



DART

System for fast and low-cost probing of the upper atmosphere

A certain part of the atmosphere is hardly investigated until now. The altitudes between 50 and 120 km are too high for balloons to reach, and too low for satellites. Sounding rockets can be used to perform in-situ measurements, but these are usually too expensive for simple and frequent missions.

The T-Minus DART system is designed to fill this void. With this low-cost and rapidly deployable rocket system, small payloads can be launched to altitudes above 120 km, from which they can descend through the atmosphere.

The vehicle consists of a lightweight and powerful booster motor and a dart-shaped payload compartment. The diameter of the dart is only 35 mm, in order to minimize drag losses.



The Mission

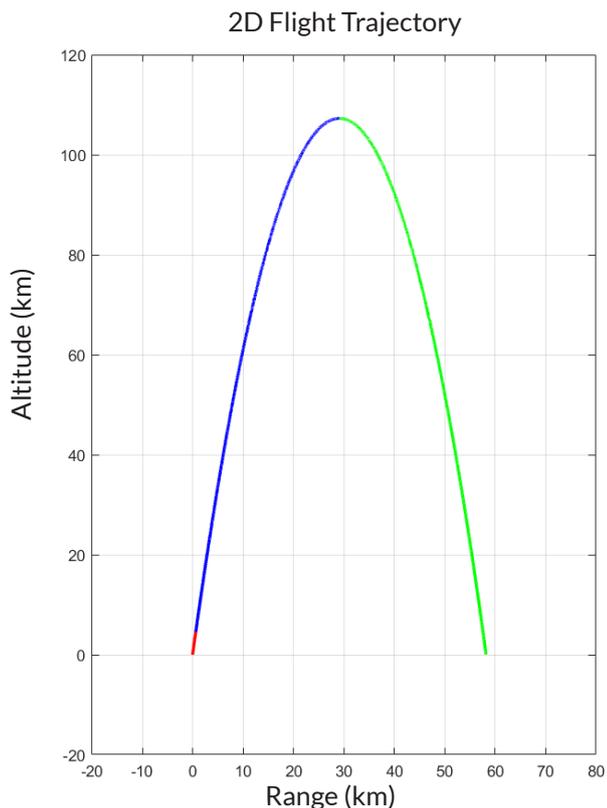
Upon ignition, the booster provides thrust for 5 seconds. After burnout, the aerodynamic forces cause vehicle separation and the dart coasts until it reaches apogee altitude, approximately 150 seconds into the flight. Here, the recovery system is activated, so that the measurement time is maximized. The booster follows a ballistic trajectory until it impacts on the ground.



Payload possibilities

The dart can be equipped with various payloads. Standard payloads are an inflated reflective sphere or chaff. Custom payloads, such as sensor packages are possible as well. The maximum payload volume is 30 x 250 mm (DxL). The use of a recovery/deceleration system is optional for increased measurement time.

Characteristics



Powered 
Unpowered 
Descent 

Dart Characteristics

Dimensions

Diameter 35 (mm)
Length 1.12 (m)

Weights

Total mass 3.5 (kg)
Payload mass 0.5 (kg)

Loads

Max. Longitudinal acceleration <60 (G)
Max mach number 5.2

Booster Characteristics

Motor Dimensions

Diameter 118 (mm)
Length 2.3 (m)

Motor performance

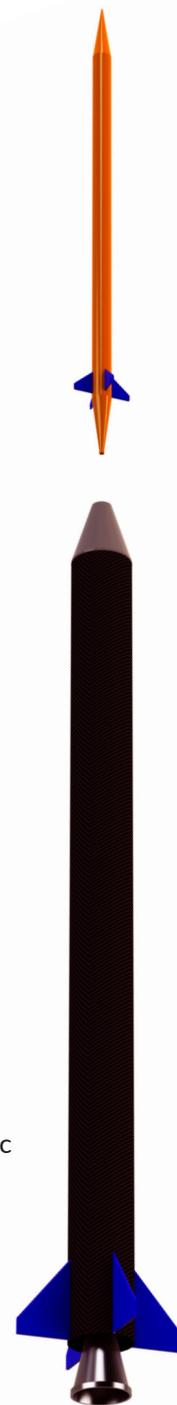
Burn time 7 (s)
Average thrust 8.0 (kN)

Motor weights

Propellant mass 19.7 (kg)
Loaded mass 25.7 (kg)

Other Characteristics

Propellant type AP composite
Casing Material Carbon fiber
Reinforced plastic
Nozzle material Aluminium / Graphite





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