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MARS ASCENT VEHICLE (MAV) PRELIMINARY ARCHITECTURE ASSESSMENT OVERVIEW

Abstract

Feasibility concepts for the Mars Ascent Vehicle (MAV) have been studied for many years to determine its ability to perform ascent requirements after experiencing the harsh environments of Mars descent and landing as a payload, and then after storage for several months on the Mars surface. This MAV vehicle will be integrated with the Mars Sample Return Lander (SRL) and ultimately assessed for its capability to reach a specific orbit and deploy Martian soil samples that would rendezvous with another vehicle to be brought back to the Earth for evaluation. A partnership between NASA's Marshall Space Flight Center (MSFC) and Jet Propulsion Laboratory (JPL) are undergoing a Preliminary Architecture Assessment (PAA) of MAV to mature two MAV concepts. One vehicle concept utilizes a single-stage hybrid propulsion system, and the other concept is a two-stage solid propulsion vehicle.

Concept maturation for each vehicle will also address all the non-propulsive subsystems and analysis such as thrust vector control, reaction control system, thermal, structures, avionics, guidance navigation control, mission and fault management, integrated analysis and operations. The assessment will utilize an iterative concept design methodology, engaging subject matter experts across MSFC, JPL, Ames Research Center and Langley Research Center's engineering disciplines.

As MAV is one piece of a larger integrated mission, another goal of assessment is to identify key technical and programmatic drivers and risks within MAV or the campaign. This PAA and key drivers will feed a multi-faceted systems analysis where an optimized mission and MAV can be assessed.