

SLS (Space Launch System) Interim Cryogenic Propulsion Stage

The SLS (Space Launch System) interim cryogenic propulsion stage (ICPS) is an in-space rocket stage that provides propulsion to the Orion spacecraft during the first three Artemis missions.

Measuring 45 ft. (13.7 m) tall and 16.7 ft. (5.1 m) in diameter, the ICPS provides in-space propulsion after the SLS solid rocket boosters and core stage are jettisoned. This propulsion is provided by the RL10 engine, which uses a liquid hydrogen/liquid oxygen-based system.

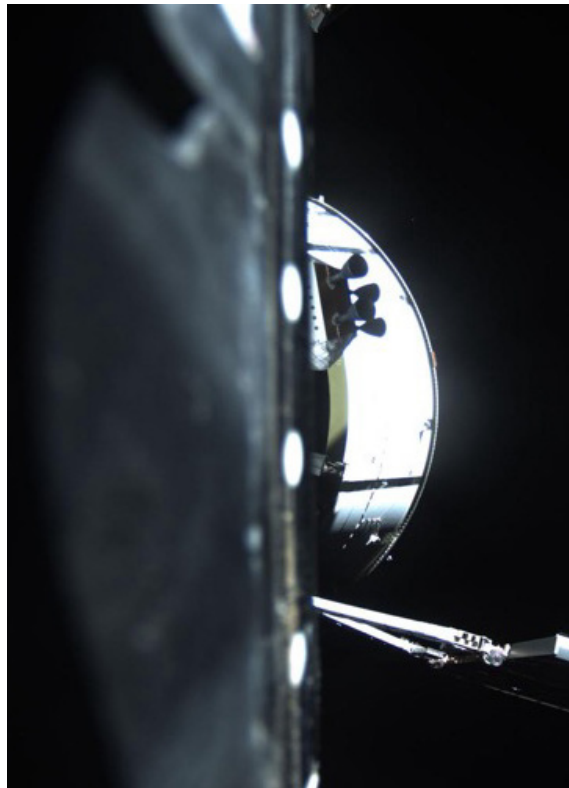
During the successful Artemis I uncrewed test mission, the ICPS's RL10 engine provided the Orion spacecraft the final boost it needed to fly

to the Moon with extreme precision, burning for a record-breaking 18 minutes.

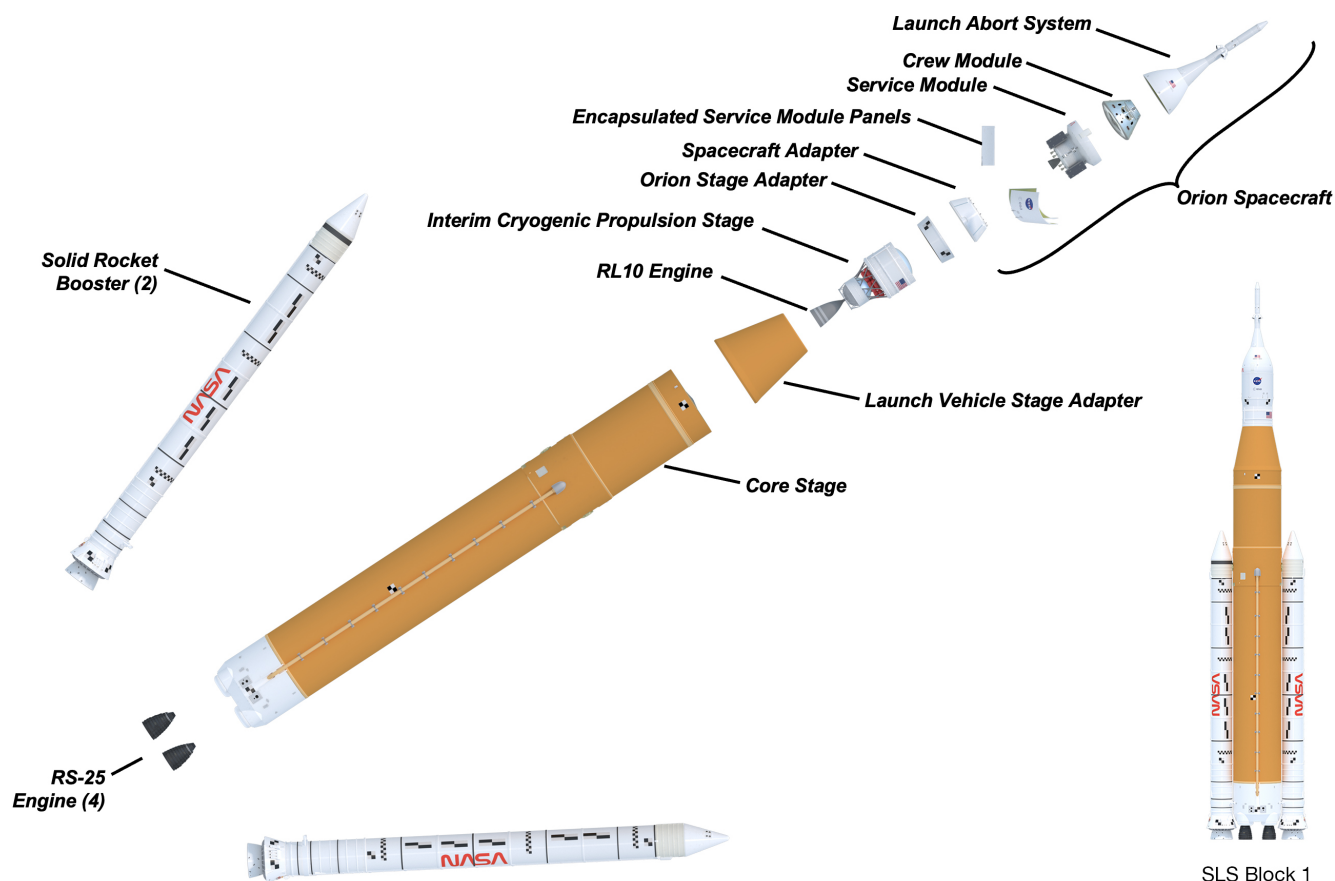
During Artemis II, Orion and ICPS will orbit Earth twice, with the ICPS firing once to maintain Orion's path and firing a second time to raise the spacecraft to a high-Earth orbit. After the Orion spacecraft separates from the SLS upper stage, Artemis II astronauts will use a target affixed on the outside of the ICPS as a visual marker to "test drive" Orion. This demonstration will assess Orion's handling qualities for future rendezvous and docking operations with other Artemis components such as human landing systems and the Gateway lunar space station.



The interim cryogenic propulsion stage (ICPS), a modified United Launch Alliance Delta Cryogenic Second Stage, provides 24,750 lbs. of thrust for in-space propulsion for the Block 1 crew and cargo vehicles.



Approximately two hours after the Artemis I launch Nov. 16, 2022, the ICPS separated from Orion after completing the translunar injection burn that put the spacecraft on course toward the Moon.



Built by Boeing and United Launch Alliance, the ICPS is a modified Delta Cryogenic Second Stage, a proven upper stage used on United Launch Alliance's Delta IV family of launch vehicles.

Modifications for SLS include lengthening the liquid hydrogen tank, adding hydrazine bottles for attitude control, minor avionics changes, and a modified liquid hydrogen vent and relief valve that supports RL10 in-flight engine restart.

The propulsion system is managed under the SLS Program by the Spacecraft/Payload Integration and Evolution Office at NASA's Marshall Space Flight Center in Huntsville, Alabama.

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

Interim Cryogenic Propulsion Stage Details

Height	45 ft. (13.7 m)
Diameter	16.7 ft. (5.1 m)
Propellant	Liquid Hydrogen/Liquid Oxygen
Engine	1 RL10 by L3Harris Technologies
Thrust	24,750 lbs.
Contractors	Boeing, United Launch Alliance

National Aeronautics and Space Administration

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For more information about SLS, visit:

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