24 OCTOBER 2021

THE FINAL FRONTIER FLASH

Developments & Analysis of the Space Domain

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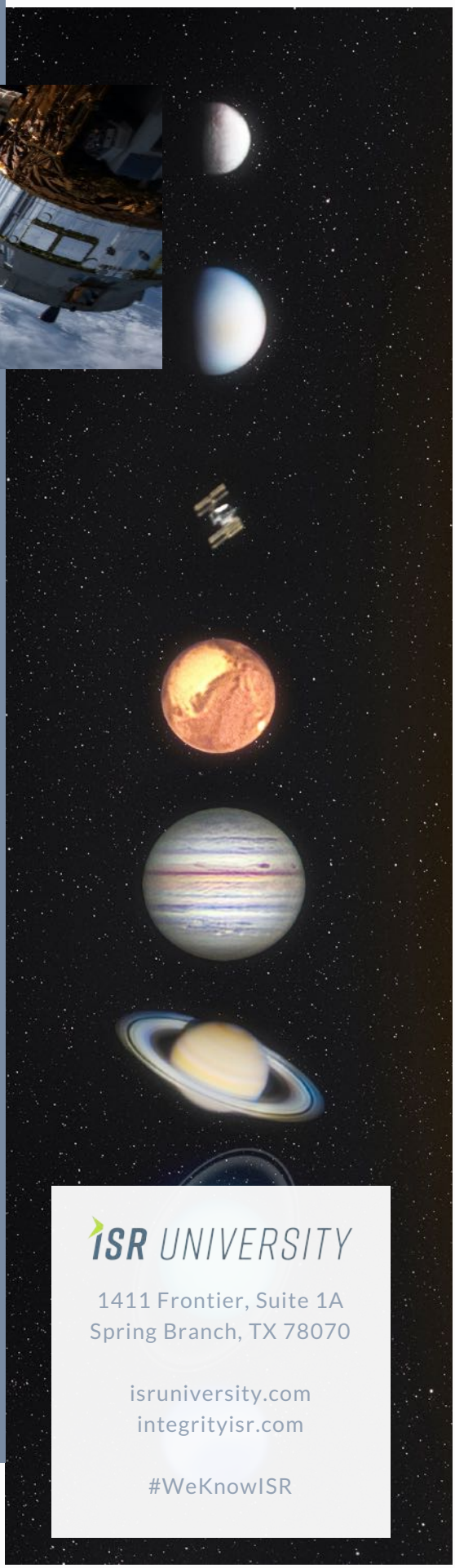

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Final Frontier Flash Catalog

All hyperlinks are underlined

Not Dead Yet--Shiyan 10 Raises Its Orbit

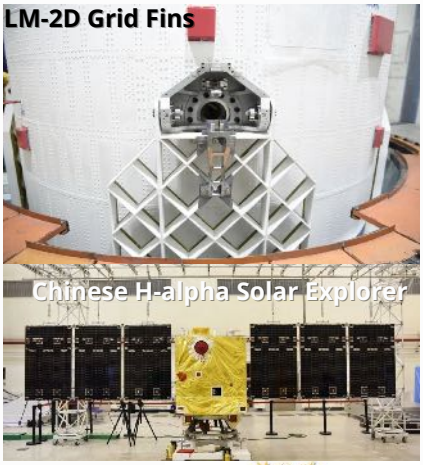
19 October 2021: Nearly three weeks after suffering an anomaly during launch that appeared to result in the loss of the spacecraft, Shiyan-10 now appears to be active and has increased its altitude at perigee from 177km to nearly 1100km.

- China launched the experimental Shiyan-10 satellite on a Long March 3B from Xichang Satellite Launch Center Sept. 27 but the usual declaration of success did not follow.
- New orbital elements published by 18 SPCS indicate that Shiyan-10 has performed small burns to raise the perigee of the orbit. Latest update has SY-10 in a 1100km x 40100km orbit inclined at 51 degrees.
- The incremental increases suggest smaller, backup engines are being used instead of a larger burn by a main engine to circularize the orbit.
- The health and operational status of the satellite—along with its intended purposes—remain unknown.
- Neither Chinese state media nor the country's main space contractor, the China Aerospace Science and Technology Corp. (CASC) has commented on the development.
- A social media post of an apparent Shiyan-10 'big red screen' —which are displayed at Chinese mission control centers following launch success—appeared briefly on social media before being swiftly deleted.

Shiyan spacecraft are technology test satellites that are built by different providers as a pathfinder for new satellite technologies. The last orbital adjustment for SY-10 occurred on 21 October 2021. An announcement of launch success may be made if and when the satellite reaches its intended orbit.

China Tests New Configuration/Grid Fins on LM-2D

14 October 2021: A Long March 2D lifted off from Taiyuan space launch facility in Northern China. The launch carried the Chinese H-alpha Solar Explorer and 10 other satellites into orbit. The rocket used a new configuration to deploy more than 10 satellites for the first time while the first stage also included grid fins.



- For the first time, the Long March 2D flew with grid fins on its first stage, similar to those sported by SpaceX's Falcon 9 rocket.
- The purpose of these is not to help recover the stage for reuse, but to help guide it as it falls back to Earth and ensure that it falls harmlessly into its planned drop zone.

Because China's older launch sites are located inland, its rockets have become infamous for dropping debris in populated areas (see video1 or video2), so recent launches of several Long March variants have tested the fins as a way of reducing the risk to people and property under the flight path.

South Korea Launch Attempt

20 October 2021: South Korea's second-generation launch system, Korea Space Launch Vehicle (KSLV)-II, has conducted its maiden orbital launch attempt. KSLV-II, also known as Nuri, was developed by the Korea Aerospace Research Institute (KARI). Nuri lifted off on October 21 from the Naro Space Center. This launch attempted to carry a 1.5-ton mass simulator to a 700 km Sun-Synchronous Orbit (SSO), although a premature shutdown of the third stage resulted in a failure to achieve orbit. Launch VIDEO

- Nuri is the second rocket in South Korea's family of orbital launch vehicles. The country's first orbital rocket was the KSLV-I, also known as Naro-1.
- Unlike Naro-1, Nuri is an all-South Korean-built rocket. Nuri is a three-stage launch vehicle, all stages using Jet-A/LOX propellant.
- Throughout 2019-2021, the final certification tests ahead of Nuri's maiden launch were completed. The completion of these tests green-lighted the assembly of the Nuri pathfinder.
- In early September 2021, Nuri successfully completed a wet dress rehearsal (WDR). A WDR is a test where the rocket is loaded with actual propellants during a mock launch countdown.
- Nuri's first and second stages performed nominally. The third stage cut out 50 seconds early, resulting in both the stage and mass simulator falling short of orbit.
- KARI is currently planning for a second orbital flight. The mission will launch a 1.3-ton satellite to orbit along with a 0.2-ton performance-verifying satellite. This flight is scheduled for no earlier than May 19, 2022.
- South Korean President Moon Jae-In said, "Although (the launch) failed to achieve its objectives perfectly, it was an excellent accomplishment for a first launch. The separations of the rockets, fairings, and the dummy satellite worked smoothly. All this was done based on technology that is completely ours."

KARI has numerous vehicle upgrades planned including an engine upgrade and a new staged combustion cycle engine for upper-stage applications. These upgrades, along with others, allow for significant payload mass to be launched to geostationary transfer orbit (GTO) and geostationary orbit (GEO). This future rocket will lift KARI's GEO satellites, lunar exploration probes, and lunar landers.

There Goes the Neighborhood: Shijian-21 Launches

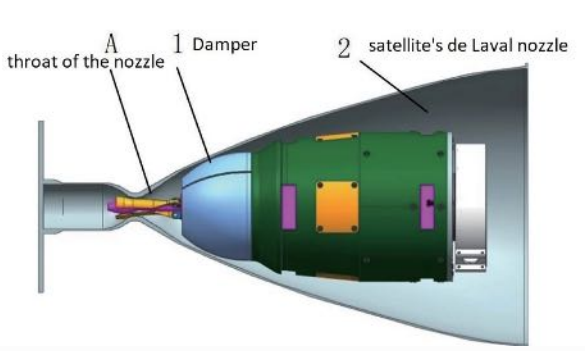
24 October 2021: A LM-3B launched from Xichang Satellite Launch Center. Open source astronomers report the payload is the Shijian-21 experimental satellite. Official press releases say SJ-21 will test space debris mitigation technology. Launch Video.

- Commercial sources are tracking 2 objects (2021-094A & 094B) in GTO. Observations in the coming days will determine which of the objects is the SJ-21.
- Chinese news sources noted the satellite would test "Space debris mitigation technologies." Such capabilities are "dual-use," with both civilian and military applications.

Shijian ("practice") satellites are technology demonstration satellites. Shijian-17, launched by the first Long March 5 heavy-lift rocket in 2016, is an experimental satellite that has carried out rendezvous and proximity operations in geostationary orbit. The Secure World Foundation has tracked Chinese and other space actors' rendezvous and proximity operations. It notes that Shijian-17 has demonstrated maneuverability around the geostationary belt, circumnavigated Zhongxing-5A (ChinaSat-5A) and made later approaches to Zhongxing-6B and Shijian-20, which launched in December 2019.

New Potential Chinese Anti-Satellite Weapon

21 Oct 2021: South China Morning Post article reports China has developed a device that can lock itself into the thruster nozzles used by most satellites and stay there for long periods undetected.



- A team of Chinese military researchers say they have built and tested an anti-satellite robotic device that can place a small pack of explosives into a probe's exhaust nozzle.
- The device could stay inside the satellite for an extended period using a locking mechanism driven by an electric motor. If needed, the process can be reversed to separate it from the target.
- The project was funded by a government program to develop a new type of warhead for rocket missiles, according to the paper that was published in the domestic journal Electronic Technology & Software Engineering in September.
- Per the report, the device has been built and tested in a ground facility.
- The explosives are packed into a bullet shaped device that weights only 3.5kg and mirrors the shape of the de Laval nozzles that power most satellites.
- The device works by pushing a rod through this narrow point, which then opens up to anchor itself into place by locking the device against the inner wall of the nozzle.
- When the device is detonated, the explosion will be partially contained inside the nozzle and be mistaken for an engine mishap, according to a space scientist not involved in the project.
- In recent years China's anti-satellite program has focused on technology that would produce little or no debris, such as capturing a satellite with a net or robotic arms.
- The Chinese military has also developed various types of ground-based weapons that could blind or damage a passing satellite with a laser beam.

There were no other open source reports discussing this particular threat. If the SCMP article is accurate it describes what is likely the very early stages of development for such a weapon system. Command and control of such a device on orbit to maneuver it to latch onto a target satellite would likely require a significant test and development effort.

The article also contained a link to an excellent 5 min video on the evolution of China's space program.

Pics o' the week!

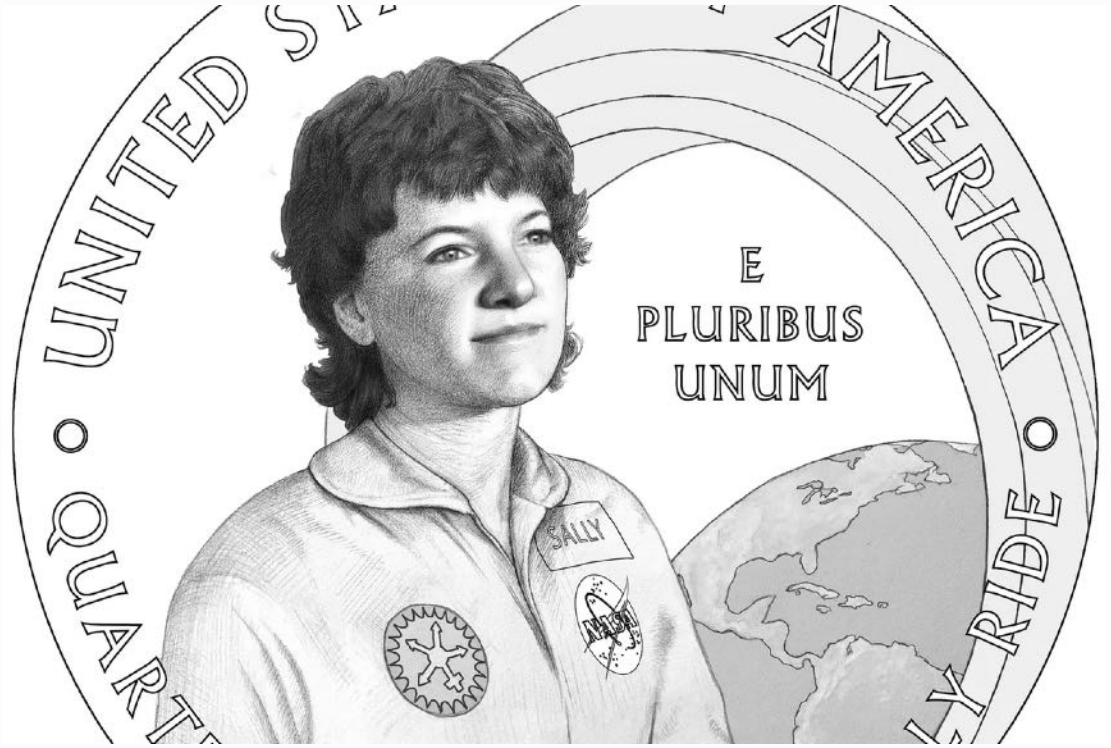
Shenzhou-13 Taikonauts Prepare for Launch

China's Deep Blue Successful 100m Hop

Patch for CASIC Tengyun (腾云) spaceplane project


SLS Taking Shape


Meanwhile, in Texas...Video



US Mint will release Astronaut Sally Ride Quarter in 2022

Soviet Image from Zond-8, 24 Oct 1970