

Orion Launch Abort System Performance During Exploration Flight Test 1

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The Orion Launch Abort System Office is taking part in flight testing to enable certification that the system is capable of delivering the astronauts aboard the Orion Crew Module to a safe environment during both nominal and abort conditions. Orion is a NASA program, Exploration Flight Test 1 is managed and led by the Orion prime contractor, Lockheed Martin, and launched on a United Launch Alliance Delta IV Heavy rocket. Although the Launch Abort System Office has tested the critical systems to the Launch Abort System jettison event on the ground, the launch environment cannot be replicated completely on Earth. During Exploration Flight Test 1, the Launch Abort System was to verify the function of the jettison motor to separate the Launch Abort System from the crew module so it can continue on with the mission. Exploration Flight Test 1 was successfully flown on December 5, 2014 from Cape Canaveral Air Force Station's Space Launch Complex 37. This was the first flight test of the Launch Abort System performing Orion nominal flight mission critical objectives. The abort motor and attitude control motors were inert for Exploration Flight Test 1, since the mission did not require abort capabilities. Exploration Flight Test 1 provides critical data that enable engineering to improve Orion's design and reduce risk for the astronauts it will protect as NASA continues to move forward on its human journey to Mars. The Exploration Flight Test 1 separation event occurred at six minutes and twenty seconds after liftoff. The separation of the Launch Abort System jettison occurs once Orion is safely through the most dynamic portion of the launch. This paper will present a brief overview of the objectives of the Launch Abort System during a nominal Orion flight. Secondly, the paper will present the performance of the Launch Abort System at it fulfilled those objectives. The lessons learned from Exploration Flight Test 1 and the other Flight Test Vehicles will certainly contribute to the vehicle architecture of a human-rated space launch vehicle.