



ESCAPE

NASA's Escape and Plasma Acceleration
and Dynamics Explorers (ESCAPE)

PRESS KIT

Rocket Lab USA, Inc.
rocketlabusa.com





ROCKET LAB MAKERS OF MARS SPACECRAFT

MISSION AT A GLANCE



SPACECRAFT

Two Rocket Lab
Explorer Spacecraft



MISSION PARTNERS

UC Berkeley (Principal Investigator) and
NASA (ESCAPADE is part of the NASA
Small Innovative Missions for Planetary
Exploration (SIMPLEX) program.)



MADE IN

Rocket Lab HQ,
Long Beach, CA



LAUNCHING

Late 2024



MISSION DURATION

11 Months in Mars orbit



MISSION

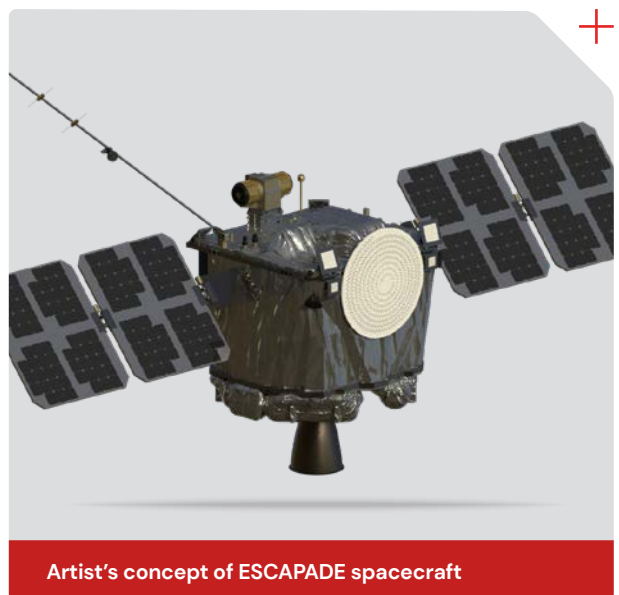
Investigate Mars' hybrid
magnetosphere



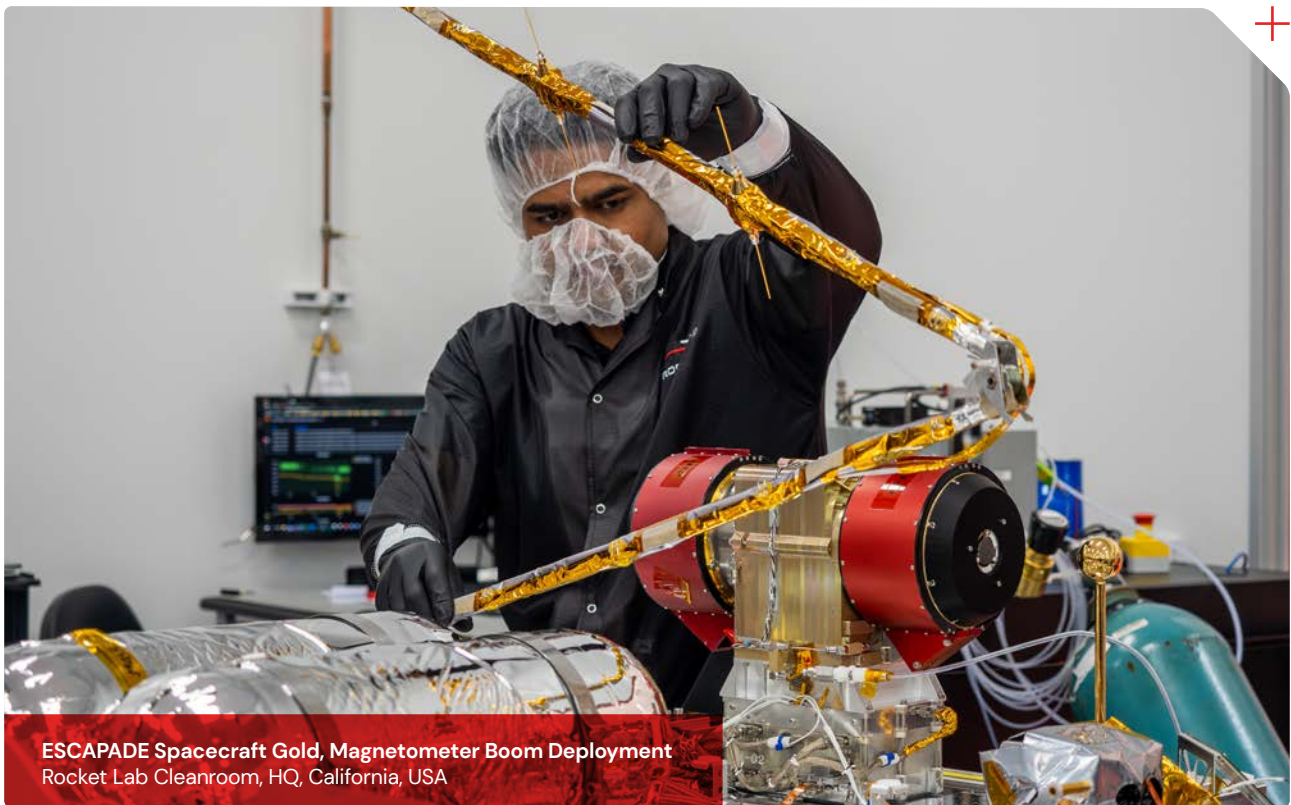
MISSION OVERVIEW

ABOUT NASA'S ESCAPADE MISSION

NASA's Escape and Plasma Acceleration and Dynamics Explorers (ESCAPADE) are twin spacecraft designed and built by Rocket Lab, bound for Mars to study the interaction between the solar wind and Martian atmosphere. The duo – Blue and Gold – will orbit around the Red Planet to understand the structure, composition, variability, and dynamics of Mars' unique hybrid magnetosphere. The mission will leverage its unique dual viewpoint on the Mars environment to explore how the solar wind strips atmosphere away from Mars to better understand how its climate has changed over time – so much that Mars no longer supports liquid water on its surface. The pair will be the first multi-spacecraft science mission to Mars.



Artist's concept of ESCAPADE spacecraft

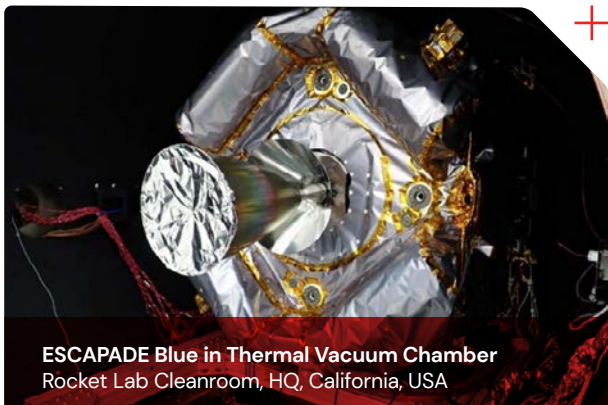


ESCAPADE Spacecraft Gold, Magnetometer Boom Deployment
Rocket Lab Cleanroom, HQ, California, USA

Built and tested at Rocket Lab's Space Systems facility in Long Beach, CA, Blue and Gold's design originated from Rocket Lab's flight-heritage Explorer spacecraft, a configurable, high delta-V interplanetary spacecraft platform. The spacecraft were vertically integrated using Rocket Lab's reliable, flight proven satellite subsystems and components such as: Solar panels, star trackers, propulsion tanks, reaction wheels, reaction control systems, radios, separation systems, multi-layer insulation, battery packs, thermal control system, composite structures and flight computers.

ESCAPADE is being developed under NASA's Small Innovative Missions for Planetary Exploration (SIMPLEX) program in the Science Mission Directorate (SMD). The mission is led by University of California at Berkeley's Space Science Laboratory with spacecraft design provided by Rocket Lab.

Blue and Gold will take an 11-month journey to Mars on Blue Origins New Glenn rocket. The total primary mission duration will be 29 months (including approximately seven months of phasing orbits) with its prime science duration of 11 months.



ESCAPADE Blue in Thermal Vacuum Chamber
Rocket Lab Cleanroom, HQ, California, USA



Rocket Lab Engineer Installing ESCAPADE's Propulsion Deck
Rocket Lab Cleanroom, HQ, California, USA

“

Working on ESCAPADE has been the most challenging, yet rewarding, role of my professional career. I've had the unbelievable chance to work alongside the most talented team at Rocket Lab to build on NASA's legacy of spacecraft traveling to Mars.”

Lane Cook
Senior Program Manager



Rocket Lab engineers integrating UCB's science instrument suite on ESCAPEDE Blue spacecraft
Rocket Lab Cleanroom, HQ, California, USA



“

We've built two beautiful spacecraft through simplification, streamlining, and parallelizing them until they've burgeoned into the most elegant satellites I've ever seen. Our satellites stand as a testament to the power of the human mind; stripped of unnecessary ornamentation, every element serves its purpose with uncompromising efficiency. Blue and Gold are a perfect expression of functionality, in their lean purposeful form, you see the essence of human achievement: not a mere machine, but a monument to reason, ambition, and a drive to explore.

Christophe Mandy
Lead Systems Engineer, Space Systems

“

Growing up in New Zealand, I would have never thought I'd get to work on a NASA mission to Mars. It has been an amazing experience working with such a talented team of engineers across both NZ and the USA to bring these twin spacecraft to life over the past two years. We are all incredibly proud of the spacecraft we have built and are excited about the contribution they will be making towards planetary science.”

Sarah Blyde
Program Manager, Space Systems



Rocket Lab Technician integrating UCB's science instrument suite

Rocket Lab Cleanroom, HQ, California, USA



VERTICALLY INTEGRATED

ROCKET LAB SUBSYSTEMS AND COMPONENTS ON ESCAPADE



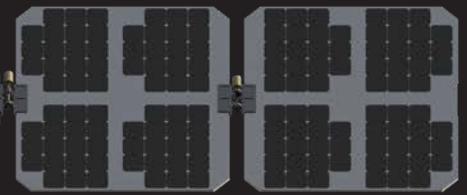
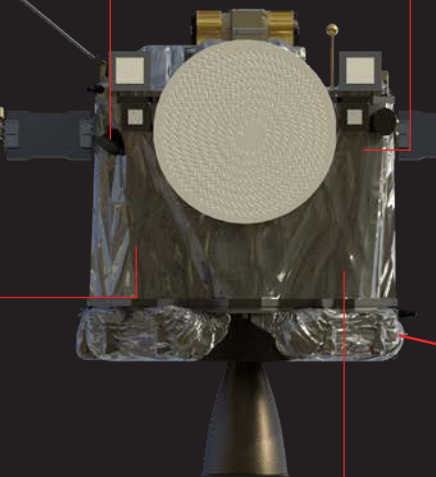
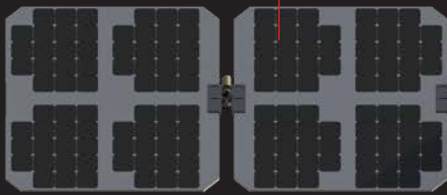
Solar Panels developed in New Mexico, US.



Star Trackers developed in Toronto.



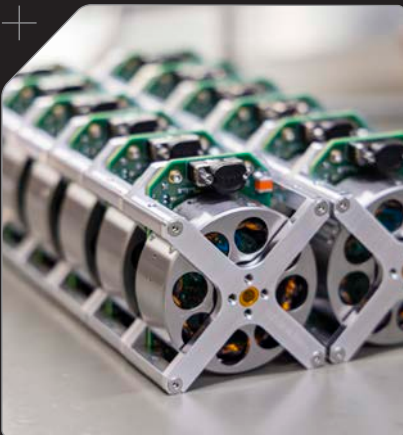
Satellite Radios developed California (HQ), and Auckland, NZ.



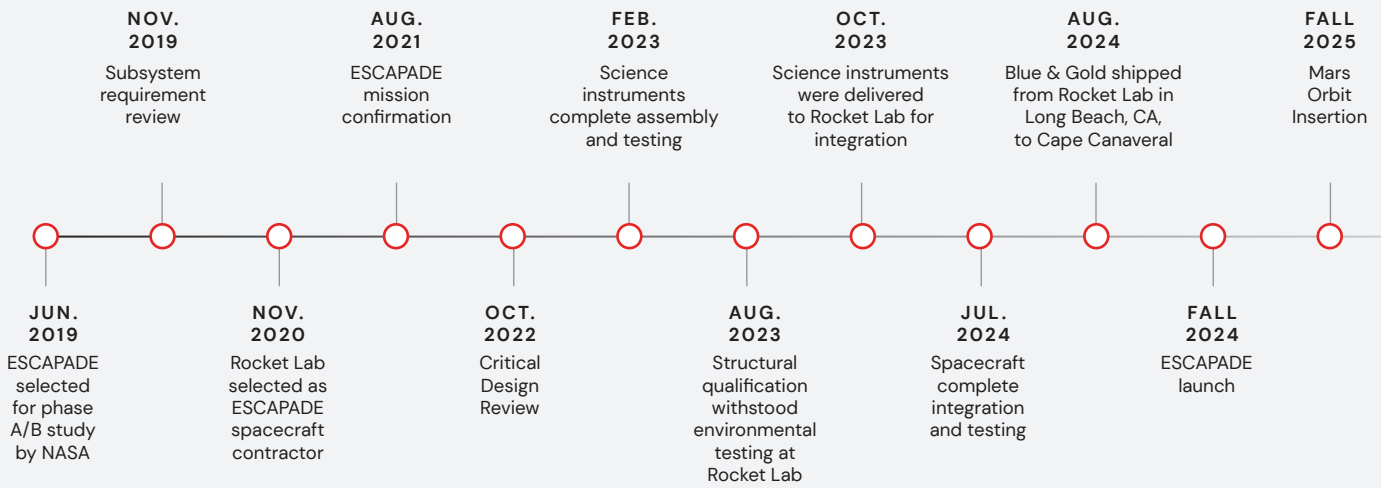
Reaction Wheels developed in Toronto.

Propulsion Tanks developed in California (HQ).

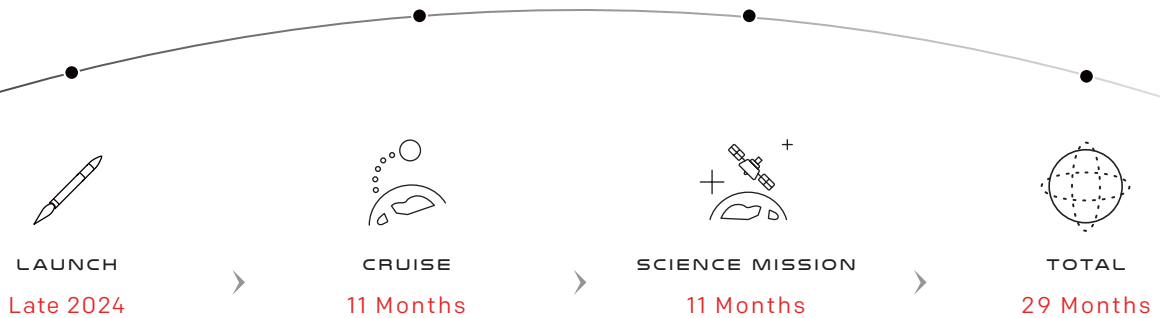
Reaction Control Systems developed in Auckland, NZ.



MISSION TIMELINE



MISSION DURATION



KEY PARTNERS



MISSION MANAGEMENT, ESCAPEDE ELECTROSTATIC ANALYZERS, BOOM, DATA PROCESSING UNIT & INSTRUMENT CONTROL BOARD



SPACECRAFT



MAGNETOMETER



LANGMUIR PROBES



VISIONS CAMERA



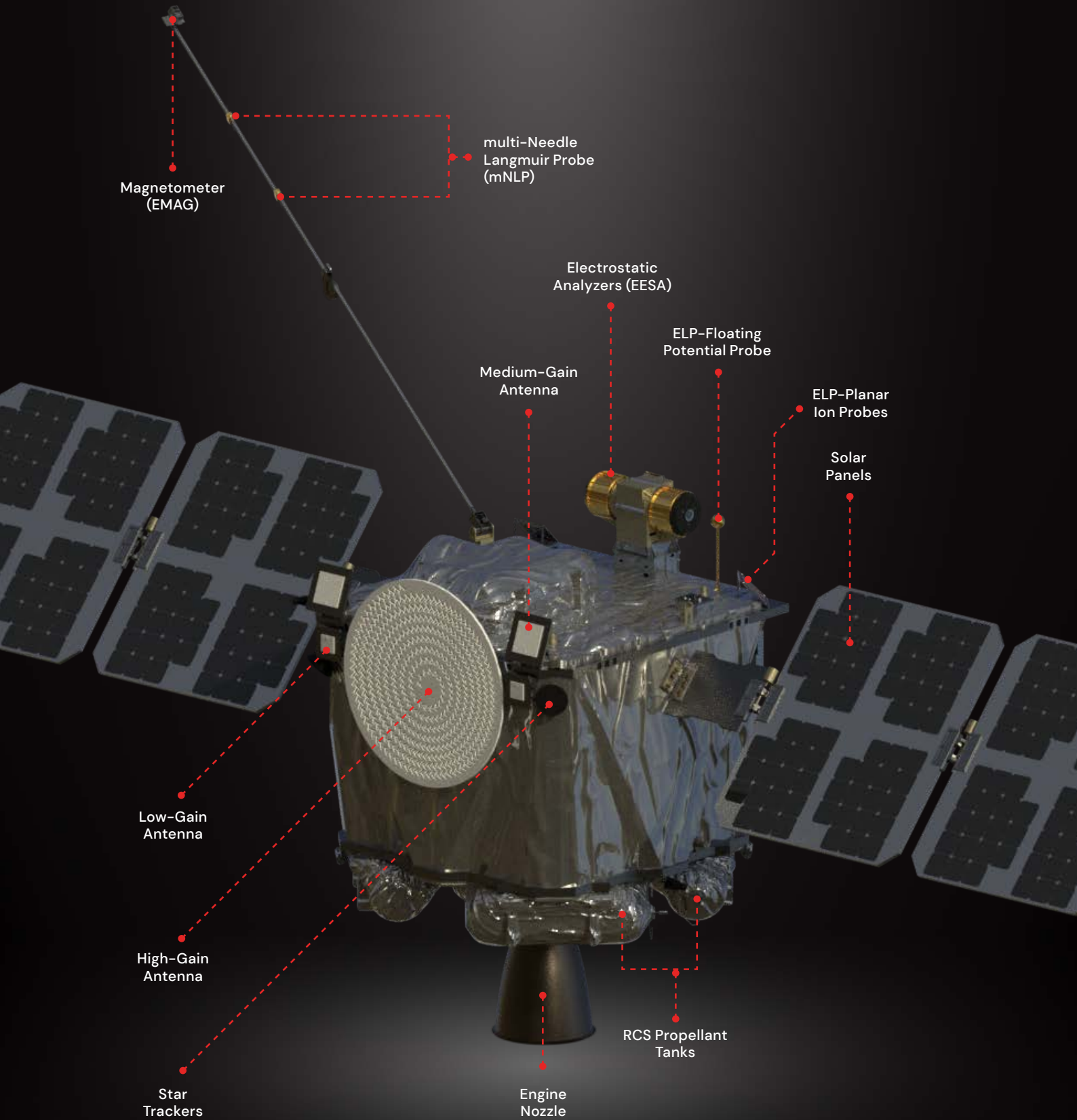
MISSION DESIGN



LAUNCH

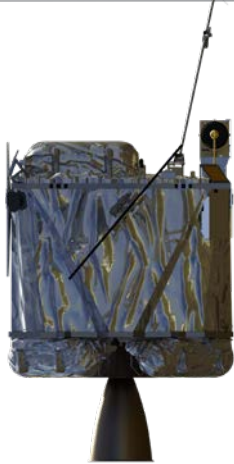
SPACECRAFT OVERVIEW

DESIGNED FROM ROCKET LAB'S EXPLORER SPACECRAFT



SPACECRAFT SPECS

DESIGNED FROM ROCKET LAB'S EXPLORER SPACECRAFT
CREATED BY TEAMS ACROSS THE US AND NZ



SIZE

Stowed: 1.20 m x 1.65 m x 1.09 m
Deployed: 4.88 m x 1.65 m x 1.09 m

MASS

Dry Mass: 209 kg **Wet Mass:** 535 kg

PROPULSION

Main engine: Hypergolic bipropellant Mixed Oxides of Nitrogen (MON) and Monomethyl Hydrazine (MMH) engine
Reaction control System (RCS) thrusters: Cold gas Nitrogen thrusters, capable of translation and rotation

On-board tanks:

- 2x fuel tanks, additively manufactured metal
- 2x oxidizer tanks, additively manufactured metal
- 2x pressurant (He) tanks, Composite Overwrap Pressure Vessel (COPV)
- 4x RCS (N₂) tanks, COPV

POWER

Science (nominal) mode power draw: 128 W (about as much as a tea kettle)
Power generation at Earth: 800W
Power generation at Mars (aphelion): 288W
Energy storage: 7s5p battery assembly

AVIONICS

Redundant flight computer and redundant radios

GUIDANCE AND NAVIGATION CONTROL

Sensors: 2x Star Trackers, 4x Fine Sun Sensors
Actuators: 4x Reaction Wheels, Reaction Control thrusters

TRAJECTORY

Cruise: 11 months
Primary Science Mission: 11 months

COMMUNICATIONS

Total planned downlinked science data: 45Gb
Rocket Lab Frontier-X radios
Antennas:

- 4x low-gain patch antennas
- 2x medium gain patch antennas
- 1x radial line slot array high gain antenna

Uplink and Downlink: X-band





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