Payload summary*:

- The payload was designed to collect energy on assent of the launch vehicle and calculate the rate at which it is collected vs the ascent rate of the

launch vehicle thus allowing the team to determine if the current generated was worth the amount of drag created and there for the wasted energy from said drag as well as determine how much energy could be collected from such a system.

●*Data analysis & results of payload*:

- The objective of the payload was to collect energy on assent and calculate the rate at which it is collected versus the ascent rate of the launch vehicle. Thus due to the lack of data from both the altimeter and the voltage data logger we are unable to calculate the the amount of energy collected.

●*Scientific value*:

- While no data was retrieved from our launch in huntsville prior test flights revealed a loss in altitude of nearly 200 ft due to added drag created by the AIGS payload.

●*Visual data observed*:

- As aforementioned, early visual data indicates that the rocket may have had a drag separation. However it also indicates that the amount of drag from such a system may not be worth the energy collected as other methods can obtain similar results with less drag.

●*Lessons learned*:

- We as a team have learned throughout the course of this program what being a team means and how much we must rely on one another to complete work in an orderly and timely fashion as one or two people simply can not do the job alone. While the final launch did not go as planned (We strive not to make pinatas out of rockets but except that sometimes it is inevitable.) we are happy to say that overall we had a safe flight and know that our next design should incorporate shear pins on our forward section.

●*Summary of overall experience (what you attempted to do versus the results and how you felt your results were; how valuable you felt the experience was):*

- As stated we are not ecstatic by the loss of the vehicle but are in fact happy with the overall performance of the launch vehicle and we would all happily do it all again. The experience is one we will never forget and we are sure it will drive us in our future endeavors.

●*Educational Engagement summary:*

- As of now the team has given educational presentations to our district's middle school, as well as having performed numerous community informative and outreach presentations for both tv news and newspaper articles. We are currently set to have a rocket building workshop on May 17 with students from the said middle school presentation.

●*Budget Summary:*

- Because our schools NASA SLI project is not founded by our school and we are entirely self funded we are happy to say that not one but both of our teams we are able to completely reach our overall goal for our project and raise enough funds to complete everything we set out too as well as leave funds behind for future teams to have a starting platform for their program