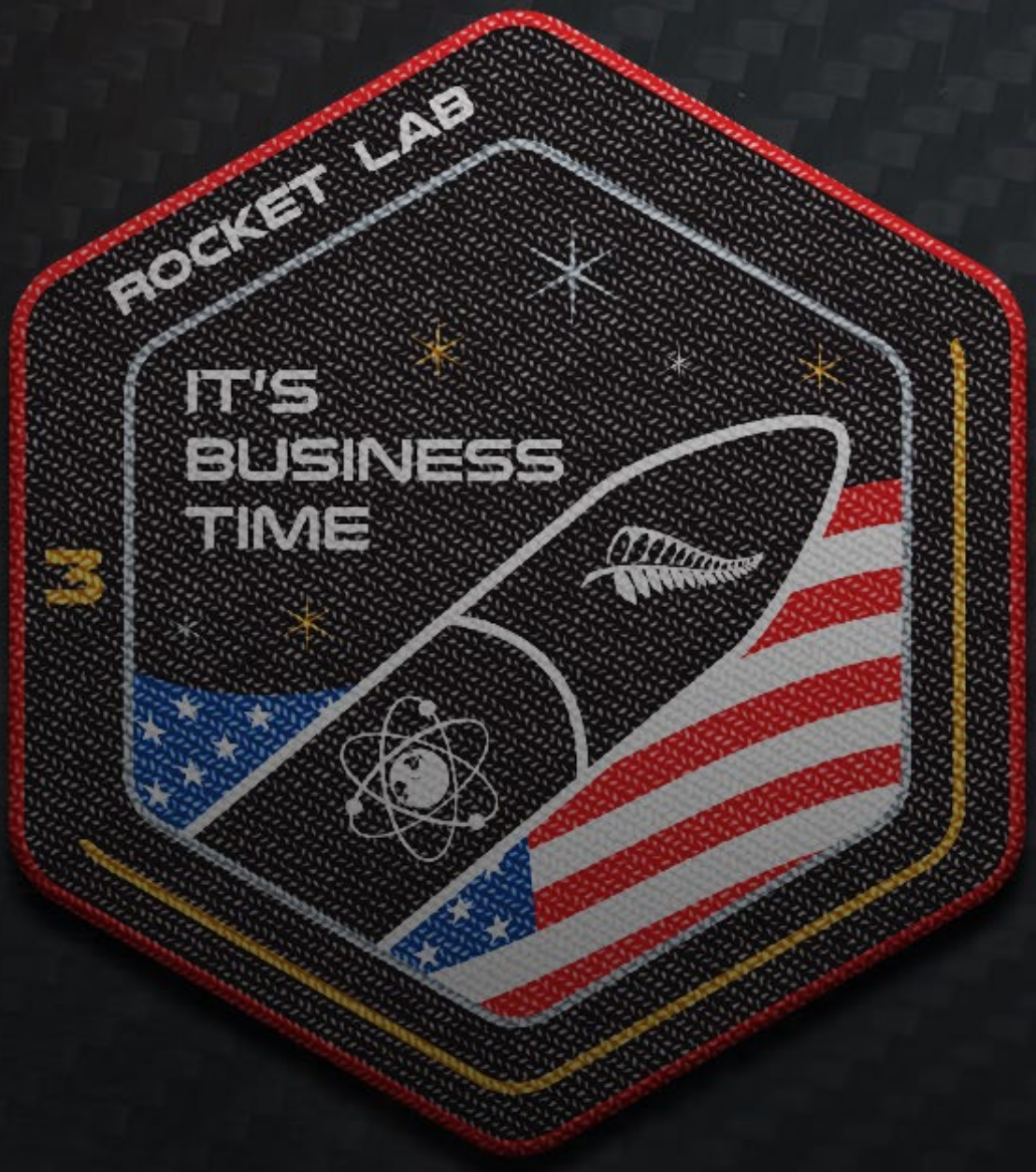
ROCKET LAB USA 2018

'IT'S BUSINESS TIME' PRESS KIT NOVEMBER 2018



ROCKET·LAB

MISSION OVERVIEW

ABOUT THE IT'S BUSINESS TIME PAYLOADS

Rocket Lab will open a nine day launch window for It's Business Time from 11 - 19 November 2018 NZDT. Launch attempts will take place within this during a daily four hour window beginning at 16:00 NZDT, or 03:00 UTC.

Rocket Lab's Electron launch vehicle will loft six satellites and a technology demonstrator to Low Earth Orbit. The payloads will be launched to a 210km x 500km circular orbit at 85 degrees, before being circularized to 500 x 500 km using Rocket Lab's Curie engine powered kick stage. It's Business Time is manifested with commercial satellites from Spire Global, Tyvak Nano-Satellite Systems, Fleet Space Technologies, as well as an educational payload from the Irvine CubeSat STEM Program (ICSP) and a drag sail technology demonstrator designed and built by High Performance Space Structure Systems GmBH (HPS GmbH). Ecliptic Enterprises Corporation, assisted with the pairing of NABEO with Electron as a candidate hosted technology demonstrator.

PAYLOADS

spire

LEMUR-2-ZUPANSKI & LEMUR-2-CHANUSIAK

Electron will loft two Lemur-2 satellites, LEMUR-2-ZUPANSKI and LEMUR-2-CHANUSIAK, for data and analytics company Spire. These satellites will join Spire's constellation of more than sixty nanosatellites currently in Low Earth Orbit. The Lemur-2 satellites are used for Automatic Identification System (AIS) vessel tracking data to monitor ship movements over the most remote parts of the globe. They also employ GPS Radio Occultation to monitor weather.

Spire collects data for Earth from space, to help business and governments address previously insurmountable problems affecting everyone on the planet. Its constantly improving constellation of LEO satellites uses listening sensors to listen to the planet in real-time, gaining access to rich and untapped data sources totally off-limits to camera-based technology and inaccessible from the ground. To learn more, visit www.spire.com

IRVINE CUBESAT

IRVINE01

IRVINE01 is a CubeSat built by high school students participating in the Irvine CubeSat STEM Program (ICSP), a group of six high schools from Irvine, California. The ambitious program will mark the first time American high school students have put an operational satellite into orbit. The IRVINE01 CubeSat program is an educational mission that gives high school students the experience of building, testing, and controlling a solar-powered nano-satellite. IRVINE01 is designed to carry a camera and a solar panel propulsion system and collect data such as temperatures and the satellite's speed, direction, location and altitude. Originally manifested on a different launch vehicle, ICSP selected an Electron rocket due to the launch vehicle's gentle payload environment which offers a smooth ride to orbit. To learn more, visit www.irvinecubesat.org.

Tyvak
A Terran Orbital Corporation

TYVAK NANOSATELLITE SYSTEMS

It's Business Time will also carry a satellite for GeoOptics Inc., built by Tyvak Nano-Satellite Systems. Headquartered in Irvine, CA, Tyvak Nano-Satellite Systems provides end-to-end nanosatellite solutions to governments, universities, and commercial organizations. For more about Tyvak Nano-Satellite Systems, visit www.tyvak.com

HPS
High Performance Space Structure Systems GmbH

NABEO

NABEO is a new drag-augmentation subsystem that will be tested for the first time as part of the It's Business Time mission. Designed to passively de-orbit inactive satellites at the end of their functioning life, NABEO is a small sail is made of an ultra-thin membrane that can be coiled up tightly within a spacecraft and then deployed once the satellite reaches the end of its orbital lifespan. The large reflective panels unfold to increase the spacecraft's surface area, causing it to experience greater atmospheric drag. Because the sail is reflective, it also makes use of solar radiation pressure to manoeuvre; a technique called solar sailing. This enables the satellite to be lowered to an orbit where the aerodynamic drag takes over and pulls the satellite back into the Earth's atmosphere enabling much faster de-orbiting.

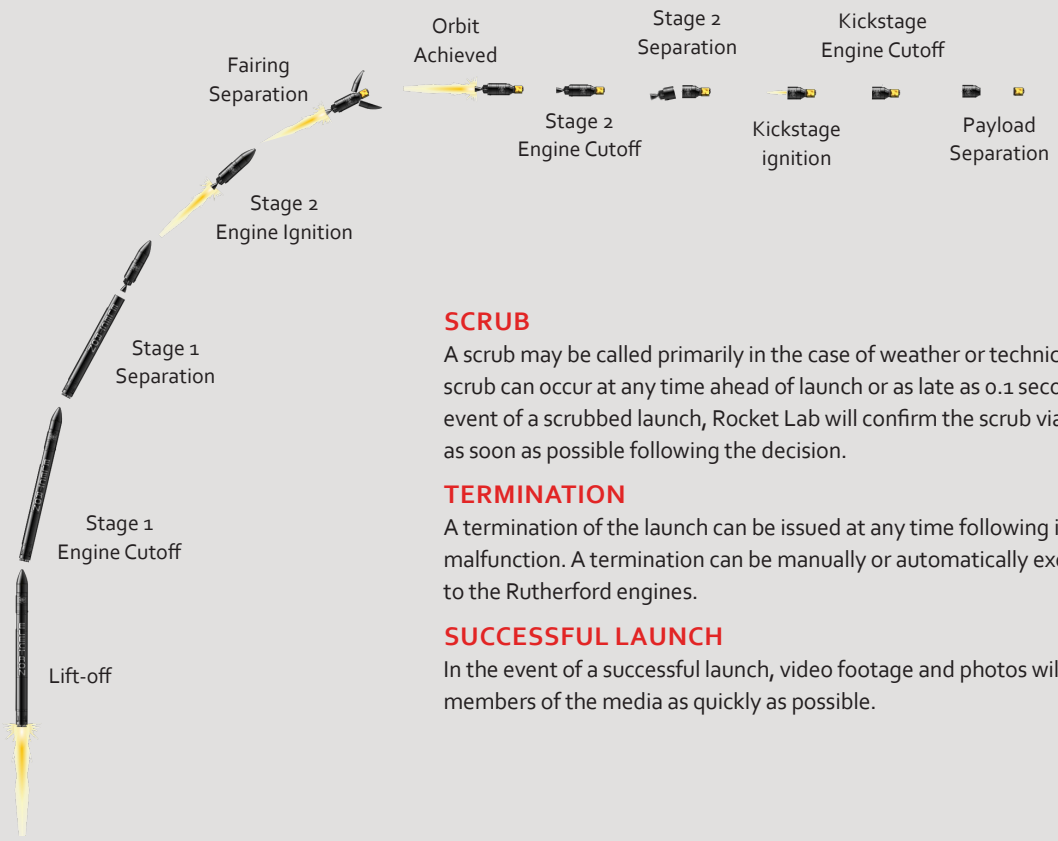
FLEET

FLEET SPACE TECHNOLOGIES

It's Business Time will loft two Proxima satellites for Australian company Fleet space Technologies. The satellites will form the foundation of Fleet's global Internet of Things (IoT) communications constellation that will provide internet connectivity for millions of sensor devices based in remote locations on Earth.

TIMELINE OF EVENTS

HOURS:MINUTES:SECONDS FROM LIFT-OFF	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 the 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
+00:02.33	Main engines (Stage 1) cut off
+00:02.36	Stage 1 of Electron separates
+00:02.39	The vacuum Rutherford engine on Stage 2 ignites
+00:03.08	The Electron's fairing (the protective casing around the payload) separates
+00:09.02	Electron reaches orbit
+00:09.05	Stage 2 engine cuts off
+00:09:09	Stage 2 of Electron separates
+00:51:00	Curie kickstage ignites
+00:52:45	Engines powering Curie kick stage cut off
+00:54:10	All payloads separated from launch vehicle



SCRUB

A scrub may be called primarily in the case of weather or technical issues. If issues arise a scrub can occur at any time ahead of launch or as late as 0.1 seconds before lift-off. In the event of a scrubbed launch, Rocket Lab will confirm the scrub via Twitter @RocketLab as soon as possible following the decision.

TERMINATION

A termination of the launch can be issued at any time following ignition as a result of a malfunction. A termination can be manually or automatically executed, which cuts all power to the Rutherford engines.

SUCCESSFUL LAUNCH

In the event of a successful launch, video footage and photos will be made available to members of the media as quickly as possible.

ABOUT THE LAUNCH

LAUNCH TIMING

Rocket Lab will open a nine day launch window from 11 November - 19 November 2018. Launch attempts will take place within this during a daily four hour window beginning at 16:00 NZDT.

LAUNCH SAFETY ZONES

As Rocket Lab's top priority is public safety, there are safety zones in place during a launch and no access will be permitted to Onenui Station. Temporary road closures will be in place for traffic management and to ensure the safety of vehicles on the Māhia East Coast Road.

Launch Complex 1 is not visible during a launch from any publicly accessible point on the Māhia Peninsula.

Temporary limitations will apply to the airspace over the site. Pilots and airlines will be advised by Airways NZ ahead of time through the AIP and Airways IFIS, and given details on the day through the standard Notice to Airmen (NOTAM) process.

Rocket Lab will also maintain exclusive use of an area of water surrounding the launch site for a brief period during launch window.

For full information on air, marine and land safety zones, please visit www.rocketlabusa.com/launch-info/launch-complex-1

VIEWING A LAUNCH

Due to the likelihood of postponed or scrubbed launches, Rocket Lab recommends viewing a launch via Rocket Lab's video livestream. This offers the best views of launch and includes helpful commentary about the launch process. A livestream will be made available approximately 15 minutes prior to a launch attempt. notified via the Rocket Lab Twitter account. The livestream is viewable on a launch day at www.rocketlabusa.com/live-stream and Rocket Lab's YouTube channel.

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.

THE VIEW FROM ELECTRON 'STILL TESTING' | Space, 2018

CONDITIONS FOR SUCCESSFUL LAUNCH

Due to the nature of launching rockets, planned launches will often be postponed or scrubbed (i.e. rescheduled to another day) to ensure ideal launch conditions.

A scrub is a high possibility as weather conditions constantly change. Triggers that would immediately postpone a launch include excessive cloud cover, rain, lightning or winds at high altitude.

Before a launch, a series of routine checks are completed with ground support equipment. If anything does not perform exactly as expected, the launch will be delayed to resolve the issue. If the atmospheric or technical parameters required for launch are not optimal, a decision will be made to scrub the launch. Rocket Lab will announce the decision to scrub a launch as soon as possible after it is made in order to reduce the burden on marine and air traffic.

SUCCESSFUL LAUNCH

At ignition, a deluge of water used to protect the launch pad and suppress exhaust noise will be vapourised into large billowing white clouds of steam. After the engines have burned for a couple of seconds to confirm nominal thrust levels, the Electron will be released and begin to climb from the pad. It will ascend away from the steam cloud, supported by an intensely bright white-orange plume and leaving little or no smoke trail.

The climb will be slow at first, taking approximately three seconds to clear the 4-storey tall launch tower. As the rocket climbs and becomes lighter it will accelerate, reaching a commercial airliner's typical cruising altitude in approximately one minute.

Once it has left the thicker parts of the atmosphere, the rocket will begin to turn south and start building up the 27,000km/h horizontal velocity in order to achieve orbit. Observers on the ground may see the rocket turn and fly towards the southern horizon.

The launch will be monitored at Mission Control in Auckland and all site and launch safety is managed at Range Control, 2.4km north of the launch site.

LAUNCH FOOTAGE AND IMAGES

Images and footage of previous launches can be found and downloaded at http://www.rocketlabusa.com/gallery. New footage and images following the successful launch of 'It's Business Time' will be available as soon as possible.

LIVESTREAM

A livestream will go live approximately 15 minutes before lift off at www.rocketlabusa.com/live-stream

CONTACTS

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SOCIAL MEDIA

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

@RocketLabUSA @RocketLab

ABOUT ROCKET LAB

Rocket Lab develops and launches advanced rocket technology to provide rapid and repeatable access to orbit for small satellites. Our mission is to go to space to improve life on Earth.

Every detail of the Rocket Lab launch system has been designed to provide small satellites with rapid, reliable and affordable access to space. 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 150 kg to a 500 km sun-synchronous orbit.

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 Mahia Peninsula. The flight made it to space, at an altitude of 250km. Rocket Lab's second test flight, 'It's a Test', successfully reached orbit and deployed customer payloads on 21 January, 2018.

Rocket Lab is a privately funded company with tier one investors including Khosla Ventures, DCVC (Data Collective), Bessemer Venture Partners, Lockheed Martin and Promus Ventures.

LIFT OFF | Electron, 'STILL TESTING' launch, Māhia Peninsula, January 2018

LAUNCH COMPLEX 1

Rocket Lab's Launch Complex 1 is located on the tip of the Māhia Peninsula, between Napier and Gisborne on the east coast of the North Island of New Zealand. The complex is the first orbital launch site in New Zealand, and the first privately operated orbital launch site globally. The remote location of Launch Complex 1, particularly its low volume of air and marine traffic, is a key factor in enabling unprecedented access to space. The geographic position of the site means it is possible to access a large range of orbital azimuths – satellites launched from Māhia can be delivered to a wide range of inclinations to provide services across many areas around the world.

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

PETER BECK – CEO AND FOUNDER

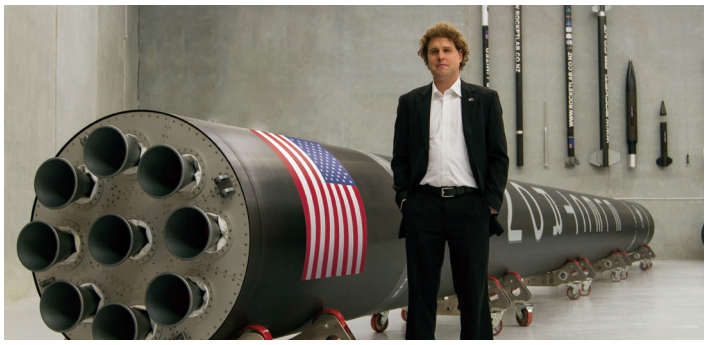
Peter Beck is the founder and chief executive of Rocket Lab.

After founding the company in 2006, Peter has grown Rocket Lab to become a globally recognized industry leader in space and a billion-dollar company employing hundreds of world-class engineers and technicians.

Peter is an acclaimed engineer who grew up dreaming of space flight. He has dedicated his career to opening access to space for small satellites to improve life on Earth.

Following years of developing and launching sounding rockets and undertaking research and development for agencies such as DARPA, Peter established the Electron orbital launch program in 2013. In addition to leading the development of Electron and Launch Complex 1, Peter played a crucial role in establishing international treaties and legislation to enable orbital launch capability from New Zealand.

Rocket Lab's launch model will see thousands of small satellites reach orbit and feed critical data back to Earth, helping us better monitor our planet and manage our impact on it. Satellites launched on Electron perform vital social and commercial services, including monitoring deforestation, global internet from space, improved weather prediction and crop monitoring.



PETER BECK AND ELECTRON | Auckland, New Zealand

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.

ELECTRON

MAX. PAYLOAD
225KG

STAGES
2

HEIGHT
17M

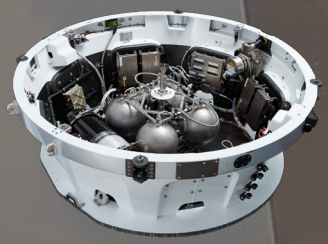
NOMINAL SUN-SYNC. ORBIT
500KM

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 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.

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