Rocket Report: Firefly to the Moon, SpaceX makes a splash, H3 nets a customer

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Welcome to Edition 1.28 of the Rocket Report! Lots of news this week, and much of it good, with Stratolaunch reaching an important test, Firefly winning a sweet contract from NASA, and the H3 getting its first commercial flight. All in all, a nice week in launch.

As always, we welcome reader submissions, and if you don't want to miss an issue, please subscribe using the box below (the form will not appear on AMP-enabled versions of the site). Each report will include information on small-, medium-, and heavy-lift rockets as well as a quick look ahead at the next three launches on the calendar.

Branson says Virgin will reach space before Christmas. The entrepreneur behind Virgin Galactic told CNN Business at the end of November that he is "pretty confident" his space tourism venture can achieve its milestone by the end of the year. "I obviously would love to prove our critics wrong, and I'm reasonably confident that before Christmas, we will do

so," Richard Branson said. The VSS Unity spacecraft has previously flown to an altitude of 32 miles.

Test pilots first … Branson reiterated that he plans to fly into space on one of the early flights (space, in this case, means breaking an altitude of 50 miles). Test pilots will fly the first few missions, but then he and some members of his family will fly before customers who have paid for their tickets will go. Branson still believes that Virgin Galactic will reach space with people before Blue Origin does. Stop us if you've heard this before.

New York company takes long view of smallsat launch. The start-up company Launcher told *SpaceNews* that it has hired Igor Nikishchenko, who has more than 30 years of experience with liquid-fuel engine development, as its chief designer. Previously, Nikishchenko worked as deputy chief designer in the liquid propulsion department of Ukrainian aerospace company Yuzhnoye and for the Italian launch vehicle company Avio.

Willing to wait … According to the report, Launcher is interested in oxygen-rich staged combustion, similar to that used for the RD-180 engine but with a smaller engine for a smallsat rocket. The company is targeting payloads up to 300kg for low Earth orbit but does not plan to have a rocket ready for commercial launches until 2026. Needless to say, that is an age and a half in the rapidly developing small-satellite launch market. (submitted by Ken the Bin)

Firefly among lunar payload program winners. Firefly, which is developing the smallsat Beta launch vehicle, was among the bidders selected by NASA for the award of a Commercial Lunar Payload Services contract, SpaceWatch reports. They will now be eligible to win agency task orders for the delivery of small science experiments to the surface of the Moon.

To the Moon and beyond … "In conjunction with our Beta launch

vehicle and our partnership with Intuitive Machines, Firefly will provide an integrated lunar services offering, from the launchpad to the surface of the Moon," Firefly's CEO, Tom Markusic, said. It seems clear that the Texas launch company has ambitions beyond just smallsats.

Stratolaunch tests engine pre-burner at full power. Stratolaunch's 3D-printed preburner has undergone its first hot firing at NASA's Stennis Space Center in Mississippi, Geek Wire reports. A preburner is a key component that typically begins a rocket engine's combustion process, and this hot firing suggests the company is making good progress with the PGA engine, named after company founder Paul G. Allen.

Moving fast … The company indicated that its engineers had designed, built, and tested the pre-burner in 11 months. "Per public records, this is the fastest preburner development in US history," Hanna Steplewska Kubiak, Stratolaunch's vice president of business development, said. We're not sure about that, but it does lead us to believe the company's first rocket may indeed fly by its intended target of 2022. (submitted by Ken the Bin)

Rocket Lab sets launch window for fourth mission. Rocket Lab is nearing the company's third orbital launch of the year and fourth overall flight of its Electron rocket. The company said it would attempt to perform the Educational Launch of Nanosatellites (ELaNa)-19 mission for NASA between December 13 to 21. Lift-off is scheduled between 04:00 and 08:00 UTC from Rocket Lab's launch site in New Zealand.

A big step forward … "It is an honor and privilege to launch NASA payloads on Electron and to be the first small-satellite launcher to fly under a NASA Venture Class Launch Services contract," Rocket Lab founder and CEO Peter Beck said. From our perspective, flying only about a month after the company's first fully commercial mission, It's Business Time, would represent a big step forward for the company. (submitted by

Ken the Bin)

SpaceX misses a Falcon 9 landing. After successfully landing its Falcon 9 rocket 26 consecutive times on the coast and at sea, SpaceX missed one for the first time since June 2016. “Grid fin hydraulic pump stalled, so Falcon landed just out to sea,” SpaceX founder and lead designer Elon Musk tweeted shortly after the rocket touched down. Video of the incident is quite dramatic. The failure came after the successful launch of the CRS-16 mission to supply the International Space Station.

Effect of this uncertain … It is not clear how (if at all) this failure might affect the company’s launch manifest. The company has one more mission planned for 2018, an important GPS launch for the Air Force. However, SpaceX had not planned to recover that booster anyway. We expect that SpaceX engineers will learn from this and continue to improve its system.

Soyuz crew vehicle returns safely to flight. Less than two months after a booster separation issue with a Soyuz rocket caused a dramatic, high-gravity landing, the Russian vehicle soared back into space on Monday. The launch from Kazakhstan—under mostly clear, blue skies—was nominal, and each of the rocket’s first, second, and third stages fired normally.

Back in business … The launch sent NASA astronaut Anne McClain, Canadian David Saint-Jacques, and Russian Oleg Kononenko into space aboard their Soyuz MS-11 spacecraft. This marked a critical launch both for Russia’s space agency, Roscosmos, as well as NASA, because it means the partnership’s sole lifeline to the International Space Station is back in business.

China sets launch date for lunar far side mission. China has officially announced that it will launch a Chang'e 4 mission to the far side of the Moon on Saturday, December 8, Beijing time (Friday afternoon in the United States, 18:30 UTC), Space Policy Online reports. The lander and rover will fly into space on a Long March 3B rocket at the Xichang Satellite Launch Center.

A first for China? … This is an ambitious mission for China, which earlier this year launched a relay spacecraft to facilitate communications between the lander, rover, and Earth. The six-wheeled rover is 1.5 meters long, and although it looks very similar to Yutu, its chief designer, Wu Weiren, told Chinese news agency Xinhua that adjustments were made for the different terrain on the far side and the need to communicate through the Queqiao relay satellite. (submitted by BH)

The same Falcon 9 flies for a third time. Monday's launch of a Falcon 9 rocket carrying 64 smallsats marked the first time a single orbital rocket has ever taken off and landed vertically for a third time. SpaceX has opted not to waste time, money, or mass by painting over the used rockets, so they have a distinctive scorched and sooty appearance.

Block 5 flexing its muscles … This was an exciting step forward for SpaceX, which had only flown its previous Falcon 9 rockets twice. This Block 5 core has now flown three times in seven months and could be pressed into service again early in 2019. Will it get all the way to its goal of 10 flights? We'll have to wait and see.

The H3 rocket gets its first commercial flight. According to Peter B. de Selding of Space Intel Report, Japan's new H3 rocket has found its first commercial customer: satellite operator Inmarsat. The rocket, due to debut in the year 2020, will aim to launch the unspecified Inmarsat mission in 2022.

An important step … With the more cost-efficient H3 rocket, Japan's Mitsubishi Heavy Industries is seeking to increase the number of launches it performs from four a year to about eight. The only way the company can really do this is to sell more commercial launches. This is no easy feat in an increasingly crowded market of boosters offering service to geostationary transfer orbit. Ars explored this issue in depth in November.

Europa Clipper may fly on a Falcon Heavy. It's far from certain, but NASA is seriously looking at flying the six-ton Europa Clipper science mission on a Falcon Heavy rocket. Current law mandates flying the spacecraft on a Space Launch System rocket, which would get the payload to Jupiter's Moon in less than three years. But mission engineers are seeking to protect themselves from the potential for more delays to the development of SLS, Ars reports.

Want to fly on SLS, but … NASA found that adding a Star 48 "kick stage" would allow the Clipper to launch on SpaceX's Falcon Heavy rocket to Jupiter without requiring a Venus flyby, which introduced thermal complications to the mission. "Nobody is saying we're not going on the SLS," Barry Goldstein, the Europa Clipper's project manager, said in a closed meeting. "But if by chance we don't, we don't have the challenge of the inner Solar System. This was a major development. This was a big deal for us."

Delta IV Heavy gears up for next flight. The large booster built by United Launch Alliance is scheduled to make its second flight of 2018 on Friday. Launch of the NROL-71 mission for the National Reconnaissance Office would be from Vandenberg Air Force Base in California and is scheduled for 8:18pm PT (04:19 UTC Saturday).

One to enjoy … This will be the 38th flight for a Delta IV rocket since 2002 and the 11th for the Delta IV Heavy variant with three cores. If skies are clear, this should be a spectacular launch for the West Coast to enjoy. And with only four known Delta IV Heavy launches left on the manifest, watch one before this big rocket retires sometime in the 2020s.

Next three launches

Dec. 7: Long March 3B | Chang’e 4 lander and rover | Xichang Satellite Launch Center | 17:30 UTC

Dec. 8: Delta IV Heavy | NROL-71 spy vehicle | Vandenberg Air Force Base, Calif. | 04:19 UTC

Dec. 13: Electron | ELaNa-19 mission | Mahia Peninsula, New Zealand | 04:00 UTC

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