Rocket Report: Raptor engine sets record, Northrop may say “Aloha!” to Omega

Enlarge / An Ariane 5 rocket lifts off on August 15, 2020.

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Welcome to Edition 3.13 of the Rocket Report!

This week’s report is one of the longest ever, because there seems to be a lot of news in the world of heavy lift.

We try to cover it all—from bad vibrations on the SLS rocket to the Raptor engine setting records.

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.

COVID-19 cases suspend activities at Indian launch site. New regulations have been issued for ISRO’s Satish Dhawan Space

Center in Sriharikota, according to which all regular activities are temporarily suspended as the coronavirus pandemic spreads. Some employees have demanded a full closure of the facility, New Indian Express reports.

Locals on lockdown … The rocket launch station, located on a barrier island in the Bay of Bengal, will function with minimum essential staff to take care of critical activities. All the movements into and out of the employee living area were strictly prohibited. (submitted by Ken the Bin)

PLD Space targeting 2024 for orbital, reusable launch. A feature story in the Spanish newspaper El Pais digs into the background of the startup PLD Space. Founded back in 2011 by Raúl Torres and Raúl Verdú. The company is first building the Miura 1 suborbital vehicle before working on the larger Miura 5 orbital rocket, which is intended to be recovered and reused.

Taking steps to orbit … The company has raised about $21 million over its lifetime, the majority of which has come from private sources. PLD Space estimates it probably will need a total of about $100 million to reach the Miura 5's first launch. The suborbital rocket will allow the company to test key technologies. "First, we create one that allows us to learn enough and then do the final one," Verdú said. The company hopes to launch the smaller Miura 1 rocket next year. (submitted by Leika)

HyImpulse targeting 2022 for first launch. Another European rocket startup, formed by engineers from the German space agency DLR, is targeting late 2022 for the first flight of a small launch vehicle designed around hybrid engines, SpaceNews reports. HyImpulse is developing a three-stage rocket capable of sending 500kg to a 400km low Earth orbit.

Simpler hardware? … According to HyImpulse co-CEO Christian Schmierer, the 40-person company is bankrolled by Rudolf

Schwarz, who is the chairman of German technology company IABG. HyImpulse also has a $3 million grant from the European Commission to advance its launcher technology. HyImpulse is seeking to differentiate itself by using hybrid engines that run on a paraffin-based fuel and liquid oxygen. (submitted by platykurtic, Ken the Bin, and JohnCarter17)

NASA targets October 23 for next crew launch. NASA's SpaceX Crew-1 mission will be the first of regular rotational missions to the space station following completion of NASA certification, the agency said. Crew-1 will launch in late October to accommodate spacecraft traffic for the upcoming Soyuz crew rotation and best meet the needs of the International Space Station.

From two to four … The launch date is pending completion of data reviews and certification following NASA's SpaceX Demo-2 test flight. The mission will carry Crew Dragon commander Michael Hopkins, pilot Victor Glover, and mission specialist Shannon Walker, all of NASA, along with Japan Aerospace Exploration Agency (JAXA) mission specialist Soichi Noguchi for a six-month stay on the ISS. (submitted by JohnCarter17 and Ken the Bin)

SpaceX raises heaps of money. SpaceX is close to finalizing $2 billion in new funding after the company increased the size of the round due to strong demand, according to people familiar with the matter, Bloomberg reports. The company did not comment.

The funding round is oversubscribed … When the transaction is finalized, the company will have an equity value of $46 billion, including the fresh $2 billion in capital, the publication reports. This puts SpaceX as one of the most valuable US venture-backed companies. The funds will likely be

used to support the company's Starship and Starlink projects. (submitted by Ken the Bin, JohnCarter17, and Rick S)

The Rocket Report: An Ars newsletter

The easiest way to keep up with Eric Berger's space reporting is to sign up for his newsletter, we'll collect his stories in your inbox.

Ariane V makes first launch since pandemic start. On Saturday Arianespace launched two communications satellites and a satellite servicer on an Ariane 5 rocket, completing the company's first launch since the reopening of the Guiana Space Center in Kourou, French Guiana, SpaceNews reports.

Vega on deck … The launch was delayed two weeks to replace a problematic sensor on the rocket's first stage, and it was delayed again by a day because of upper-level winds. Weather introduced a 34-minute delay prior to liftoff. Arianespace's next launch will be a long-awaited Vega mission on September 1 carrying 53 smallsats, most recently delayed from June. (submitted by Ken the Bin and JohnCarter17)

SpaceX flies a Falcon 9 for the sixth time. Right on schedule, a Falcon 9 rocket lifted off from Florida on Tuesday morning at 10:31am local time. As this first stage made its sixth flight, a record for liquid-fueled first stages, all appeared nominal with the mission. A few minutes later, the Falcon 9 first stage touched down on a drone ship in the Atlantic Ocean, Ars reports.

Ready to go for seven? … The Starlink platform may eventually turn into a profitable business for SpaceX, although there remains plenty of work to do with regard to ground stations to receive signals, compliances with regulations, and more. But what is unquestionable is that launching Starlink missions has allowed SpaceX to push the boundaries of reuse with its Falcon 9 rocket.

Musk talks Falcon 9 reusability. In a series of tweets this

week, SpaceX founder and chief engineer Elon Musk reiterated that SpaceX will push for 10 flights with each Falcon 9 first stage. Given the Block 5 upgrade of the Falcon 9 rocket's 37 successful launches to date, this suggests the final version of the single-stick rocket has met the goals laid out for it back in 2018, Teslarati reports.

A bit more on turnaround work … Musk said the company almost never needs to replace a whole engine. On the other hand, some parts (like turbine wheels) are changed at times. In terms of limits for the Falcon 9, Musk added that 100-plus flights are possible, although some parts will need to be replaced or upgraded. Cleaning all nine Merlin turbines is difficult, he said. (submitted by danneely and Ken the Bin)

Northrop appears to have canceled Omega rocket. Earlier this week, Northrop sent an email to employees saying it was ending development of the large Omega rocket that was to launch from Florida. As of Thursday morning, however, the company has not made any public announcements.

No Air Force, no Omega … The decision to end Omega does not come as a great surprise, given that the US Air Force did not select it for national security launch contracts in the mid-2020s. Those awards went to SpaceX and United Launch Alliance. Northrop Grumman had talked about trying to forge ahead without a guaranteed customer—but that will now not happen.

SLS rocket may shake too much for Clipper. At a meeting of NASA's Planetary Science Advisory Committee this week, Lori Glaze, director of NASA's planetary science division, said the Europa Clipper mission had recently discovered compatibility issues involving the Space Launch System. This is the vehicle preferred by Congress to launch the Clipper spacecraft,

SpaceNews reports.

A valuable, $4 billion spacecraft … "There have been some issues that have been uncovered just recently," she said of the use of SLS for Europa Clipper. Industry sources told the publication that these compatibility issues likely involve the environment the spacecraft would experience during launch, such as vibrations. If NASA doesn't want to launch the Clipper on the SLS, the alternative is SpaceX's Falcon Heavy rocket. (submitted by BH and Ken the Bin)

Could a Falcon Heavy fly Dragon to the Moon? In a feature story, Ars explores the political and technical dimensions behind the possibility of substituting the Crew Dragon spacecraft and Falcon Heavy rocket into the Artemis Moon mission. The rocket and the spacecraft could provide an alternative to NASA's Orion spacecraft and SLS rocket for ferrying crews to and from lunar orbit.

But, but, but … Such a solution has advantages in terms of much lower cost, and the SpaceX vehicles are now proven in flight. However, reworking Dragon to meet the demands of longer-duration, deep-space flight would not be trivial. And Congress seems unlikely to fund such an approach given its desire to keep legacy jobs in place. At the least, SpaceX seems like a nice option for NASA to keep in its back pocket if there are further delays with the SLS rocket.

Northrop tests Vulcan Centaur booster. Northrop Grumman said it has completed the first qualification test of a new strap-on rocket motor developed for United Launch Alliance's future vehicle Vulcan Centaur, SpaceNews reports. The static firing of the 63-inch-diameter graphite epoxy motor known as GEM 63XL took place at Northrop Grumman's facility in Promontory, Utah.

That's a big booster … The motor fired for approximately 90 seconds, producing nearly 449,000 pounds of thrust to qualify the motor's internal insulation, propellant grain, ballistics

and nozzle. That's according to Charlie Precourt, Northrop Grumman's vice president of propulsion systems. The GEM 63XL version is 72-feet long, and it will fly on the Vulcan Centaur rocket as early as 2021. (submitted by Ken the Bin and JohnCarter17)

SpaceX moves ahead with Air Force claim. SpaceX said in a court document filed Wednesday that it is pressing on with a legal complaint against the US Air Force over contracts awarded in October 2018 to United Launch Alliance, Northrop Grumman, and Blue Origin, SpaceNews reports. SpaceX reiterates its claim made in a May 2019 protest that the Air Force gave an unfair advantage to the other companies by awarding them Launch Service Agreements and excluding SpaceX.

SpaceX says Air Force should end all 2018 contracts … Earlier this month the Air Force announced that SpaceX and ULA were selected as the winners of the National Security Space Launch Phase 2 launch service procurement, with ULA getting 60 percent of national security launches over five years while SpaceX nabbed 40 percent. SpaceX insists that the Air Force's 2018 development awards caused SpaceX "irreparable harm" and gave ULA a key advantage in winning the larger share of Phase 2 launches. (submitted by platykurtic and JohnCarter17)

Raptor engine sets chamber pressure records. As SpaceX continues to tune and test and develop its Raptor rocket engine, the company is understandably putting the engine through its paces. This week, company founder Elon Musk released a graphic showing Raptor, on a test stand, briefly reaching a main combustion chamber pressure of 330 bar during a controlled burn, Teslarati reports.

Setting the bar higher … The publication reports that, outside of subscale laboratory tests, the highest main combustion chamber known to full-scale, orbital-class rocketry was achieved by the Soviet Union in the 1980s with the RD-701 engine. The unique engine was canceled before it could be

used, but it reportedly reached pressures of 290-300 bar in one mode of operation. Now Raptor has exceeded this by 10 percent. (submitted by Ken the Bin and JohnCarter17)

Next three launches

Aug. 26: Delta IV Heavy | NROL-44 | Cape Canaveral, Fla. | 05:50 UTC

Aug. 27: Falcon 9 | SAOCOM 1B | Cape Canaveral, Fla. | 23:19 UTC

Sept. 1: Vega C | Rideshare mission for 53 satellites | Kourou, French Guiana | 01:51 UTC

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