D.3 Delta Launch and Performance History

The Delta launch-vehicle family originated in 1959 with a NASA contract to Douglas Aircraft Company, now McDonnell Douglas Corporation. The Delta, using components form USAF's Thor IRBM program and USN's Vanguard launch-vehicle program, was operational 18 months later. On May 13, 1960, the first Delta was launched from Cape Canaveral with a 179-pound Echo-I passive communications satellite. In the intervening years, the Delta has evolved to meet the ever-increasing demands of its payloads – including weather, scientific, and communications satellites. Each Delta modification corresponded to an increase in payload capacity. Table 42 shows a summary of Delta configurations since the beginning of the program.[10]

The Delta 7925, the latest vehicle in the series, is a three-stage liquid-propellant vehicle with nine solid-propellant strap-on booster motors. For propellants, the Delta uses RP-1 and liquid oxygen in Stage 1, and nitrogen tetroxide and aerozine 50 in Stage 2. Stage 3 consists of a Payload Assist Module (PAM) with a solid-propellant motor. The strap-on boosters are Hercules graphite epoxy motors (GEMs) using HTPB-type solid propellant. At liftoff, the liquid-propellant Stage-1 engine and six of the nine GEMs are ignited. The remaining three GEMs are ignited some 65 seconds later.

Table 42. Summary of Delta Vehicle Configurations

Configuration	Description
Delta	Stg. 1: Modified Thor. MB-3 Blk I engine Stg. 2: Vanguard AJ10-118 propulsion system Stg. 3: Vanguard X-248 motor
A	Stg. 1: Engine replaced with MB-3 Blk II
B	Stg. 2: Tanks lengthened; higher energy oxidizer used
C	Stg. 3: Replaced with Scout X-258 motor PLF: Bulbous replaced low drag
D	Stg. 0: Added 3 Thor-developed SRMs (Castor I)
E	Stg. 0: Castor II replaced Castor I Stg. 1: MB-3 Blk III replaced Blk II Stg. 2: Propellant tank diameters increased Stg. 3: Replaced with USAF-developed FW-4 motor PLF: Fairing enlarged to 65-inch diameter
J	Stg. 3: TE-364-3 used
L, M, N	Stg. 1: Tanks lengthened, RP-1 tank diameter increased Stg. 3: Varied: FW-4 (L), TE-364-3 (M), none (N)
M-6, N-6	Stg. 0: Six Castor IIs employed
900	Stg. 0: No Castor IIs employed Stg. 2: Replaced with Transtage AJ10-118F engine
1604	Stg. 0: Six Castor IIs employed Stg. 3: Replaced with TE-364-4