

ROCKET LAB USA 2019

LOOK MA, NO HANDS PRESS KIT

AUGUST 2019



LAUNCHING ON ELECTRON VEHICLE
EIGHT: 'LOOK MA, NO HANDS'





ROCKET LAB PRESS KIT

'LOOK MA, NO HANDS' 2019

LAUNCH INFORMATION

LAUNCH WINDOW

17 AUGUST - 30 AUGUST 2019 NZST
(16 AUGUST - 30 AUGUST 2019 UTC)

LAUNCH SITE

LAUNCH COMPLEX 1
MAHIA PENINSULA, NZ

Launch Timing: First launch opportunity no-earlier than 12:57 UTC, Friday 16 August.

The launch window will be approximately 1 hour 40 minutes each day.

This table outlines the target launch timing for the first week of the window.

Window open (NZST)	Window open (UTC)
2019-08-17 00:57	2019-08-16 12:57
2019-08-18 00:32	2019-08-17 12:32
2019-08-19 00:06	2019-08-18 12:06
2019-08-19 23:40	2019-08-19 11:40
2019-08-20 23:15	2019-08-20 11:15
2019-08-21 22:49	2019-08-21 10:49
2019-08-22 22:23	2019-08-22 10:23

Watch the live launch webcast: www.rocketlabusa.com/live-stream.

For information on launch day visit www.rocketlabusa.com/missions/next-mission/ and follow Rocket Lab on Twitter @RocketLab.



© LIFT OFF OF THE MAKE IT RAIN MISSION | June 2019



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MISSION OVERVIEW

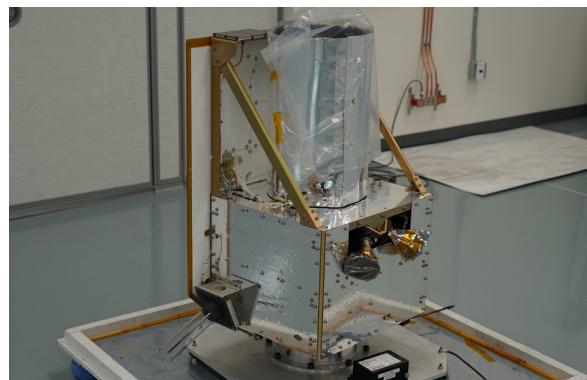
Rocket Lab's eighth mission will lift-off from Launch Complex 1 carrying a total of four satellites on an Electron launch vehicle.

The mission is manifested with a satellite destined to begin a new constellation for UNSEENLABS, as well as more rideshare payloads for Spaceflight, consisting of a spacecraft for BlackSky and the United States Air Force Space Command.

PAYLOADS

UNSEENLABS

The first payload onboard Electron is a CubeSat that will form the cornerstone of a new maritime surveillance constellation for French company UNSEENLABS. The constellation aims to deliver precise, reliable, and secure maritime data, enabling organizations to monitor their own vessels and observe those that present risks, such as pirates and illegal vessels.



● BLACKSKY'S GLOBAL-4 SPACECRAFT | July 2019

SPACEFLIGHT

Electron will also launch three satellites for mission management and rideshare aggregator Spaceflight, as part of the company's second rideshare mission with Rocket Lab. Among the rideshare payloads is BlackSky's Global-4 Earth-imaging satellite. The satellite will join BlackSky Global-3, which was launched to low Earth orbit on an Electron vehicle in June 2019. BlackSky's constellation delivers rapid-revisit satellite imagery to assist with monitoring economic activity such as crop development and herd migration, or surveying damage following natural disasters.

The final spacecraft manifested on the mission are two experimental satellites for the United States Air Force Space Command, designed to test new technologies including propulsion, power, communications, and drag capabilities for potential applications on future spacecraft.

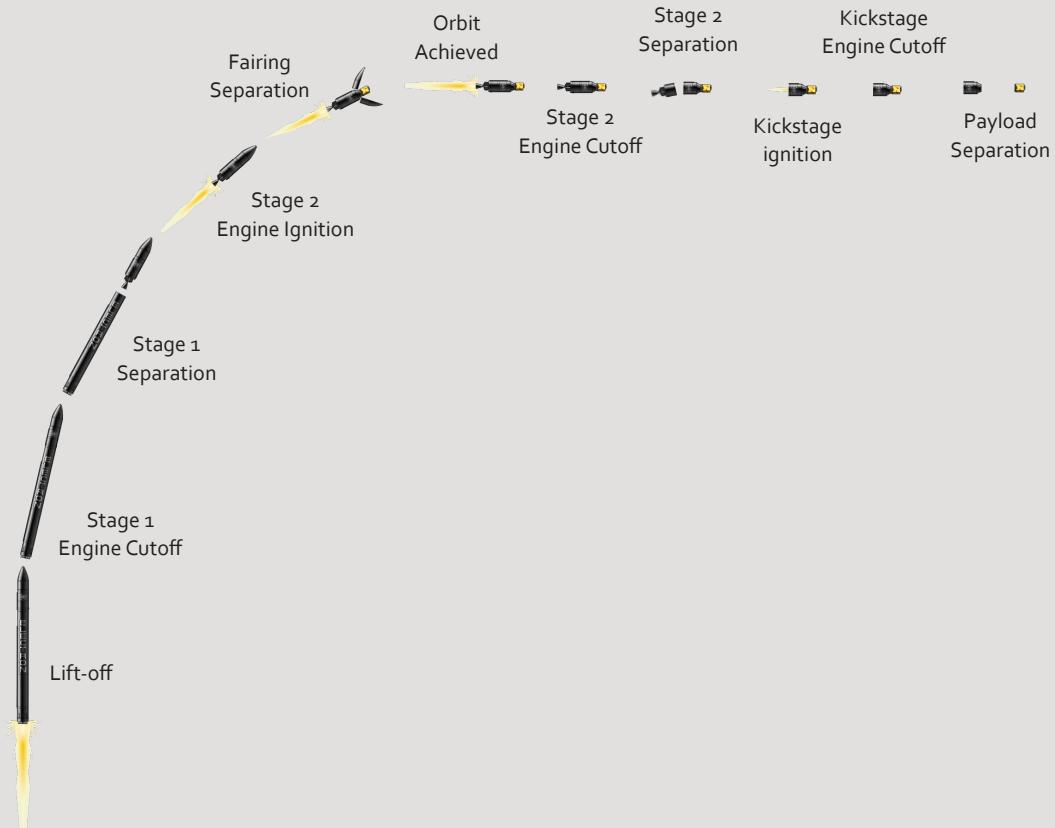


● LOOK MA, NO HANDS AHEAD OF PAYLOAD INTEGRATION AT LAUNCH COMPLEX 1 | July 2019

TIMELINE OF EVENTS

HOURS:MINUTES:SECONDS FROM LIFT-OFF

EVENT	
-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)
-02:00:00	Safety zones are activated for designated marine space
-00:30:00	Safety zones are activated for designated airspace
-00:18:00	The Launch Director conducts a go/no-go poll of launch operators to confirm Electron is ready for launch
-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
+00:02:35	Main engines (Stage 1) cut off
+00:02:38	Stage 1 of Electron separates
+00:02:42	The vacuum Rutherford engine on Stage 2 ignites
+00:03:40	The Electron's fairing separates
+00:08:51	Electron reaches orbit
+00:08:55	Stage 2 engine cuts off
+00:08:59	Stage 2 of Electron separates
+00:50:21	Kick Stage ignites
+00:51:48	Curie engine powering Kick Stage cuts off
+00:53:30	Payloads separated from launch vehicle





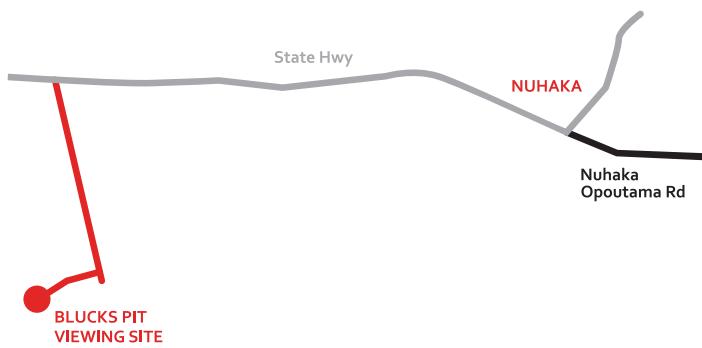
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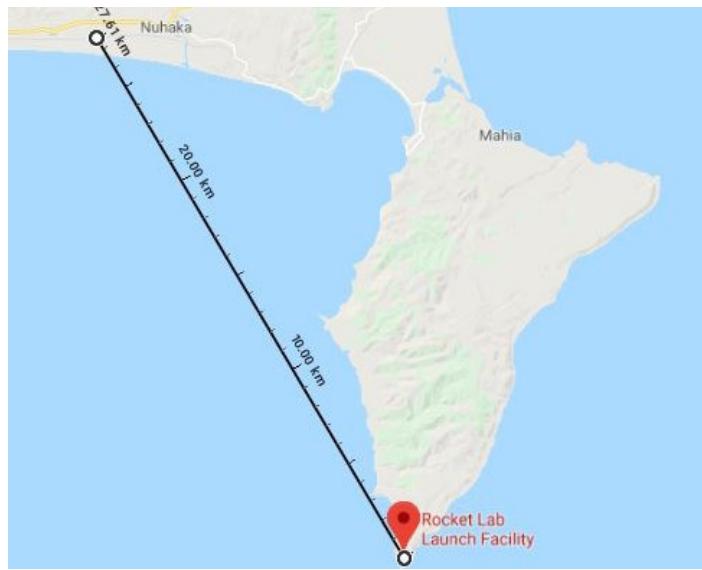
VIEWING A LAUNCH

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 the test 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 15 - 20 minutes prior to a launch attempt. Rocket Lab will post links to the webcast when live via Facebook and Twitter. The livestream is viewable at www.rocketlabusa.com/live-stream and Rocket Lab's YouTube channel.



LAUNCH FOOTAGE AND IMAGES

Images and video footage of the 'Look Ma, No Hands' launch will be available shortly after a successful mission at www.rocketlabusa.com/news/updates/link-to-rocket-lab-imagery-and-video

SOCIAL MEDIA

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

@RocketLabUSA @RocketLab

CONTACTS

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ABOUT ROCKET LAB

We open access to space to improve life on Earth

The wait is over. Frequent and reliable launch for small satellites is here with the Electron launch vehicle. With six orbital missions and 35 satellites launched to orbit since January 2018, Electron is the world's only operational private launch vehicle dedicated to small satellites. We're connecting the ideas of the future to space, and we're doing it now.

We are in an exciting new era of small satellite technology - one that's making life on Earth better. Small satellites keep us connected, provide security, help us monitor resources and environmental change, and they enable us to explore new and exciting science that benefits us all.

We believe getting these satellites to space should be simple, seamless and tailored to your mission - from idea to orbit.

Since the Electron launch vehicle was first conceived in 2013, every detail of the Rocket Lab launch experience has been designed to provide small satellites with rapid, reliable, and affordable access to space. Innovation is at the core of the Electron launch vehicle, just as it's at the core of the revolutionary small satellites we're launching to orbit. We've designed Electron to be built and launched with unprecedented frequency, while providing the smoothest ride and most precise deployment to orbit.

Led by founder and Chief Executive Peter Beck, Rocket Lab has grown to a global team of more than 400 highly-skilled engineers and technicians. Rocket Lab is a privately funded company. Investors include Khosla Ventures, DCVC (Data Collective), Bessemer Venture Partners, Future Fund, Greenspring Associates, ACC, K1W1, Promus Ventures and Lockheed Martin.



● ROCKET LAB MISSION CONTROL | October, 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.



● LIFT OFF OF THE ELANA-19 MISSION FOR NASA FROM ROCKET LAB LAUNCH COMPLEX 1 | December, 2018 | Image credit: Trevor Mahlmann

ABOUT 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.

Z
O
R
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W



NOMINAL PAYLOAD
150KG

STAGES
2

HEIGHT
18M

NOMINAL SUN-SYNC. ORBIT
500KM

DIAMETER
1.2M



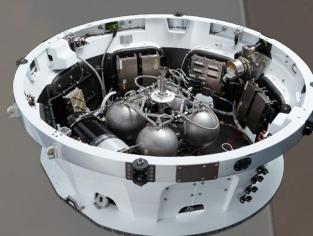
DEDICATED

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 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 liquid propellant 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.

THE ROCKET LAB KICK STAGE

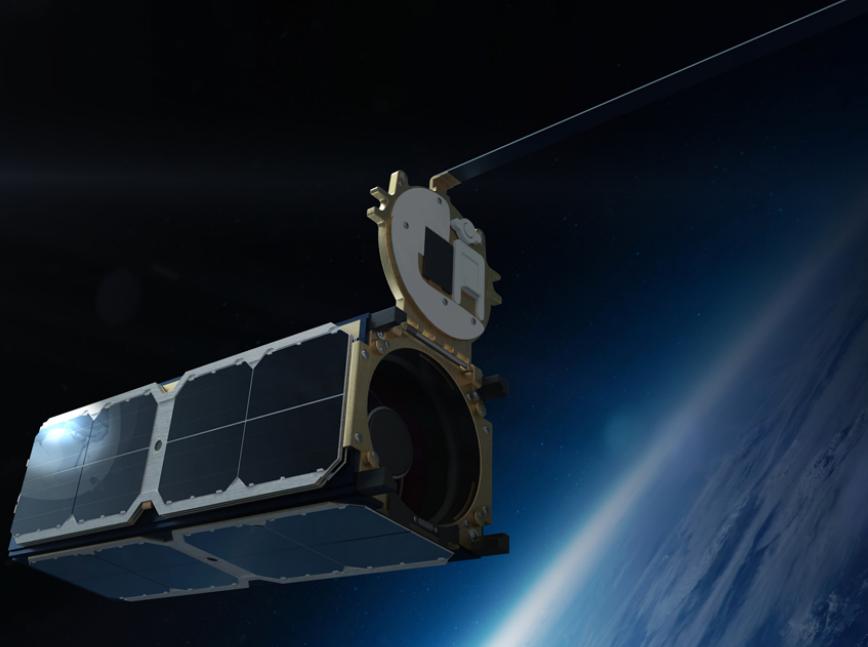
RESPONSIBLE ORBITAL DEPLOYMENT

As the small satellite industry experiences rapid growth, we're determined to be part of the solution for sustainability and the reduction of orbital debris in space. Traditional methods of deploying satellites can leave large rocket stages in orbit, contributing to the global issue of space junk. We know there's a better way.

The Rocket Lab Kick Stage is designed to deliver small satellites to precise orbits, before deorbiting itself to leave no part of the rocket in space.

Powered by the Curie engine, named after physicist and chemist Marie Curie, the Kick Stage is a nimble but powerful extra stage on Electron designed to circularize payload orbits. It employs a cold gas reaction control system to precisely point itself and deploy satellites to independent yet highly precise orbits, and also eliminate the risk of recontact with other spacecraft during deployment.

After all payloads are deployed, the Kick Stage can reorient itself and reignite the Curie engine one last time to perform a deorbit maneuver. This drastically lowers the Kick Stage's orbit, enabling it to re-enter the atmosphere and burn up without a trace.



• 'ELANA-19' PAYLOAD INTEGRATION ON THE KICK STAGE | 2018

BY DOING THIS WE LEAVE NOTHING IN ORBIT BUT OUR CUSTOMERS' SATELLITES - THE WAY IT SHOULD BE.



• PAYLOADS ON THE KICK STAGE ON MISSION 'IT'S BUSINESS TIME' | Space, 2018



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