

ARCHIVED REPORT

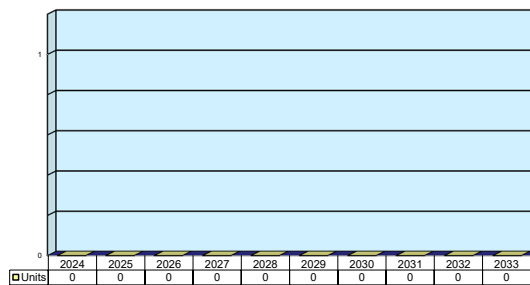
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LauncherOne

Outlook

- Virgin Orbit declared bankruptcy in April 2023
- The first demo test flight in 2020 resulted in an anomaly; the mission was successfully terminated
- Last mission was a failure in January 2023
- Highly likely that LauncherOne will never fly again

Unit Production Forecast
2024-2033



Orientation

Description. LauncherOne is a lightweight, air-launched, two-stage launch vehicle that uses liquid-fueled engines.

Sponsor. Commercial company Virgin Orbit, which is headquartered in Long Beach, California, was developing/producing LauncherOne. Virgin Orbit declared bankruptcy in 2023.

Status. Production ceased

Total Produced. Six.

Application. LauncherOne carries payloads of up to 300-500 kilograms to sun-synchronous orbit.

Price Range. Virgin Orbit advertises a per-flight price of around \$12 million for LauncherOne.

Contractors

Prime

Virgin Orbit	http://virginorbit.com , 4022 E Conant St, Long Beach, CA 90808 United States, Tel: + 1 (562) 384-4400, Email: info@virginorbit.com , Prime
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LauncherOne

Technical Data

Design Features. LauncherOne is a lightweight, air-launched, two-stage launch vehicle designed to carry payloads of up to 500 kilograms to sun-synchronous orbit. It is launched from a modified Boeing 747-400 carrier aircraft, called Cosmic Girl, which carries the expendable LauncherOne to 35,000 feet before releasing it to begin rocket-powered flight.

LauncherOne's first stage is powered by a single Newton 3 rocket motor using liquid oxygen and kerosene (LOX/RP-1) to produce 326.9 kN (73,500 lbf). The second stage uses a Newton 4 engine, also powered by LOX/RP-1, that produces 22.2 kN (5,000 lbf).

	Specifications	
	<u>Metric</u>	<u>U.S.</u>
Dimensions		
Diameter	1 m	3.3 ft
Performance		
Payload to sun-synchronous orbit	300 kg	661 lb

Propulsion		
<u>Stage</u>	<u>Engines</u>	<u>Peak Thrust</u>
First stage	1 Newton 3	326.9 kN (73,500 lbf)
Second stage	1 Newton 4	22.2 kN (5,000 lbf)



Artist's Impression of LauncherOne on 747 Carrier Aircraft

Source: Virgin Galactic

Program Review

Virgin Galactic was founded with the goal of carrying tourists into space. However, in 2012, the company introduced a lightweight, expendable launch vehicle to carry small satellites into space. By April 2014, Virgin Galactic reported that it had already begun full mission duty cycle tests of both the main stage and upper stage and that it had signed launch contracts with a variety of smallsat operators.

While Virgin Galactic was able to sign contracts for its LauncherOne, the company also saw demand for a launch vehicle with slightly higher payload capability. Therefore, in September 2015, the company announced

it would increase LauncherOne's payload capacity from 120 kilograms to 200 kilograms. The payload figure was later raised even further, to 300-500 kilograms. The advertised price remained the same at \$10 million per launch.

The performance increase was followed in the same month by an announcement that the company had successfully conducted a 20-second firing test of one of its Newton 3 engines.

In December 2015, Virgin Galactic introduced a newly acquired Boeing 747-400 aircraft that will be used to

LauncherOne

carry LauncherOne to 35,000 feet. Plans originally called for LauncherOne to be carried by WhiteKnightTwo, made by Virgin Galactic and vehicle developer Scaled Composites, but were later changed to include the Boeing aircraft.

In March 2017, Virgin Group transferred responsibility for LauncherOne from Virgin Galactic to a newly formed subsidiary called Virgin Orbit.

In November 2017, the first full launch vehicle was completed. The rocket is being used for ground testing. Launch rehearsals and fairing deployment tests were conducted in February 2018. The first demonstration launch was in 2020; however, the launch suffered an anomaly, and the mission was successfully terminated.

The first successful launch of LauncherOne took place on January 17, 2021, with 12 payloads on board (some reports claim 10). Another successful launch occurred in June 2021. There have been six launches in total, with two failures.

Bankruptcy

In April 2023, Virgin Orbit declared bankruptcy, citing funding issues. Assets were sold soon thereafter. Rocket Lab bought the headquarters and manufacturing facility in Long Beach, California. Launcher bought Virgin Orbit's test facility in Mojave, California. Stratolaunch Systems bought the 747 "Cosmic Girl" and Firefly Aerospace purchased the remaining engines and components.

Forecast Rationale

Unfortunately for Virgin Orbit, Richard Branson declared bankruptcy in April 2023. This was mainly due to funding issues, with a secondary cause being the last mission's failure.

The assets of the company have been sold and there will likely not be another LauncherOne vehicle produced. This report will remain active for one more year if there are no signs a LauncherOne will be built.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR UNIT PRODUCTION												
Designation or Program	High Confidence					Good Confidence			Speculative			Total
	Thru 2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	
Virgin Orbit												
LauncherOne Note: Virgin Orbit Defunct												
	6	0	0	0	0	0	0	0	0	0	0	0
Total	6	0	0	0	0	0	0	0	0	0	0	0