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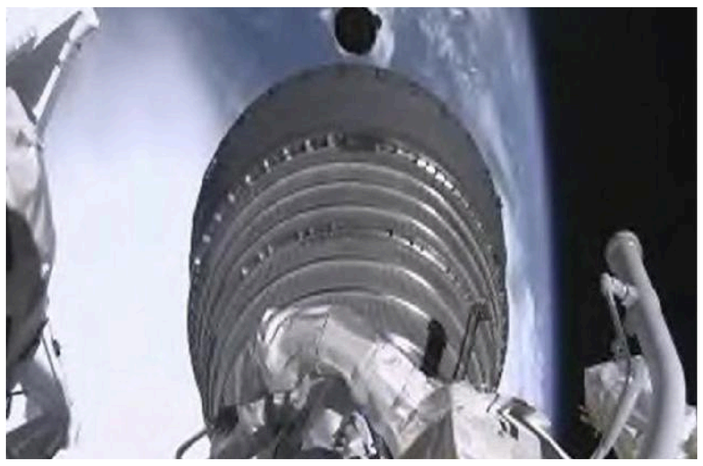
RL10 PROPULSION SYSTEM

Six decades of powering space exploration and national security

LAUNCH VEHICLE	ATLAS V	ATLAS V	ATLAS V, VULCAN, SLS	VULCAN
RL10 Model	RL10A-4-2	RL10C-1	RL10C-1-1	RL10E-1
Thrust	22,300 lbf	22,890 lbf	23,825 lbf	24,120 lbf
Weight	370 lbs	420 lbs	415 lbs	510 lbs
Fuel	Liquid hydrogen	Liquid hydrogen	Liquid hydrogen	Liquid hydrogen
Oxidizer	Liquid oxygen	Liquid oxygen	Liquid oxygen	Liquid oxygen
Nominal Mixture Ratio	5.5:1	5.5:1	5.5:1	5.5:1
Specific Impulse	451.0 sec	449.7 sec	453.8 sec	460.9 sec
Length	90”	86”	96.7”	130.4”
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Nozzle Diameter	46”	57”	62”	73.7”

For sixty years, Rocketdyne’s RL10 engine has played a vital role in placing more than hundreds of military, government, and commercial satellites into Earth’s orbit and has helped send spacecraft to explore every planet in our solar system, including Voyager 1 and Voyager 2, the first two spacecraft to reach interstellar space.

Today, several models of the RL10 carry the engine’s legacy forward as the launch industry’s “workhorse” by powering the upper stages of United Launch Alliance’s Atlas V and Vulcan launch vehicles. Additionally, RL10 engines also help power NASA’s Space Launch System (SLS) rocket to lift astronauts to deep-space destinations aboard the Orion spacecraft. A single RL10 powered the Interim Cryogenic Propulsion Stage on the first two Artemis missions, and two RL10 engines will power the Centaur V upper stage, which NASA has selected for SLS beginning with Artemis IV.



PROGRAM MILESTONES

1959: First RL10 test

1963: First successful Atlas Centaur flight (two RL10 engines powered upper stage)

1964: Saturn S-4 Launch (six RL10 engines powered upper stage)

1993: First DC-X “Delta Clipper” flight (four RL10A-5 engines powered vehicle)

2002: First Atlas V flight (two RL10A-4-2 engines powered Centaur upper stage)

2009: 400th RL10 engine flight

2010: Demonstrated deep-throttling from 104 percent of rated power down to 5.9 percent (an unprecedented thrust range of 17.6:1)

2013: RL10 marks 50 years of service

2014: First flight of RL10C-1

2020: 500th RL10 engine flight

2021: First operational use of an RL10 engine equipped with 3D-printed components

2022: A single RL10 powered the Interim Cryogenic Propulsion Stage on the first SLS mission

2024: Delivered first production RL10E-1 engine that features a 3D-printed copper thrust chamber

Rocketdyne has developed and qualified a modern version of the engine, known as the RL10E-1, that includes major components produced using 3D printing technology.

Incorporating 3D printing into the manufacturing process reduces lead times and cost while maintaining the outstanding performance and reliability customers have come to expect.







R10 Propulsion System

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