

INSPIRE - ENGAGE - EDUCATE - EMPLOY

The Next Generation of Explorers



NASA Student Launch- Introduction

SLI and USLI Differences

Student Launch Initiative	University Student Launch Initiative
Middle/high school teams must place in the top of the Team America Rocketry Challenge (TARC) or Rockets for Schools to be eligible.	Any University can submit a proposal to participate in the USLI competition.
Must send one teacher or mentor to the Advanced Rocketry Workshop (ARW). ✓	Not required to attend ARW.
SLI is not a competition, but several awards are given.	USLI is a competition and awards are given.
Must use commercial ammonium perchlorate motors. Motor size limited to K class.	Must use commercial ammonium perchlorate motors. Motor size limited to L class.
Team chooses scientific payload with NASA's approval.	Team must complete a mission challenge defined by NASA.

14 teams last year

Basic Requirements

- 9-month commitment (Sept 2021 – May 2022)
- Engineering design challenge; teams must send in a proposal and be competitively selected
- Design and build a reusable rocket to a declared altitude above ground level carrying a scientific payload
- Last year apogee altitude between 3,500 and 5,500 feet above ground level
- Successfully complete milestone reports and flysheets, design reviews, test launches, and a flight hardware and safety inspection
- Provide STEM engagement activities to community participants
- Develop and maintain a social media platform



Activity Timeline

August 18th	Handbook Released Request for Proposals
September	Teams submit proposals and participating teams are selected
October	Teams announced, Kick-Off Session and workshops offered
November	Preliminary Design Review (PDR) Packages due PDR Milestone Presentations
December	Teams building/testing
January	Critical Design Review (CDR) Packages due CDR Milestone Presentations
February	Teams building/testing
March	Flight Readiness Review (FRR) Packages due FRR Milestone Presentations
April	Launch Week in Huntsville, AL or At-Home Launches
May	Post Launch Assessment Review (PLAR) due Awards Announced

Proposal – What should be included*

- General Information
 - Cover page, mailing address, student team leader and safety officer info, team member and two adult educators info, and team organizational structure
 - National Association of Rocketry (NAR) or Tripoli Rocketry Association (TRA) section and mentor
 - Team contact information
- Facilities
 - Provide a description for all the facilities (meeting rooms, workspace, labs, etc.) and equipment/tools available to you
 - Know your manufacturing capability.
- Safety (include MSDS)
- Technical Design
 - General vehicle/payload design ideas and dimensions, proposed recovery, and propulsion systems
 - Address handbook requirements, and major challenges.
- STEM Engagement – Include plans, and evaluation criteria
- Project Plan
 - Timeline. Include as much detail as possible.
 - Budget. Every item you plan to use, and their market values. Include taxes, shipping, vendors, what you have on hand, etc.
 - Funding plan. How and when will you acquire funds? How much do you need?
 - Sustainability. How will you ensure team continuation?

***ALL requirements for what to include in your team's proposal can be found in the NASA SL Handbook**

General SLI Requirements

Students will do 100% of the project, including design, construction, written reports, presentations, and flight preparation (with the exception of energetics, see below)

ALL SLI Teams must have a mentor: Jonathan Rains

- Mentor must maintain Level 2 NAR/TRA certification and must have flown/successfully recovered at least 2 flights in the motor to be used or a higher impulse class.
- Only the team mentor can handle black powder or any variant of ejection charges, and prepping/installation of electric matches
- The mentor is designated as the owner of the rocket for liability purposes and must travel with the team to launch week and at-home launches and testing.

ALL SLI Teams must have an advisor:

- Advisor must be an adult (ex: educator, parent etc.)
- We do not recommend that the same person be the team's advisor and mentor



General SLI Requirements

Vehicle Requirements Overview

The NASA SLI Team's vehicle will...

- carry a scientific payload of the team's discretion (approved by NASA).
- fly to a declared altitude, to be determined by team, by PDR.
- be designed to land within 2500 ft of the launch pad.
- have a dual-deployment recovery system that is fully redundant.
- contain electronic tracking devices on every un-tethered section.
- use only commercially available, certified motors and altimeters.
- be flown with team-provided motors and energetics (NASA does not provide motors or energetics)



Rocket Motor Classifications

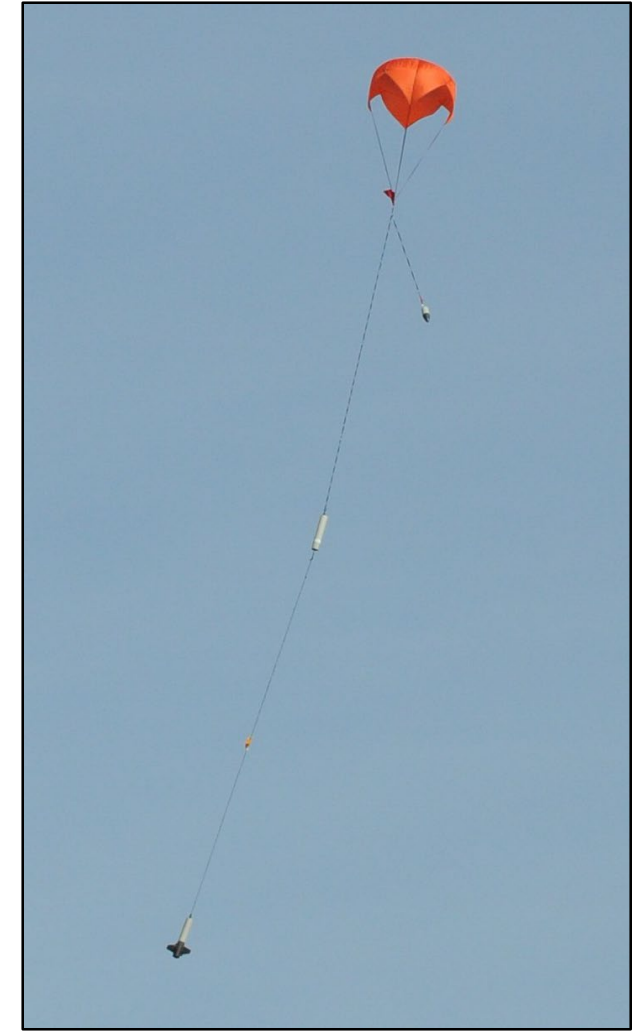
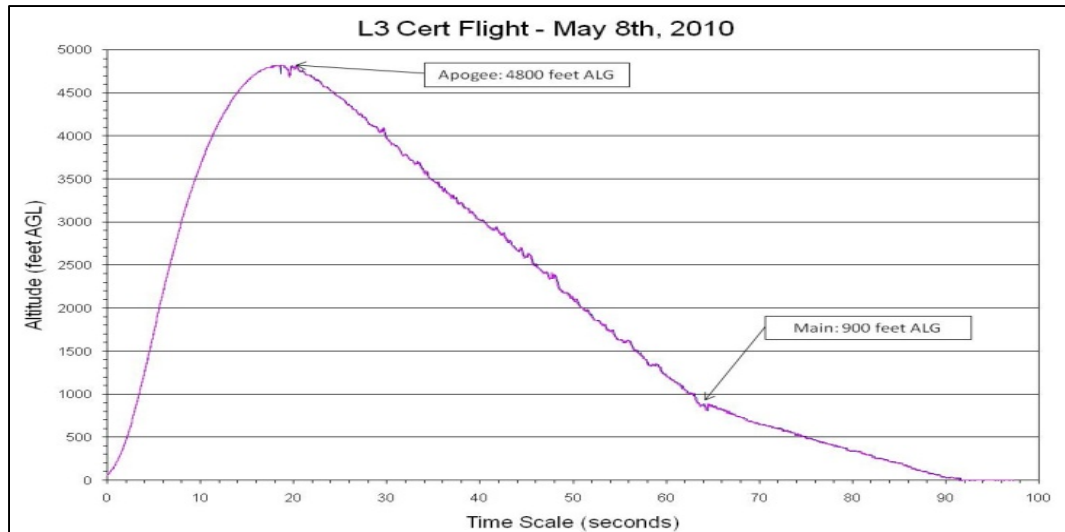
- HPR motors approved for sale in the United States are stamped with a two-part code that gives some basic information about the motor's power and behavior:
 - A letter specifying the impulse class ("H")
 - Number specifying the average thrust ("225")
- HPR motors cannot be purchased over the counter
- Special storage, handling, and shipping procedures are required. (overseen by Team Mentor)

Impulse Class		Category
H	160.01Ns to 320.01Ns	Level 1
I	320.01Ns to 640.00Ns	
J	640.01Ns to 1280.00Ns	Level 2
K	1280.01Ns to 2560.00Ns	
L	2560.01Ns to 5120.00Ns	Level 3
M	5120.01Ns to 10240.00Ns	
N	10240.01Ns to 20480.00Ns	
O	20480.00Ns to 40960.00Ns	

Note: The SLI team maximum Impulse limit of 2,560 N*s translates to a K or lower motor.

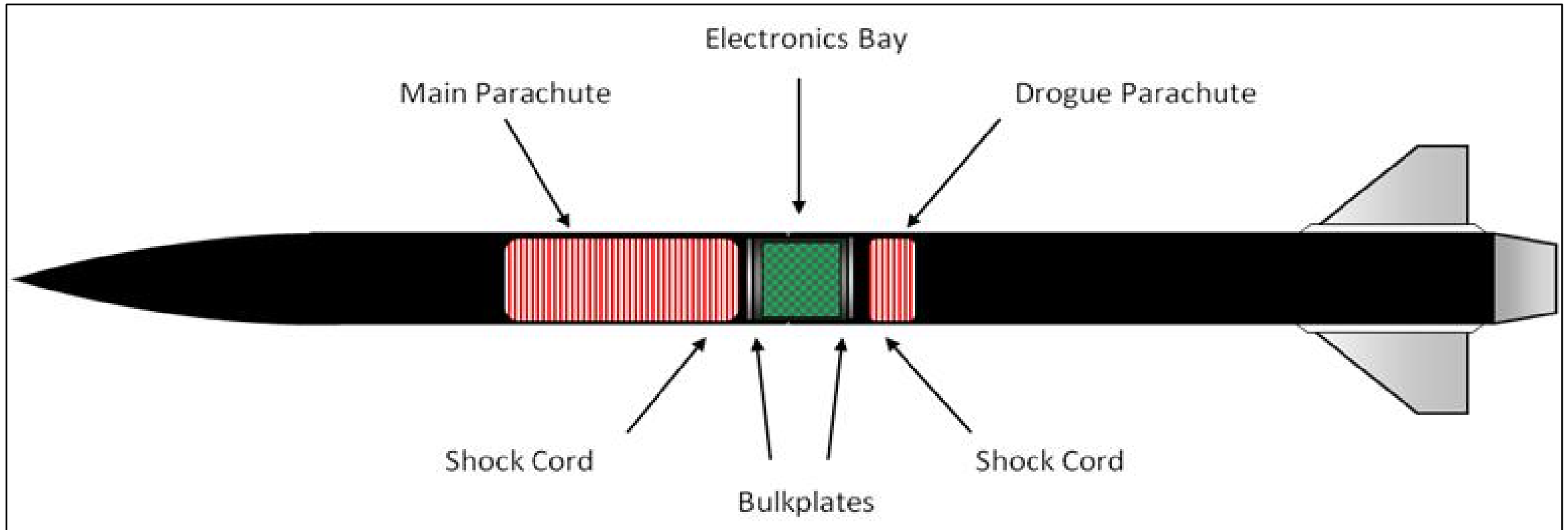
Dual Event Recovery Systems (DERS)

- **Your Student Launch Project rocket is required to use a *Dual Event Recovery System***
- 1st event at apogee
- 2nd event at much lower altitude
 - Typically 500-1000 feet *Above Ground Level (AGL)*
 - Requires electronics do to so
- Significantly reduces the recovery area



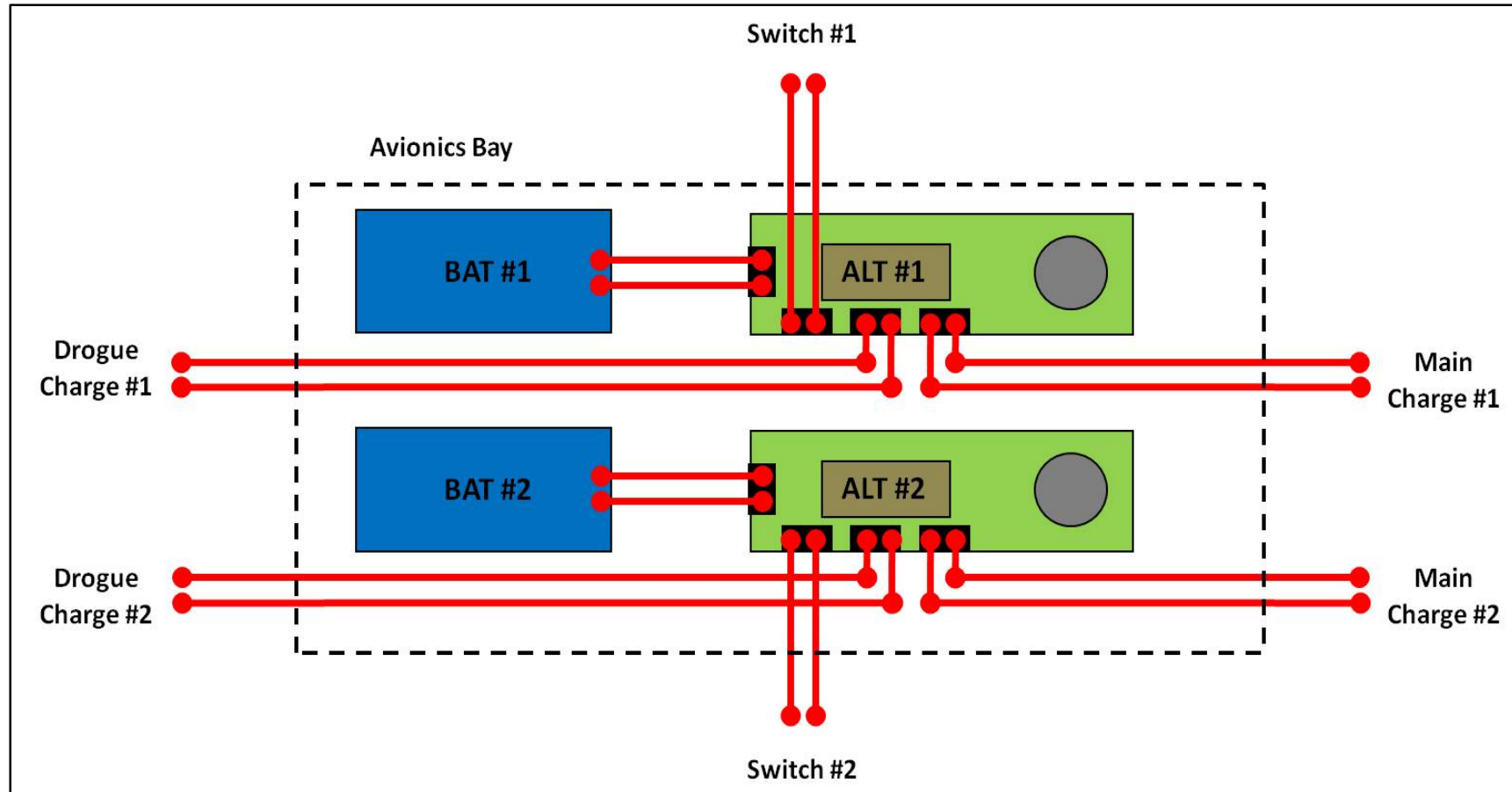
Dual Event Recovery Systems (DERS)

General System Layout:



Dual Event Recovery Systems (DERS)

General Electronics Layout:



SLI Payload Requirements

- **The launch vehicle shall carry a science or engineering payload that is designed by the team and approved by NASA personnel.**
- Data from the science or engineering payload shall be collected and analyzed by the team following the scientific method and reported in the team's PLAR.
 - Engineering: Clear goal for final product
 - What are we trying to do or produce?
 - Scientific: Clear hypothesis or experimental question
 - What are we trying to find out? What do we think will happen?

Former SLI Payloads

- Atmospheric Science
 - Temperature, pressure, humidity, etc.
- Biology
 - High G effects on slime molds, ladybugs, bamboo
 - Bacteria in atmosphere
 - Cricket respiratory effects
- Engineering
 - Solar panel efficiency
 - Hard drive latency
 - Fly wheel for roll stability
- UAV/Rovers
 - RC airplanes, steerable parafoils, etc.
 - Deployable drones to detect landing colored objects



Launch Week – Huntsville, AL - April 20th – 23rd, 2022

