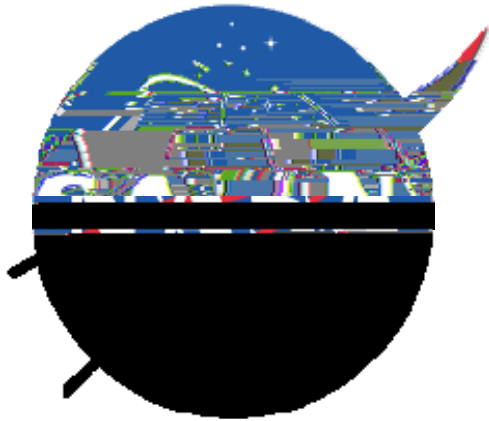


# Flight Readiness Review Tuskegee University USLI 2009

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## Summary of Flight Readiness Review

### Team Summary

School Name	Tuskegee University
Location	Tuskegee, Alabama
Mentors	Eldon Triggs, Aerospace Science Eng. Arbin Ebrahim, Electrical Engineering

### Launch Vehicle Summary

Size	L = 120 inches, D = 4.5 inches
Motor Choice	K – 250LW
Recovery System	Parachute (1 x 36 inch diameter) + 30.0 in drogue parachute
Rail Size	100 inches (est.)

### Payload Summary

Transmitter/Receiver	900 MHz TX-900G (Ozark Aerospace) with associated receiver ground station.
Altimeter(s)	1. ARTS2 barometric/accelerometer 2. Perfectflite MINIALT/WD
GPS	Garmin Module (part of TX-900G package)
Sensors	1. Carbon Monoxide module (USB package) 2. Temp/Humidity/Dew Point module (USB package)
Power	Li-polymer battery (11.2 volt)

The sensors will be packaged so that they will be able to download via a single USB cable mounted into the structure of the payload section. The GPS data, altitude, and wind speed will be sent via 900MHz wireless communications to a ground station to verify altitude and final location. The sensors will take measurements of the atmospheric Carbon Monoxide levels, atmospheric temperature, dew point, and humidity to detect level of moisture/water vapor. This will assist in determining the viability of colonization of other planets.

## **Changes made since Critical Design Review**

1. Changes made to Vehicle Criteria



developed using Apogee Rocksim Model Rocket Design & Simulation Software. The software provide us with the following



The following MSDS sheets and files are on hand to give students and faculty the necessary information regarding hazardous materials:

1. Ammonium Perchlorate
2. Kester solder
3. Bondo<sup>®</sup> Fiberglass resin
4. Owens-Corning Fiberglass fabric
5. Krylon<sup>®</sup> spray paint
6. Title 14, Part 101, Subpart C
7. NFPA 1127, Code for High Power Rocketry

The actual sheets are not included in this document in order to reduce overall length, but are available upon request.

## Payload Criteria

### Payload

Item	Function
EL-USB-2-LCD	Humidity, Temperature and Dew Point Data Logger
EL-USB-CO	Carbon Monoxide Data Logger
MiniAlt/WD	dual logging event altimeter
standard serial RS-232 format adapter	PC connect data transfer kits for Altimeter
ARTS TX-900G	Altitude, GPS and Wind speed Telemetry transmitter
ARTS RX-900	Receiver for your Telemetry System
Standard Alkaline 9V battery	Altimeter Power supply







**assembly**

flight hardware is mounted to a fiberglass board which is then secured to two steel coil rods that are



**Safety and Environment (Payload)**

## Launch Operations Procedures

All launches will be held at NAR/TRA sanctioned sites. The launch rail will be provided and the overall length will be determined by the final length of the rocket. The minimum length is at least the length of at which the rocket becomes stable, such that the overall length of the rail will be close to 15 feet in length. The assembly of the vehicle prior to launch will have the following sections:

- a. Fuselage
- b. Motor
- c. Avionics/Science Package

The motor will be assembled before arrival at launch site. The fuselage will be assembled before arrival at launch site. The only parts that will need to be assembled on site is the parachute to shock cord, shock cord to aft end, shock end to nose cone and avionics package. The science package will be enclosed in the fiberglass structure such that the switch will be accessible from the outside. Time to assemble will require a maximum of 30 minutes. The rail lugs will be compatible with the rail constructed. All safety precautions and guidelines will be followed in accordance with the NAR/TRA, BATFE, and NPFA regulations.

## Activity Plan

## Budget

### TUSSLE Rocket Construction Est. Budget

Item	Cost each
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Tuskegee University

Cost Estimate for 1 year USLI Competition

Funding Agencies: Alabama Space Grant Consortium, Tuskegee University, External Sources

***1. PI Salary /Fringe***

Faculty Advisor/PI	Months	Time & Effort	Annual Salary	Fringe	Overhead	Total
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**ASGC**

**Tuskegee Cost Share**

**Ex**



## Timeline

Event	September	October	November	December	January	February	March	April
Initial Teleconference	12th							
Proposal Due		8th						
USLI Workshop		10th-11th						
Electrical study	15th through	31st						
Fiberglass testing					10-16			
Water tunnel test				canceled				
Electrical test					15	15		
PDR Due				5th				
Rocket body build					15	10		
CDR Due					22nd			
CDR presentations						3rd		
Test flights							7th	
Flight Readiness Rev.							18th	
Flight Read. Present.							25th thru	3rd
Launch								15th thru 19th



## **Outreach summary**

The students are planning a seminar with Booker T. Washington High School in Tuskegee and will work to encourage student hwb312 jn