Tripoli Rocketry Association
>50K Project Submittal

(Applies to any single stage or multistage project with combined 40,960 ns or more propulsion)

Launch Event: LDRS ____ BALLS ____ Other XPRS 2016

Launch Site: Blackrock Lat/Long: N40 49'45.8" W119 08'21.6" Launch Date(s): Sept 16, 2016

COMPLETED FORM MUST BE SUBMITTED TO KENT.NEWMAN@COMCAST.NET NO LATER THAN 90 DAYS BEFORE THE LAUNCH DATE

Flier Data:

Names, addresses and email (list primary contact first)	TRA No.	Cert Lvl
Allen H. Farrington	12280	3
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allen@alumni.duke.edu		

Rocket Geometry:

Rocket Name	Organic Carbon MkVI	Length	3.372 m	Diameter	98 B/ 75 S mm
Weight (dry/ wet)	5.5 / 18.1 kg	Fin location (from tip of nose)	B – 3.189 m S – 1.327 m	Fin angle (if any)	None

Briefly describe project (using component detail - airframe, fins, nose, payload, etc.) regarding specific materials, method of construction, fin attachment method, etc. Generally, the larger or more complex the project, the more detail is required. Photos and/or drawings are expected. Use additional paper as required.

This is NOT a regular Class 3 rocket, however, it has simulated to more than 50K.

Two-stage configuration for 75mm motors. Booster is 4" primary diameter with transition to 3". Sustainer is 3".

Booster:
Fiberglass AF (Madcow Nike Smoke) with Fiberglass through the wall FG fins to a 3" FG motor mount. Booster incorporates a 3" transition and drag-separation conical stage coupler for the AT-M685 nozzle (see description below). Sustainer load path is coupled to the airframe by the coupler unit. Aerodynamic loads (fins and transition) are carried by the 4" airframe. Aeropack motor retention.

Stage Coupler:
Custom coupler using a "Nike-Cajun" style drag separation mechanism where the booster fitting is cast to match the sustainer nozzle (AT HP nozzle from the M685). Calculations show approximate 250psi compression under conservative, maximum thrust configuration. This compression is well below both the nozzle and the JB Weld casting's compressive strength (both >2400 psi). This coupler has flown successfully multiple times without damage.

Sustainer:
Carbon-Fiber Airframe, Binder Design Max-Q Al fins. Aeropack minimum diameter retainer for motor retention. Fiberglass nosecone with Aluminum tip.
"Zipperless" separation configuration for single-tube dual deploy using Chute Release. The main recovery harness is protected at the airframe exit by rubber tubing with a high abrasion resistance and 1200 lb swivels at both ends.

Propulsion:

	Qty	Manufacturer (Ex.- Research – J. Smith Commercial – AT, etc.)	Propellant Type (solid, hybrid)	Burn Time	Designation	Propellant Weight	Total Impulse
Main	1	Commercial-AT	Solid	5.4s	M1315W	3499g	6713.5 N-s

Add'l							
Airstarts							
2nd Stage	1	Commercial-AT	Solid	11.5 s	M685W	4320 g	7561 N-s
3rd Stage							
Total						7819 g	14274.5 N-s

Motor Description – N/A Both Motors are certified commercial motors per Aerotech specifications.

Design (Bates, C-slot, etc.)		No of Grains		Core Diameter	
KN Range		Pressure Range		Propel. Length	
Volume Loading		Propellant Mass		Delivered ISP	
Multi-modal		% Solids		% Metals	
Initial Thrust (lbs)		Thrust/Wt. Ratio			

Payload/Recovery:

Payload Description	**Beeline GPS – 70cm at 444.55Mhz (K6AHF-1).**
Drogue (Manu/type/ size)	**Booster – reefed 48" elliptical (IRIS).** **Sustainer – reefed 48" elliptical (IRIS).**
Main (Manu/type/size)	**Booster – 48" elliptical (IRIS).** **Sustainer – 48" elliptical (IRIS).**
Deployment Method	**Booster – Dual-Deploy with reefed main released by Chute Release at 1000ft.** **Sustainer – Dual-Deploy with reefed main released by Chute Release at 1000 ft.**
Electronics (Brands & Models including tracking devices)	**Booster – Perfectflite Stratologger CF** **Sustainer – Raven 2 and Stratologger CF. Beeline GPS – 70cm.**

Launcher/Controller:

Description (Rail, tower, etc.- length; material; ground fixed or balloon, etc./ Wire controller, wireless, etc.):
Plan to use Aeropac-provided launch equipment at XPRS. >8' rail required. Controlled by Aeropac.

Safety:

Safety codes/procedures followed:
Standard HP safety codes for a Tripoli Research launch.

Aerodynamic Data (please indicate if Submitter provided or Committee requested to provide):

Ca vs Angle of Attack (AOA):	Attached	___	FAA Class 3 Committee	X
CNa vs AOA	Attached	___	FAA Class 3 Committee	X
CP vs AOA	Attached	___	FAA Class 3 Committee	X
Mass vs Time until Burnout (BU):	Attached	___	FAA Class 3 Committee	X
Cg Location vs Time until BU:	Attached	___	FAA Class 3 Committee	X
6 DOF Dispersion Analysis	Attached	___	FAA Class 3 Committee	X

Supporting Data (to be provided to Committee):

RASAero project file (.alx1)	___	RockSim File (.rkt)	X
Rasp engine file (.eng)	___	RockSim Pro File (.rkt)	___

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