

22nd IAA SYMPOSIUM ON HUMAN EXPLORATION OF THE SOLAR SYSTEM (A5)
Space Transportation Solutions for Deep Space Missions (4-D2.8)

Author: Mr. Steven Vernon

Johns Hopkins University Applied Physics Laboratory, United States, steven.vernon@jhuapl.edu

Mr. James Kinnison

Johns Hopkins University Applied Physics Laboratory, United States, james.kinnison@jhuapl.edu

Mr. Robert Gagnon

United Launch Alliance LLC (ULA), United States, rob.gagnon@ulalaunch.com

Mr. Brian Lathrup

Johns Hopkins University Applied Physics Laboratory, United States, Brian.Lathrop@jhuapl.edu

THE DEVELOPMENT OF A LAUNCH SYSTEM FOR THE NASA PARKER SOLAR PROBE
MISSION

Abstract

The Johns Hopkins University Applied Physics Lab delivered the Parker Solar Probe (PSP) Concept Study Report (CSR) to NASA in March 2008. The CSR noted that the development of a very high launch energy launch system solution was required in order to achieve the mission and science requirements. The 10+ year development cycle required to develop a very high launch energy, vehicle system solution for the Parker Solar Probe mission is detailed. The successful launch system solution development and implementation cycle is explained and described in chronological order from a historical, system engineering, and technical perspective. The unique and first flight 3rd stage system development program is documented including the challenges encountered in integrating this new stage system into the core 2-stage vehicle systems are described. The critical steps taken and challenges encountered during the development of the new STAR GXV solid motor system, are documented, including the critical events leading up to the successful static fire test conducted on the GXV and the decision to abandon the GXV and proceed with the STAR 48BV based stage system are noted. The technical, engineering, cost, and other system engineering challenges encountered during the Parker Solar Probe launch system development are documented and explained. The paper will describe how the Parker program managed the risks involved in this development program, providing rationale employed for several key decisions made along the way. The partnerships and interactions with the launch industry, NASA and the project are described. Early launch vehicle performance and performance enhancement studies performed are summarized. The paper concludes with an overview of the launch campaign conducted at NASA Kennedy Space Center, where the PSP Spacecraft and the launch systems were integrated, tested and launched successfully in the early morning hours on August, 13, 2018.