

ROCKET LAB USA 2018

'ELANA XIX' PRESS KIT DECEMBER 2018



LAUNCHING ON ELECTRON VEHICLE FOUR:
'THIS ONE'S FOR PICKERING'





ROCKET LAB PRESS KIT 'ELANA-19' 2018

LAUNCH INFORMATION

LAUNCH WINDOW:

13 – 21 DECEMBER, 2018
(NINE-DAY LAUNCH WINDOW)

DAILY LAUNCH TIMING

04:00 – 08:00 UTC / 17:00 – 21:00 NZDT
(FOUR-HOUR DAILY WINDOW)

The launch process is complex. A launch could be postponed, or “scrubbed”, multiple times to allow for small, technical modifications or inclement weather.

For up-to-date information about launch activity, visit www.rocketlabusa.com/launch-info/launch-complex-1 and follow Rocket Lab on Twitter @RocketLab.



● 'IT'S BUSINESS TIME' LIFTS OFF FROM ROCKET LAB LC-1 | November 2018

ELANA-19 MISSION OVERVIEW

ELaNa-19 (Educational Launch of Nanosatellites 19) is Rocket Lab's third orbital mission for 2018 and the company's first mission for NASA. The launch is significant for the small satellite industry as it's the first time NASA CubeSats will enjoy a dedicated ride to orbit on a commercial launch vehicle, thanks to NASA's forward-leaning Venture Class Launch Services (VCLS) initiative.

The mission will see Rocket Lab's Electron launch vehicle loft 13 CubeSats to low Earth orbit. Electron will carry approximately 172 pounds (78 kg) of payload, which will be deployed to a 500x500km circular orbit at an 85-degree inclination by Rocket Lab's kick stage

Until now, launch opportunities for small satellites have mostly been limited to rideshare-type arrangements, flying only when space is available on large launch vehicles. As NASA's first VCLS mission to fly, the ELaNa-19 mission on Electron represents a new approach to small satellite launch. VCLS contracts constitute the smallest class of launch services used by NASA and have been created to foster commercial launch services dedicated to transporting smaller payloads into orbit. The mission represents a forward-thinking approach from NASA and a direct response to the small satellite industry's changing needs for rapid and repeatable access to orbit.

While the mission itself is called ELaNa-19, Rocket Lab also names each Electron launch vehicle individually. Previous Rocket Lab designations, 'It's a Test', 'Still Testing' and 'It's Business Time', doubled as both mission and vehicle names. For the ELaNa-19 mission, the Electron launch vehicle is named 'This One's For Pickering' in honor of New Zealand-born scientist and former Director of NASA's Jet Propulsion Lab (JPL), Sir William Pickering. For 22 years, Sir Pickering headed JPL and led the team that developed the first US satellite, Explorer I, launched in 1958.



● SUCCESSFUL STAGE TEST OF 'THIS ONE'S FOR PICKERING'
Rocket Lab test facility, October 2018



ELANA-19 PAYLOADS

Many of the CubeSats on the mission are receiving their access to space through a NASA initiative called the CubeSat Launch Initiative (CSLI). The program recognizes that CubeSats play an increasingly significant role in exploration, technology demonstration, scientific research and educational investigations. These small satellites provide a low-cost platform for both research and commercial applications, including planetary space exploration; Earth observation; Earth and space science; and developing precursor science instruments like laser communications and satellite-to-satellite communications.



● **NASA ELANA-19 PAYLOAD INTEGRATION**
Rocket Lab Headquarters, Huntington Beach, April 2018



● **NASA ELANA-19 PAYLOAD INTEGRATION**
Rocket Lab Headquarters, Huntington Beach, April 2018

The ELaN-19 mission payloads will conduct a vast range of scientific experiments and test new technologies including:

- Sensors that measure radiation in near-Earth space to understand the impact radiation belts have on satellites and astronauts travelling through them,
- A flight experiment to demonstrate deployment and control of a solar sail that acts as a risk reduction precursor to the exciting advanced interplanetary UltraSail concept that could propel small spacecraft for deep-space missions,
- A student-built CubeSat with multiple sensors to provide data on Earth's magnetic field, high altitude plasma density, and take atmospheric weather measurements,
- A student-led STEM focused spacecraft that will connect with students worldwide to help reignite a passion for space,
- A flight demonstration of 3D printed robotic arms designed to validate the effectiveness of compact robotic manipulators.

For more information about ELaN-19 payloads, visit www.nasa.gov/directorates/heo/home/CubeSats_initiative



● **ROCKET LABS PAYLOAD PROCESSING FACILITIES**
Rocket Lab Headquarters, Huntington Beach, April 2018

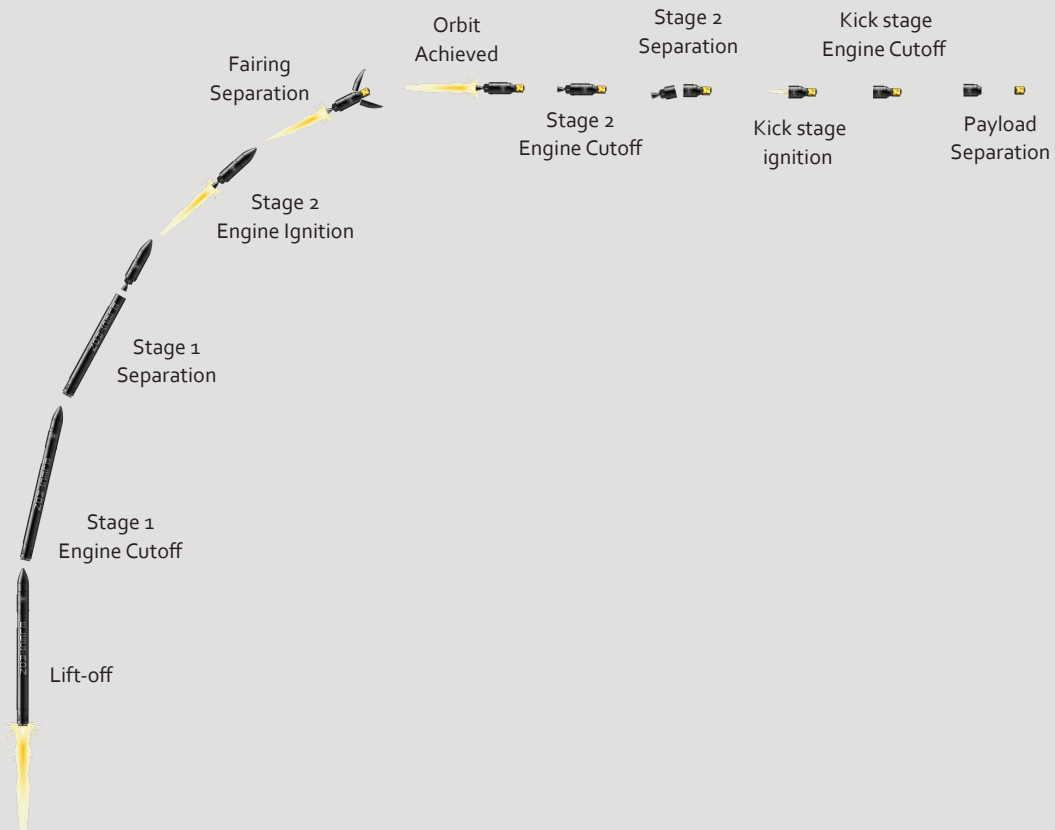


● **NASA LOGO BEING APPLIED TO ELECTRON'S FAIRING**
Rocket Lab Auckland Production Complex, Auckland, October 2018

TIMELINE OF EVENTS

EVENT	
	The team move the rocket from the hangar to the launch pad and assess weather conditions up to lift-off
-07:00:00	Rocket Lab launch team moves into position for launch
-06:00:00	Road to the launch site closed
-04:00:00	Electron lifted to vertical position and filled with fuel
-02:30:00	Launch pad personnel exit area in preparation for launch
-02:00:00	Electron filled with liquid oxygen (LOx)
-01:00:00	Aviation authority advised to alert aircraft pilots of potential hazards
-00:10:00	Final preparations for launch commence
-00:02:00	Autosequence commences and Electron's on-board computers initiate the launch sequence
-00:00:02	Ignition of the nine Rutherford engines powering Electron's first stage
00:00:00	Lift-off – Electron climbs from the launch pad – initially rising slowly and increasing in speed as the Electron gets lighter
+00:02:31	Main engines (Stage 1) cut off
+00:02:34	Stage 1 of Electron separates
+00:02:37	The vacuum Rutherford engine on Stage 2 ignites
+00:03:07	Electron's fairing (the protective casing around the payload) separates
+00:09:06	Electron reaches orbit
+00:09:06	Stage 2 engine cuts off
+00:09:10	Stage 2 of Electron separates
+00:50:00	Kick stage ignites
+00:51:30	Curie engine powering kick stage cuts off
+00:56:00	All payloads separated from launch vehicle

HOURS:MINUTES:SECONDS FROM LIFT-OFF



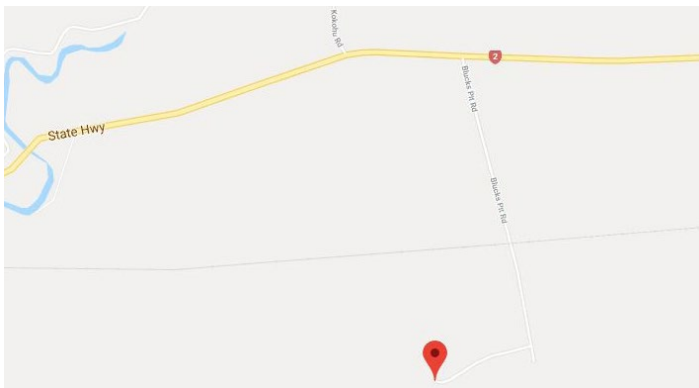


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VIEWING A LAUNCH

VIEWING IN PERSON

Wairoa District Council has allocated a rocket launch viewing area for the public near Nuhaka, accessible via Blucks Pit Road. Visit www.visitwairoa.co.nz/welcome-to-wairoa/space-coast-new-zealand/ for more information. Scrubs and postponements are likely during launch windows, so visitors to the Blucks Pit viewing site should anticipate multiple postponements, sometimes across several days.



● **LC-1 LAUNCH VIEWING AREA** | Blucks Pit Road, near Nuhaka

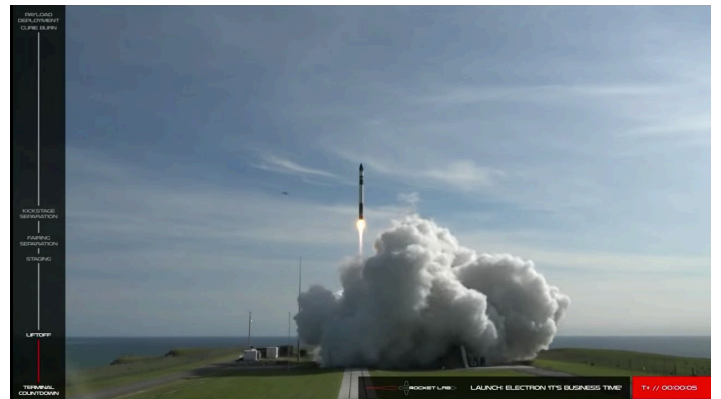


● **LAUNCH VIEWING AREAS DISTANCE FROM ROCKET LAB LC-1**

As Rocket Lab's top priority during launch is public safety, there are safety zones in place during a launch and no access will be permitted to Onenui Station, where Launch Complex 1 is located.

LIVESTREAM

The best way to view a launch is via Rocket Lab's live video webcast. This offers the best views of launch and includes helpful commentary about the launch process. A livestream will be made available approximately 20 minutes prior to a launch attempt. Rocket Lab will post links to the web cast when live via Facebook and Twitter. The livestream is viewable at www.rocketlabusa.com/live-stream and Rocket Lab's YouTube channel.



● **ROCKET LABS LIVESTREAM OF 'IT'S BUSINESS TIME'** | October, 2018

LAUNCH FOOTAGE AND IMAGES

Images and video footage of the ELaNa-19 launch will be available shortly after a successful mission at www.rocketlabusa.com/news/updates/link-to-rocket-lab-imagery-and-video

Images and footage of previous Rocket Lab launches can also be found at this link.

SOCIAL MEDIA

For real time updates on the launch follow the Rocket Lab Twitter page @RocketLab

f @RocketLabUSA t @RocketLab

CONTACTS

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ABOUT ROCKET LAB

We go to space to improve life on Earth

Rocket Lab is providing rapid and repeatable access to orbit for small satellites with the Electron rocket.

We are in an exciting new era of small satellite technology - one that's making life on Earth better. We all rely on satellites. They connect us, keep us safe, help us understand our planet and manage our impact on it, and enable us to innovate and explore.

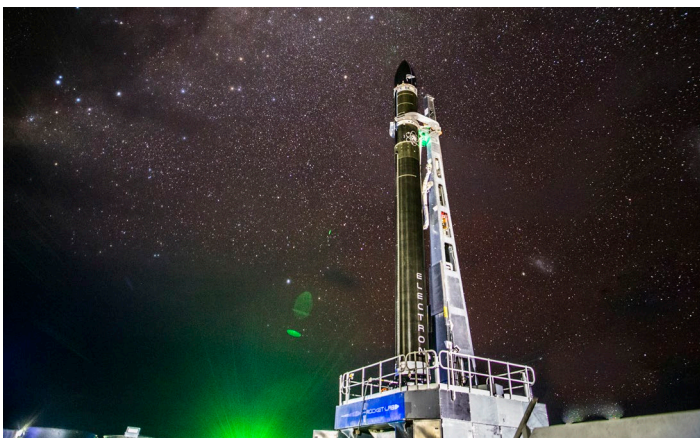
The satellites of today are getting smaller, doing more and costing less – and thousands of them need to get on orbit.

Rocket Lab is launching these satellites to orbit at unprecedented frequency to enable a new era of innovation on orbit.

Founded in 2006, Rocket Lab has developed the world's first fully carbon composite orbital launch vehicle, Electron, which is powered by 3D printed, electric pump fed engines. Electron is a two-stage vehicle capable of delivering payloads of up to 150kg to a 500 km sun-synchronous orbit. Rocket Lab has also designed and operates a unique third stage of the rocket, called the kick stage, which can raise and circularize orbits. Powered by the 3D printed Curie engine, the kick stage is capable of performing a deorbit burn to reduce its orbital lifespan to reduce space junk, following payload deployment.

On May 25, 2017, Rocket Lab successfully launched its first Electron rocket, 'It's a Test', from Rocket Lab Launch Complex 1 on New Zealand's Māhia Peninsula. Rocket Lab has since completed two successful orbital missions; 'Still Testing' launched to orbit on 21 January 2018, followed by 'It's Business Time' on 11 November 2018. To date, Rocket Lab has launched 11 small satellites to orbit.

Rocket Lab is a privately funded company. Investors include Khosla Ventures, Promus Ventures, DCVC (Data Collective), Bessemer Venture Partners, Future Fund, Greenspring Associates, ACC, K1W1, and Lockheed Martin.



● NIGHT SKIES AT LC-1 | Electron, 'Its Business Time', LC-1 Māhia Peninsula, 2018



● ELECTRON AT ROCKET LAB LAUNCH COMPLEX 1 | Māhia Peninsula, 2017

ABOUT LAUNCH COMPLEX-1

Electron is launched from Rocket Lab Launch Complex 1, the world's only private orbital launch range. Located in Māhia, New Zealand, and licensed to launch up to 120 times per year, Rocket Lab can accommodate an unprecedented launch cadence and reach orbital inclinations from sun-synchronous through to 39 degrees from a single site. Rocket Lab is also developing a second launch site to provide unmatched schedule and launch location freedom. Launch Complex 2 is being built at the Mid-Atlantic Regional Spaceport in Wallops Flight Facility, Virginia, USA.



● ROCKET LAB LAUNCH COMPLEX 1 | Māhia Peninsula, 2018

ABOUT THE RUTHERFORD ENGINE

Rutherford is a state-of-the-art oxygen and kerosene pump fed engine specifically designed from scratch for Electron, using an entirely new propulsion cycle. A unique feature of Rutherford is the high-performance electric propellant pumps which reduce mass and replace hardware with software.

Rutherford is the first engine of its kind to use 3D printing for all primary components. These features are world firsts for a high-performance liquid rocket engine with propellants that are fed by electric turbopumps. The production-focused design allows Electron launch vehicles to be built and satellites launched at an unprecedented frequency.



● RUTHERFORD ENGINE TEST | New Zealand, 2016

RUTHERFORD IS A STATE OF THE ART OXYGEN AND KEROSENE PUMP FED ENGINE SPECIFICALLY DESIGNED FROM SCRATCH FOR ELECTRON, USING AN ENTIRELY NEW PROPULSION CYCLE.

E
L
E
C
T
R
O
N



MAX. PAYLOAD
225KG

STAGES
2

HEIGHT
17M

NOMINAL SUN-SYNC. ORBIT
500KM

NOMINAL PAYLOAD
150KG

DIAMETER
1.2M



DEDICATED

Electron can deliver your payload when and where required.



RIDESHARE

Fly with other payloads at commercially competitive prices.



OPTIONAL KICK STAGE

Rocket Lab's apogee kick stage can execute multiple engine burns to place numerous payloads into different, circularized orbits. It opens up significantly more orbital options, particularly for rideshare customers that have traditionally been limited to the primary payload's designated orbit. Powered by Rocket Lab's 3D printed Curie engine, the kick stage is capable of 120N of thrust and multiple burns.

Electron is an entirely carbon-composite vehicle powered by Rocket Lab's 3D-printed, electric turbo-pump fed Rutherford engines. Electron is capable of delivering payloads of up to 150 kg to a 500 km sun-synchronous orbit – the target range for the high growth constellation-satellite market. Customers signed to fly on Electron include NASA, Spaceflight, Planet, Spire and Moon Express.



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