

# Space Propulsion 2008 Abstract

## Summary of Propulsion System Needs in Support of Project Constellation

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In January 2004, the President of the United States established the Vision for Space Exploration (VSE) to return man to the moon and ultimately to extend manned space travel to Mars. This paper will summarize the manned space flight liquid propulsion system needs in support of Project Constellation over the next 10 years. It will include all engine needs to return man to the moon. An overview of engines currently under contract, those baselined but not yet under contract, and those engine needs that have yet to be initiated.

Project Constellation includes the components as shown Figure 1. Liquid propulsion systems supporting the manned portion of these elements include the following: the Crew Exploration Vehicle named Orion (crew module reaction control system (CMRCS), service module Orion Main Engine (OME), service module auxiliary RCS, and service module reaction control system (SMRCS)), the Crew Launch Vehicle named Ares 1 (J-2X upper stage, first stage roll control system, second stage reaction control system, and the Ares 1-X roll control system), the Heavy Lift Launch Vehicle named Ares V (RS-68B first stage booster, J-2X upper stage, roll control systems, and the Earth Departure Stage (EDS) (powered by the same Ares V Upper Stage J-2X), and the Lunar Lander named Altair with both descent and ascent stages (lunar orbit insertion and descent main engine, ascent main engine, and attitude control systems for both stages). In addition, there may be additional engine needs for early demonstrators, but those will not be speculated on as part of this paper. Also, other portions of the VSE architecture, including the planned Orion abort demonstrations and the Lunar Precursor Robotic Program, are not addressed here as they either use solid motors or are focused on unmanned precursor missions.



# Components of Program Constellation

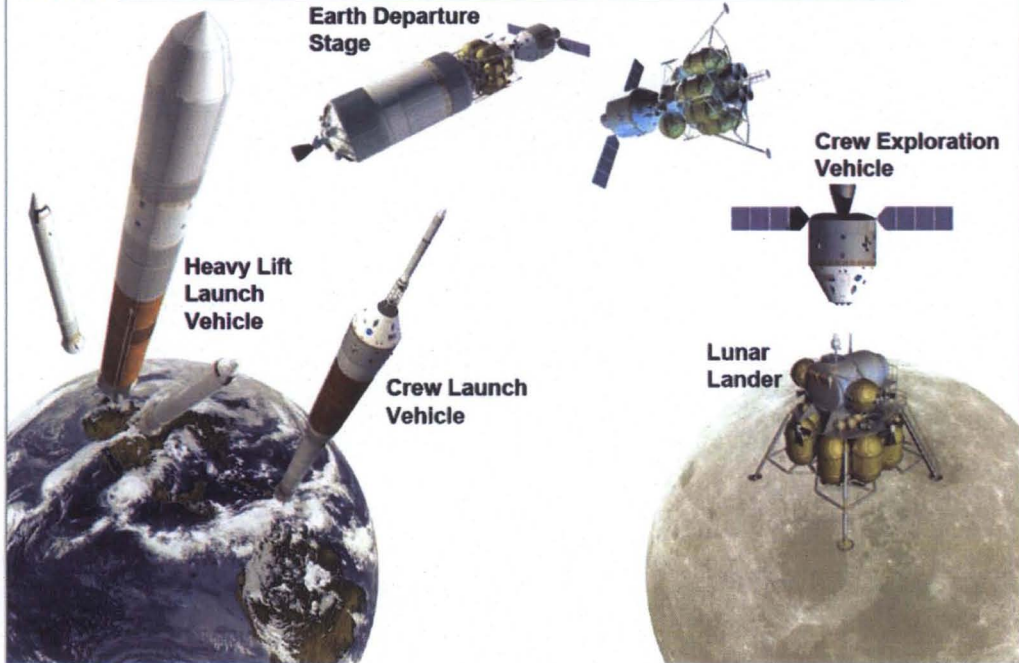


Figure 1