Astrobotic

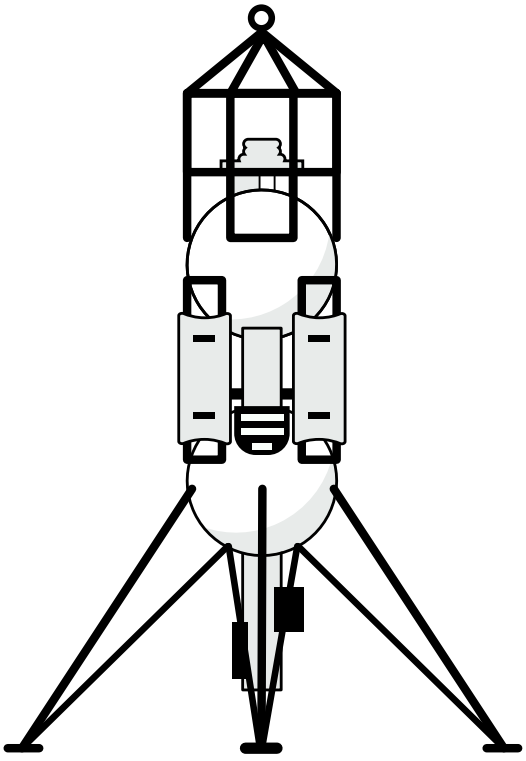
XODIAC ROCKET-POWERED LANDER

NASA TECHRISE STUDENT CHALLENGE

Vehicle Summary

Astrobotic's Xodiac rocket-powered lander takes off and lands vertically from a specific location. This suborbital vehicle is designed to demonstrate high landing accuracy and to support technology testing capabilities. As part of the NASA TechRise Student Challenge, Xodiac will perform a 2-minute flight test in Mojave, California. The lander will start on a concrete launch pad next to a 100m x 100m lunar surface test field (LSTF) from which it will launch and fly to an altitude of 82 feet (25 meters). Then, the lander will enter the LSTF and fly over the simulated lunar terrain. The LSTF will consist of gray hardscape material designed with features similar to those found on the surface of the Moon, such as craters, rilles, and troughs of different sizes. After 2 minutes, the vehicle will return to its starting location and gently land on a concrete landing pad.

Flight Integration Details



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Xodiac
Rocket-Powered Lander

Requirements	ASTROBOTIC + NASA TECHRISE
Maximum Size	4 x 4 x 8 in (10 x 10 x 20 cm)
Total Maximum Weight	1.1 pounds (0.5 kilograms)
Provided Flight Box Weight	Approximately 0.5 pounds (230 grams)
Liquids	No liquids allowed
Biological Materials	No experiments that grow/monitor living organisms; Seeds or plant substrates (e.g., soils, artificial soils) are allowed.
Extra Batteries	No extra batteries; Please rely solely on the vehicle-provided power.
Wireless Communications	No Bluetooth, Wi-Fi, cellular phones, or RF communications
Lasers	LIDAR, LADAR, and laser range finding is acceptable, so long as the lasers are Class-1 lasers that are safe for student use; Sensors that use internal lasers to detect particles or gather other data (e.g., PM/air quality sensors) are also allowed; All lasers will be subject to approval from the NASA TechRise advisory team prior to purchase and use.
Power & Data	
Voltage	9 V
Current	1 A
Vehicle Data	No data is streamed to experiments during flight; However, all teams will receive post-flight data from Astrobotic, which can be used for experiment validation or post-flight analysis. Data will include time, latitude, longitude, altitude, speed, and heading.
Flight Profile & Conditions	
Mounting Overview	Multiple experiments will mount on a ring at the top of the lander in a vertical orientation with a view to the ground
Flight Altitude	Approximately 82 feet (25 meters) above the LSTF
Flight Duration	Approximately 120 seconds
Expected Flight Location	Mojave, CA
Flight Path Characteristics	The lander will take-off from a concrete launch pad, ascend to 82 ft, and fly over a 328ft x 328ft (100m x 100m) simulated lunar terrain field before returning to a concrete landing pad
Launch Conditions	Daytime launch; Minimal to no cloud cover; No rain
Temperature	Temperature conditions will be comparable to outdoor summer ambient temperatures
Line of Sight	Experiment will have line of sight in two directions during flight - down to Earth (nadir) and at a 45 degree angle (oblique)
Ambient Pressure	The ambient pressure in Mojave, CA is 1 atm

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FLIGHT PROFILE

EXPERIMENT FLIGHT BOX

Winning teams will receive a flight box and a technical development guide to prepare for their rocket-powered lander flight.

Maximum Size: 4 x 4 x 8 in (10 x 10 x 20 cm)
Total Maximum Weight: 1.1 pounds (0.5 kg)

FLIGHT PROFILE DETAILS

Prepare for Launch	Flight experiments will be powered on and readied for the approximate 2-minute flight.
Launch & Ascent	Experiments will launch from a concrete pad and ascend to approximately 25 meters.
Survey the Simulated Lunar Terrain Field	After reaching the flight altitude, the experiments will zig zag across the 328ft x 328ft (100m x 100m) course
Termination & Descent	After 2 minutes the experiments will return to the concrete pad for landing.
Landing & Recovery	Experiments land and are mailed back to teams. Teams will also be sent a digital copy of the post-flight data to corroborate, validate, and compare with experiment results, if needed.

VIDEO

PHOTO

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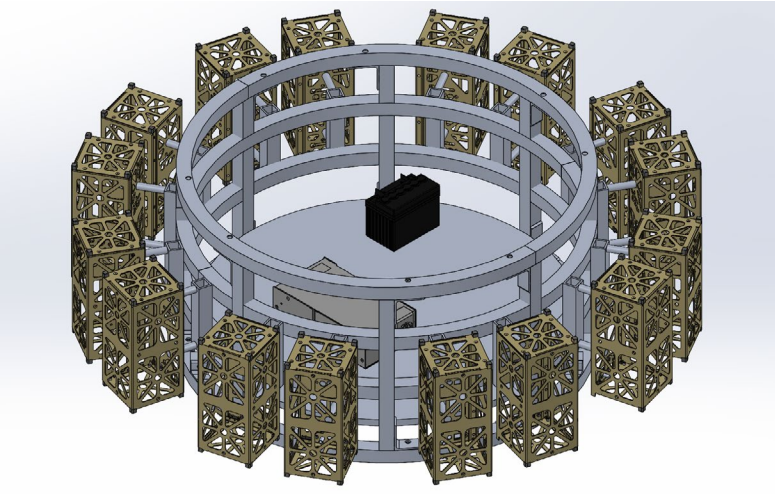
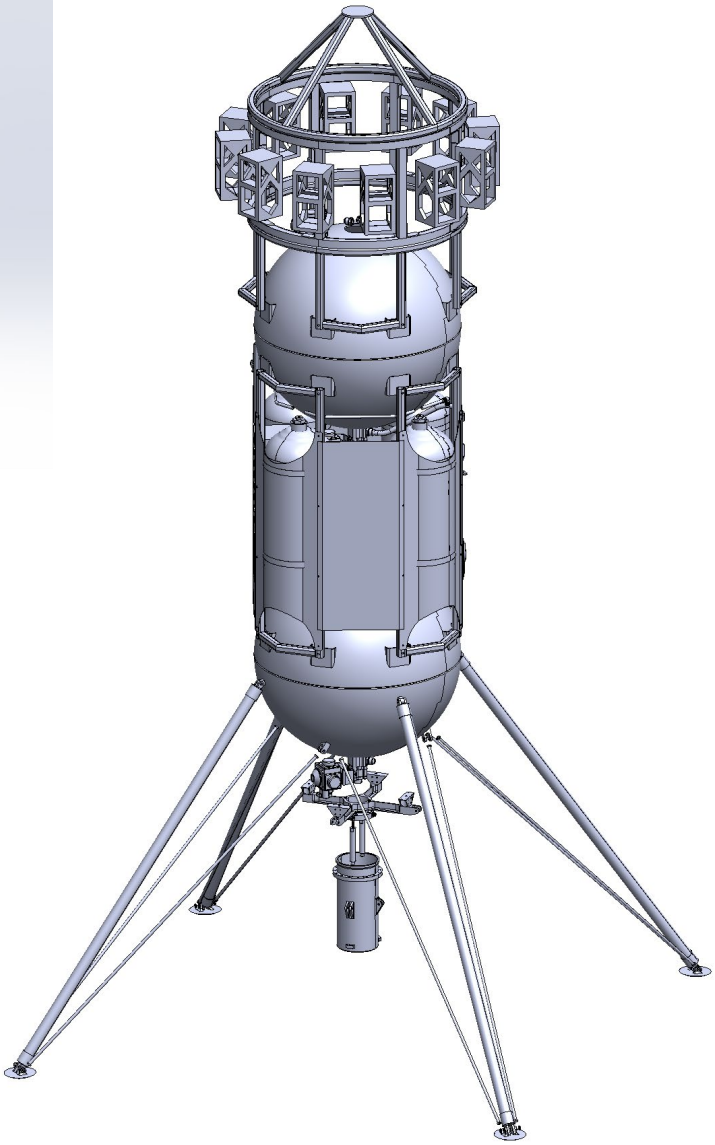
EXAMPLE RING MOUNTING CONFIGURATION



RING MOUNTED ON TOP OF LANDER



NASA TECHRISE EXPERIMENT BOX

SAMPLE IMAGE OF LUNAR SURFACE TEST FIELD (LSTF)