



PROFILING THE DELTA II "EXPENDABLE SPACE LAUNCH VEHICLE" IN RECOGNITION OF ITS 133<sup>rd</sup> SUCCESSFUL LAUNCH - CARRYING THE KEPLER PLANET-SEARCHING TELESCOPE INTO SPACE FROM CAPE CANAVERAL AIR FORCE STATION'S LAUNCH COMPLEX 17 PAD 17-B ON MARCH 6, 2009, AROUND 10:49PM

The Delta II Rocket - a single use ("expendable") space launch system, currently produced by the United Launch Alliance (ULA), has been in service since 1989, when it sent GPS14, a GPS Block II satellite, into Middle Earth Orbit. Delta II rockets have carried many notable payloads into space, including 7 Mars missions between 1996 and 2007; the GLAST gamma-ray telescope in 2008, the POLAR satellite monitoring the Earth's magnetosphere in 1996, 55 Iridium satellites, and, now, the Kepler space telescope. Delta II rockets can deliver single or multiple payloads: 900-2170 kg (1984-4790 lb) to geosynchronous transfer orbit and 2.7-6.1 metric tons (5960-13,440 lb) to Low Earth Orbit. The rockets themselves measure from 58.2 - 59m in height and weigh between 151,700 - 231,870kg (334,300 - 511,180 lb). Each launch costs around \$36.7 million for the rocket alone.

The rocket is made up of three stages:

- 1) Tanks filled with RP-1 and liquid oxygen. These power the Rocketdyne RS-27 main engine - the main propulsion engine - for ascent. The rocket accelerates from 0 - 4000 Km/h in roughly a minute, and shortly thereafter reaches the speed of sound.
- 2) Fuel and oxidizer tanks power an Aerojet AJ10-118K engine that fires multiple times to propel the "vehicle-spacecraft stack" into Low Earth Orbit. This stage also contains the rocket's inertial platform/guidance system to control the flight and prepare it for stage 3.
- 3) Optional stage. Contains an ATK-Thiokol solid rocket motor, used when the spacecraft must leave LEO and be sent on a path outside of Earth's orbit. Separation occurs once the rocket has stopped firing; also contains a "yo-yo de-spin mechanism" to slow the rocket's spin before the release of the spacecraft.

stage 1 is jettisoned before leaving Earth's atmosphere; stage 2 is jettisoned in space and becomes orbital debris, as does the non-payload part of stage 3, if it is present.

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