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**Next Steps Beyond Low Earth Orbit**

Exploring the Moon's hidden Farside from the L<sub>2</sub> Lagrange Point

Earth-Moon  $L_2$

Earth-Sun  $L_2$

Asteroid 2008 HU4

Asteroid 2000 SG344

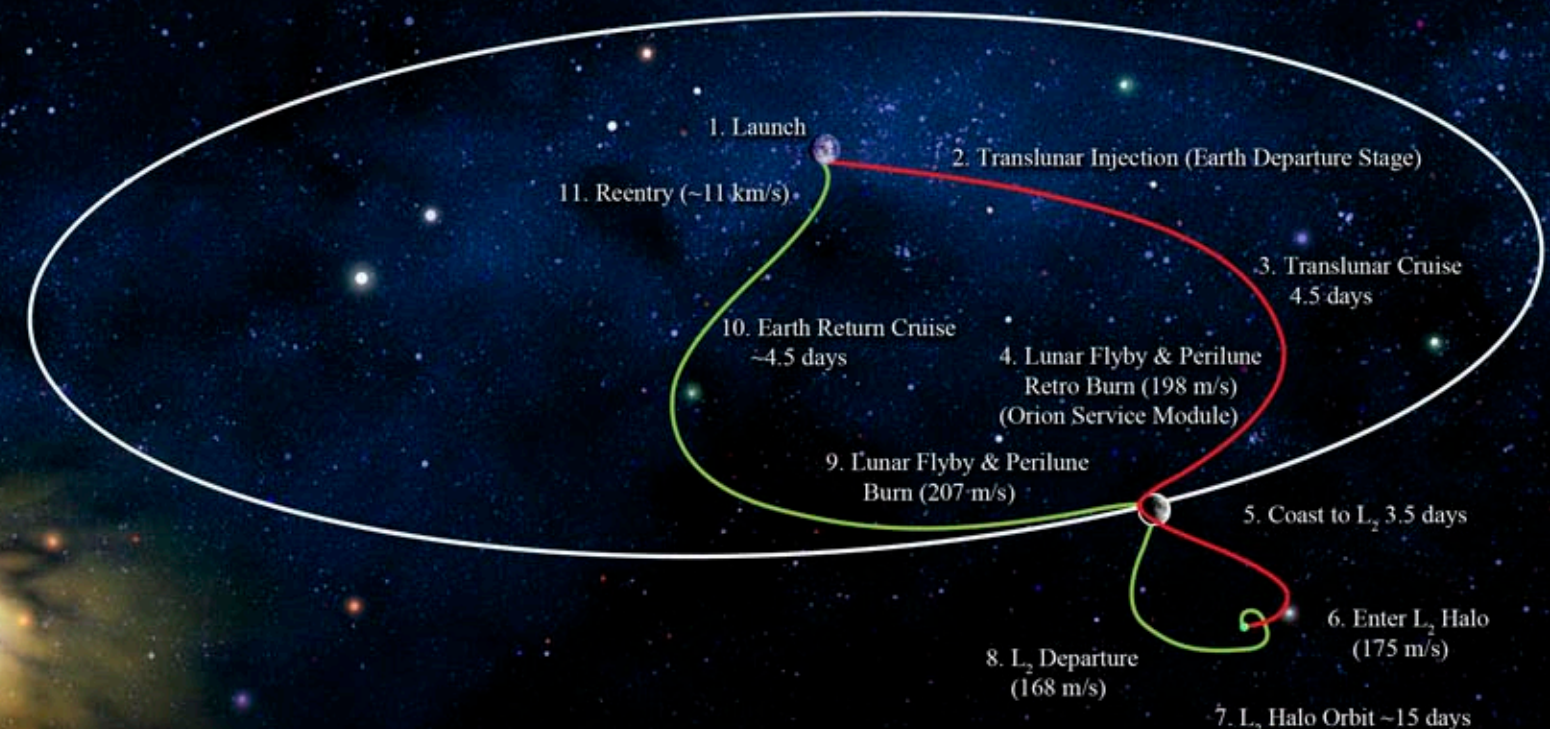
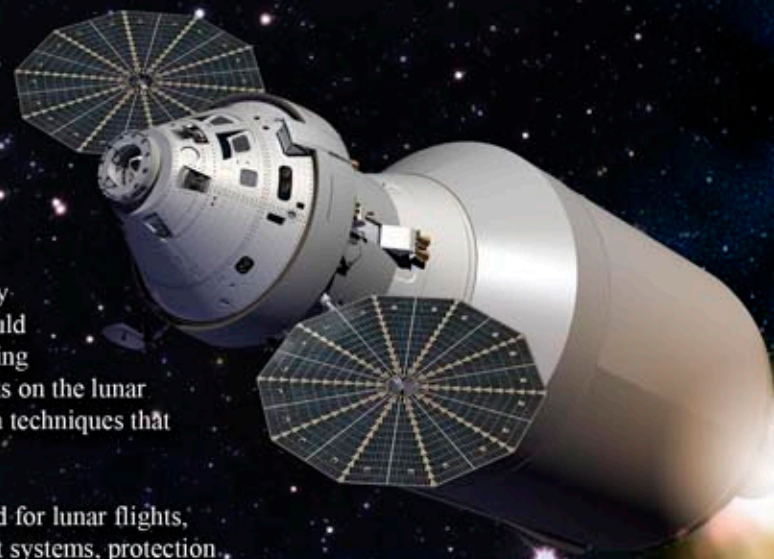
Asteroid 2008 EA9

## L2-Farside Mission

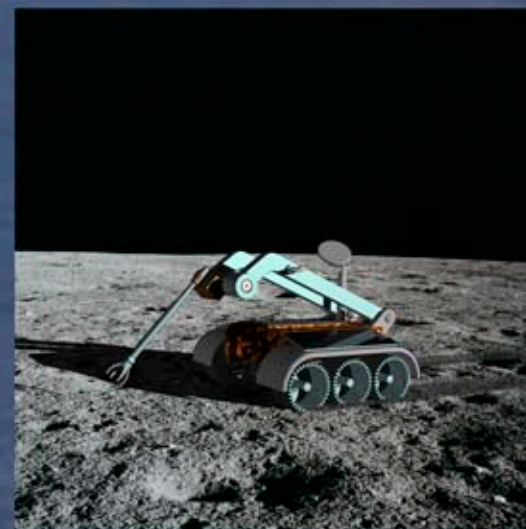
Exploring the Moon's Farside is an early goal of the Stepping Stones sequence of missions, which use the Orion spacecraft to explore incrementally more distant destinations beyond Low Earth Orbit, beginning with the Moon, then asteroids, and culminating in a trip to the moons of Mars. The second Lagrange Point ( $L_2$ ) is a location where the combined gravity of the Earth and Moon allows a spacecraft to be synchronized with the Moon in its orbit around the Earth, so that the spacecraft is relatively stationary over the Farside of the Moon.

The Moon's rotation causes one side to always face Earth, and the other – the Farside – to always face away. The Farside has been mapped from orbit, but no humans or robots have ever landed there. There are two important science objectives on the Farside. The first is to return to Earth multiple rock samples from the Moon's South Pole-Aitken basin - one of the largest, deepest, and oldest craters in the solar system. The second objective is to deploy a low-frequency radio telescope on the Farside where it would be shielded from Earth's radio noise. From the unique orbiting vantage point of  $L_2$ , astronauts could remotely operate robots on the lunar surface to accomplish these goals, learning the teleoperation techniques that will later be used to explore Mars from orbit.

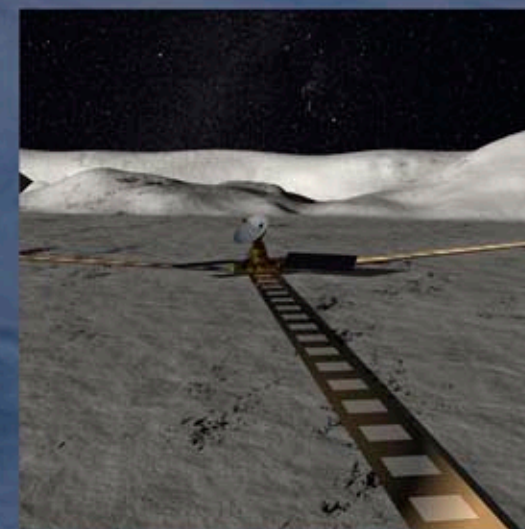
Orion is already designed with the advanced features needed for lunar flights, such as extended duration power generation and life support systems, protection from micrometeoroids and radiation, and high-speed reentry capability. A heavy-lift launch vehicle's Earth Departure Stage can deliver Orion's crew and habitats on their journey to the Earth-Moon  $L_2$  point. These missions provide an excellent opportunity for international collaboration. Partners could launch their own habitats to support the astronauts at the  $L_2$  point, or land rovers on the lunar surface to be controlled from space.



Launch from Kennedy Space Center



Remotely operated lunar rover



Deployed radio telescope array



$L_2$  orbiting facility

...and returning safely to the Earth



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