



SLS (Space Launch System) RL10 Engine

Proven, Reliable Space Propulsion

After successfully providing the in-space propulsion to send an uncrewed Orion spacecraft to the Moon on Artemis I, the storied RL10 engine is ready to reprise that role on the Artemis II and III crewed lunar missions.

On Artemis I, a single liquid hydrogen and liquid oxygen-fed RL10B-2 engine, producing 24,750 pounds (lbs.) or 110 kN of thrust, powered the interim cryogenic propulsion stage (ICPS). For Artemis II and Artemis III, a single RL10C-2 engine, a close derivative of the RL10B-2, will help send Orion to the Moon. The C-2 version includes an upgraded ignition system and active propellant utilization control to improve efficiency. During Artemis I, the stage performed perigee raise and translunar injection (TLI) burns. On Artemis II, the stage will perform the perigee and apogee raise burns, with Orion executing the TLI burn. On Artemis III, it will again perform the perigee raise burn and the TLI burn.

The engine was developed by Pratt & Whitney in the late 1950s and was first flown in 1963. Since then, more than 500 RL10 engines have flown to space. The RL10 is manufactured by SLS (Space Launch System) lead contractor L3Harris Technologies in West Palm Beach, Florida. They have provided upper stage propulsion to launch hundreds of satellites and have sent spacecraft to explore every planet in the solar system. With Artemis, an updated version of the RL10 will send people farther away from Earth than humans have ever traveled.

As SLS evolves to a more powerful Block 1B configuration, it will fly with the exploration upper stage (EUS) that will use four RL10C-3 engines to send Orion and large cargos to the Moon. The four RL10 engines on EUS provide more than 97,000 lbs. (431 kN) of thrust, which will allow the rocket to send 40 percent more mass to the Moon than the ICPS.

SLS is the only rocket that can send Orion, crew, and supplies to the Moon in a single launch.



A single RL10 engine will provide nearly 25,000 pounds of thrust and serve as the main propulsion for the interim cryogenic propulsion stage (ICPS) that is flying atop the SLS (Space Launch System) Block 1 rocket in support of each of the first three Artemis missions.



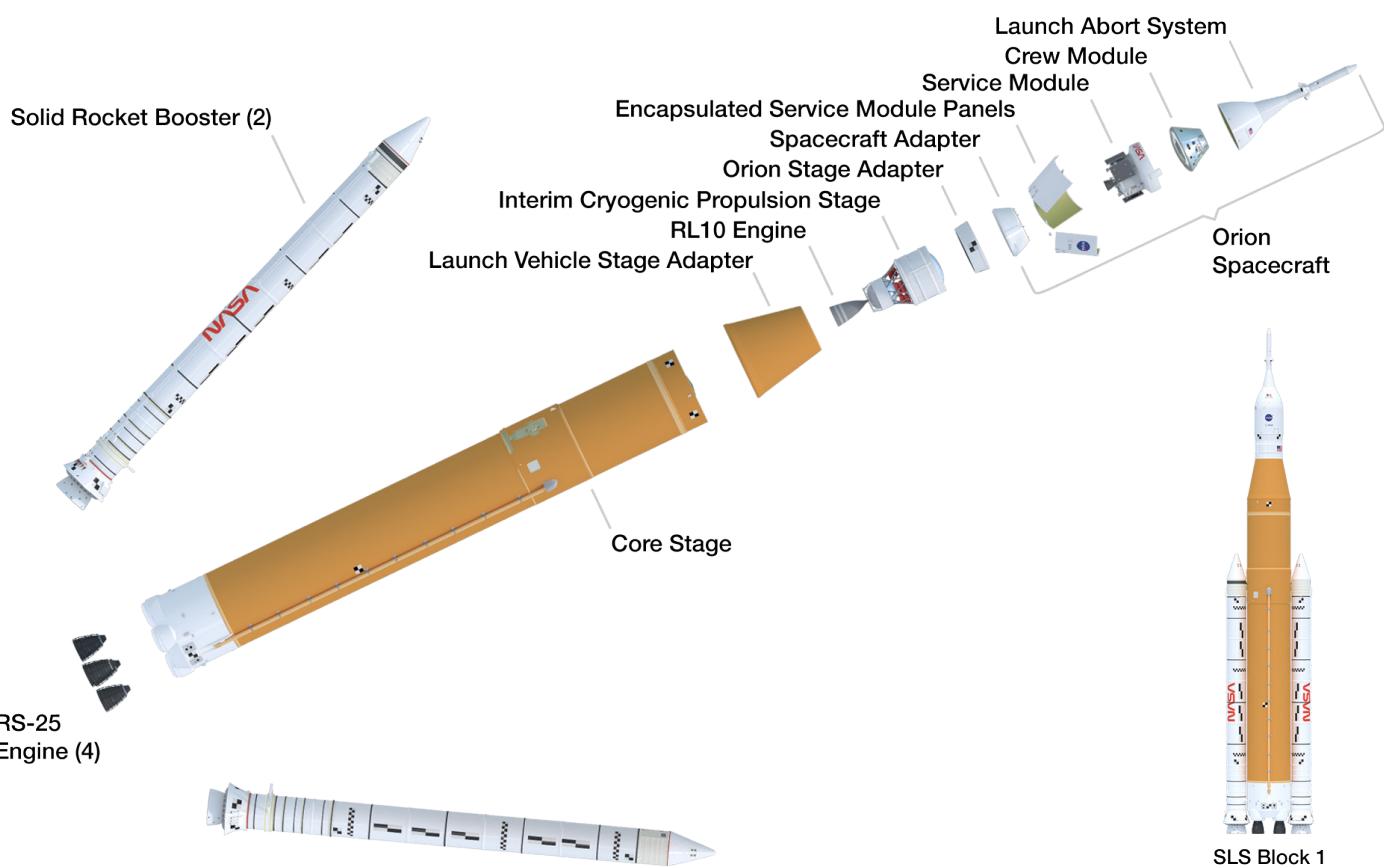
The Artemis II SLS ICPS mates with the launch vehicle stage adapter atop the SLS core stage in the vehicle assembly building at NASA's Kennedy Space Center in Florida. The ICPS will fire its RL10 engine twice to help send the Orion spacecraft to the Moon.

NASAfacts

RL10 Engine

	RL10B-2/RL10C-2	RL10C-3
Launch Vehicle	SLS Block 1 Interim Cryogenic Propulsion Stage (ICPS) – 1 engine	SLS Block 1B Exploration Upper Stage (EUS) – 4 engines
Thrust	24,750 lbf	24,340 lbf
Weight	664 lbs./672 lbs.	508 lbs.
Fuel	Liquid hydrogen	Liquid hydrogen
Oxidizer	Liquid oxygen	Liquid oxygen
Length	86.5" (stowed) 163.5" (deployed)	124.3"
Nozzle Diameter	84.5"	73"

A comparison of the RL10 variants for SLS Block 1 and Block 1B upper stages.



Expanded view of the SLS Block 1 rocket showing the location of the RL10 engine.

National Aeronautics and Space Administration

George C. Marshall Space Flight Center

Huntsville, AL 35812

www.nasa.gov/marshall

www.nasa.gov

MSFC-12-2025-SLS-4962

For more information about SLS, visit:

<http://www.nasa.gov/Artemis>

<http://www.nasa.gov/SLS>

<https://www.facebook.com/NASAArtemis/>

<https://x.com/NASAArtemis>

<http://www.instagram.com/NASAArtemis>

NASA Facts