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Small Launchers: Concepts and Operations (7)

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THE SMALL LAUNCH VEHICLE SURVEY - A 2020 UPDATE (WEEKLY LAUNCHES OR INVESTOR NIGHTMARE)

Abstract

The 2010's has seen a dramatic increase in potential small launch vehicle contenders, which we define as rockets capable of carrying at most 1000 kg to Low Earth Orbit. Spurred on by government programs such as the DLC, VCLS, and Horizon 2020, and the rapid proliferation of CubeSats and nanosatellite constellations, more than 100 different commercial, semi-commercial, and government entities worldwide are now devolving new vehicles in this class.

To date the most successful small launcher, the Northrop Grumman Pegasus has launched 44 times, but its flight rate has dropped to less than one a year. At the same time launch opportunities on ESPA rings, secondary slots on larger launchers, and CubeSat missions as cargo to the International Space Station have proliferated. Despite this seemingly bleak market environment, new entrants have emerged looking for a new magic formula and small vehicle "Launch Fever" has reached an all-time high.

In 2015 when we first presented this survey, we identified twenty small launch vehicles under development. By the end of 2019, six new vehicles in this class were operational, 41 were identified under development, and a staggering 58 more were potential new entrants. Some are spurred by renewed government investment in space, such as what we see in the U.K. Others are new commercial entries from unexpected markets such as China. In this paper we present an overview of the small launch vehicles under development today. When available, we compare their capabilities, stated mission goals, cost and funding sources, and testing progress. We also review the two dozen or so entrants that have dropped out since we first started this report. For the third year in arrow, potentially three or more systems may be going operational in 2020, yet several of these systems have been promising a first flight for several years.

In order to present the most unbiased, and neutral data to the audience, we purposely avoid making any judgements on vehicle maturity or business case realism. However, with over 100 potential vehicles in various stages of conception or development, specific trends in performance, cost, and technologies can be identified. Finally we attempt to answer the question of the validity of small vehicle development, when established players such as SpaceX and ULA believe that the continued growth area is for larger, not smaller vehicles.