



Lunar Lander Overview

November 15, 2010

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Astrium NA

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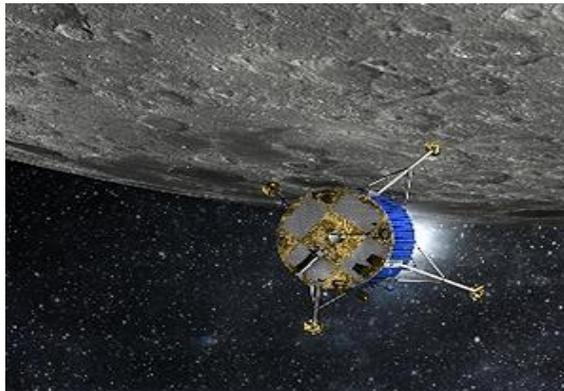
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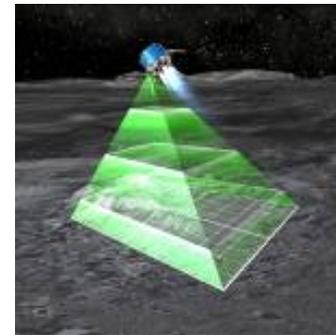
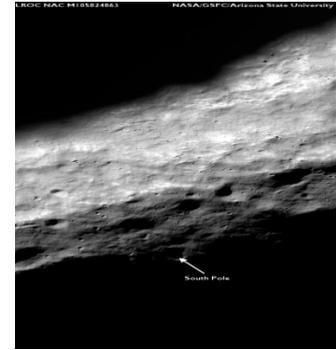
Lunar Lander – contract award

- ESA has awarded an 18 month contract to Astrium Space Transportation to develop mission design work for a robotic Lunar Lander / Lunar Rover as part of the ESA Lunar Lander Phase B1 study
- The final result of the study will be a fully defined mission concept and a detailed design of the landing vehicle and Moon rover.
- Results will be included as part of a package of proposals the 18-nation ESA expects to present to its member governments at a meeting scheduled for the first half of 2012



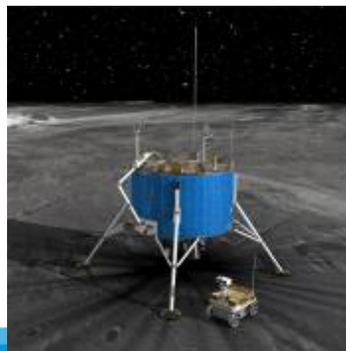
Lunar Lander Contract and Mission Objective

- Astrium GmbH, acting through its Astrium Space Transportation business unit, will be performing the 18 month Lunar Lander Phase B1 study
- The primary objective of the first European Lunar Lander mission is to demonstrate the ability to deliver a payload safely and accurately to the Moon's surface – this goal is planned for a 2018 launch.
- The 2018 mission will mature the technologies that are essential to the success and will ensure the sustainability of lunar exploration
 - Real time image based navigation techniques for precision descent and landing from orbit to touchdown
 - Autonomous surface hazard assessment (detection and avoidance) & safe site selection
 - Use of near term qualified propulsion technology, applying non throttleable, fixed mounted engines

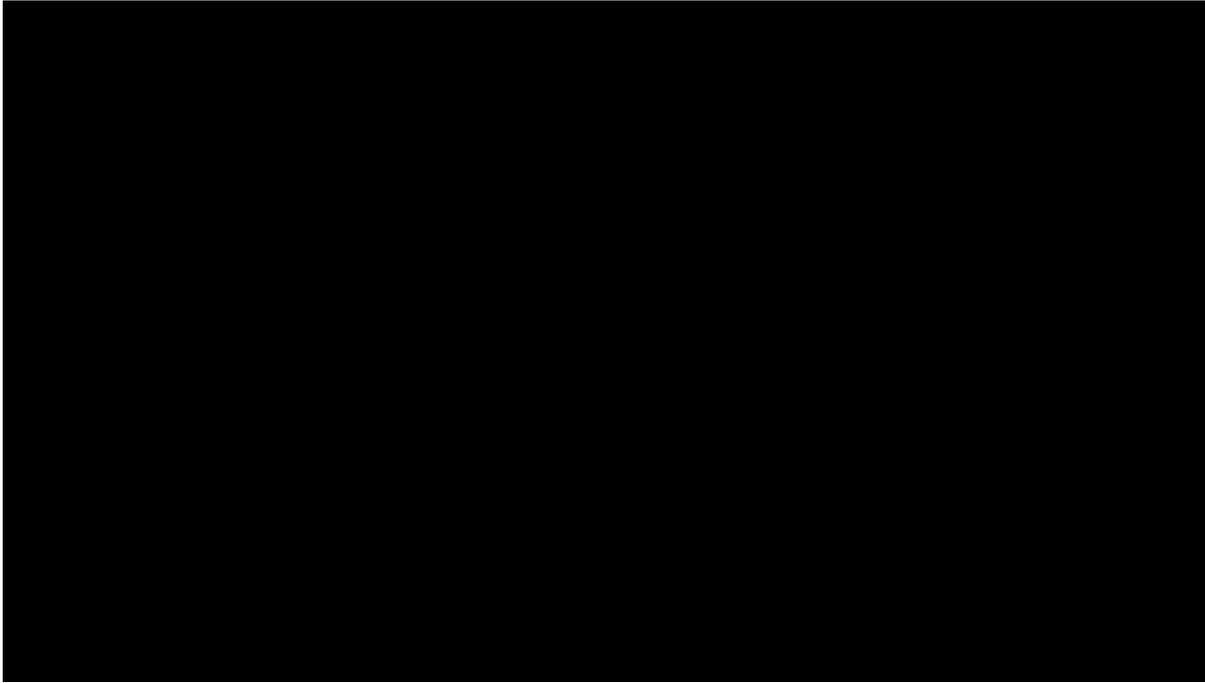


Lunar Lander Flight Overview

- The Lunar Lander mission will be launched from Kourou with a Soyuz-Fregat 2.1b launcher no later than 2018.
- The launcher will insert the lander into a standard GTO orbit, from which the lander's propulsion system will be used for entering Lunar Transfer Orbit and Lunar Orbit Insertion.
- Following transfer to the Moon the Lunar Module will be inserted into a low lunar near circular orbit (at about 100 km altitude) on which preparations for landing will be performed.
- Final descent and landing with the subsequent soft landing will then be initiated aiming for a landing near the Lunar South Pole on the near side of the Moon.



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