

RL10 PROPULSION SYSTEM

Six Decades of Powering Space Exploration and National Security

LAUNCH VEHICLE	DELTA IV	ATLAS V	ATLAS V	ATLAS V, VULCAN	VULCAN	SLS EUS
RL10 Model	RL10B-2 RL10C-2-1	RL10A-4-2	RL10C-1	RL10C-1-1	RL10C-X	RL10C-3
Thrust	24,750 lbf	22,300 lbf	22,890 lbf	23,825 lbf	24,120 lbf	24,340 lbf
Weight	664 lbs	370 lbs	420 lbs	415 lbs	510 lbs	508 lbs
Fuel	Liquid hydrogen	Liquid hydrogen	Liquid hydrogen	Liquid hydrogen	Liquid hydrogen	Liquid hydrogen
Oxidizer	Liquid oxygen	Liquid oxygen	Liquid oxygen	Liquid oxygen	Liquid oxygen	Liquid oxygen
Nominal Mixture Ratio	5.88:1	5.5:1	5.5:1	5.5:1	5.5:1	5.7:1
Specific Impulse	465.5 sec	451.0 sec	449.7 sec	453.8 sec	460.9 sec	460.1 sec
Length	86.5" (stowed)	90"	86"	96.7"	130.4"	124.3"
	163.5" (deployed)	-	-	-	-	-
Nozzle Diameter	84.5"	46"	57"	62"	73.7"	73"

For sixty years, Aerojet Rocketdyne’s RL10 engine has played a vital role in placing 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, Delta IV 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 powers the Interim Cryogenic Propulsion Stage during the first three Artemis flights. Four RL10 engines will support the more powerful Exploration Upper Stage that is being developed for future versions of 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

Aerojet Rocketdyne is also working to qualify a modern version of the engine known as the RL10C-X that will include major components built using 3D printing technology. Incorporating 3D printing into the manufacturing process will reduce lead times and cost while maintaining the outstanding performance and reliability customers have come to expect.



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