

Dream Chaser spacecraft may be used for Hubble repair mission

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The Dream Chaser Space System, built by the Sierra Nevada Corporation, may be used for one more servicing mission to the Hubble Space Telescope. Credit: NASA

The final servicing mission to the venerable Hubble Space Telescope (HST) was in 2009. The shuttle Atlantis completed that mission (STS-125,) and several components were repaired and replaced, including the installation of improved batteries. The HST is expected to function until 2030 – 2040. With the retiring of the shuttle program in 2011, it looked like the Hubble mission was destined to play itself out.

But now there's talk of another servicing mission to the Hubble, to be performed by the Dream Chaser Space System.

The Hubble was originally deployed by the Space Shuttle Discovery in 1990. It was serviced by crew aboard the shuttles 5 times on 5 different shuttle missions. Unlike the other observatories in NASA's Great Observatories, the Hubble was designed to be serviced during its lifetime.

Those servicing missions, which took place in 1993, 1997, 1999, 2002, and 2009, were complex

missions which required coordination between the Kennedy Space Center, Johnson Space Center, and the Goddard Space Flight Center. Grasping Hubble with the robotic Canadarm and placing it inside the shuttle bay was a methodical process. So was the repair and replacement of components, and the testing of components once Hubble was removed from the cargo bay. Though complicated, these missions were ultimately successful, and the Hubble is still operating.

A future servicing mission to the Hubble would be a sort of insurance policy in case there are problems with NASA's new flagship telescope, the James Webb Space Telescope (JWST.) The JWST is due to be launched in 2018, and its capabilities greatly exceed those of the Hubble. But the James Webb's destination is LaGrange Point 2 (L2), a stable point in space about 1.5 million km (932,000 miles) from Earth. It will enter a halo orbit around L2, which makes a repair mission difficult. Though deployment problems with the JWST could be corrected by visiting spacecraft, the Telescope itself is not designed to be repaired like the Hubble is.



A view of the Hubble Space Telescope from inside space shuttle Atlantis on mission STS-125 in 2009, the final

repair mission. Credit: NASA

Since the JWST is risky, both in terms of its position in space and its unproven deployment method, some type of insurance policy may be needed to ensure NASA has a powerful telescope operating in space. But without Space Shuttles to visit the Hubble and extend its life, a different vehicle would have to be tasked with any potential future servicing missions. Enter the Dream Chaser Space System (DCSS).

The Dream Chaser Space System is like a smaller Space Shuttle. It can carry seven people into Low-Earth Orbit (LEO). Like the Shuttles, it then returns to Earth and lands horizontally on an airstrip. The DCSS, however, does not have a cargo bay or a robotic arm. If it were used for a Hubble repair mission, all repairs would likely have to be done during spacewalks. The DCSS is designed as a cargo and crew resupply ship for the International Space System. The much larger shuttles were designed with the Hubble in mind, as well as other tasks, like building and servicing the ISS and recovering satellites from orbit.

The DCSS is built by Sierra Nevada Corporation. It will be launched on an Atlas V rocket, and will return to Earth by gliding, where it can land on any commercial runway. The DCSS has its own reaction control system for manoeuvring in space. Like other commercial [space](#) ventures, the development of the DCSS has been partly funded by NASA.



The robotic Canadarm during STS-72, as Space Shuttle Endeavour mission in 1996. Credit: NASA

The James Webb has a complex deployment. It will be launched on an Ariane 5 rocket, where it will be folded up in order to fit. The primary mirror on the JWST is made up of 18 segments which must unfold in three sections for the telescope to function. The telescope's sun shield, which keeps the JWST cool, must also unfold after being deployed. Earlier in the mission, the Webb's solar array and antennae need to be deployed.

This video shows the deployment of the JWST. It reminds one of a giant insect going through metamorphosis.

If either the mirror, the sunshield, or any of the other unfolding mechanisms fail, then a costly and problematic mission will have to be planned to correct the deployment. If some other crucial part of the telescope fails, then it probably can't be repaired. NASA needs everything to go well.

People have been waiting for the JWST for a long time. It's had kind of a tortured path to get this far. We all have our fingers crossed that the [mission](#) succeeds. But if there are problems, it may be up to the Hubble to keep doing what it's always done: provide the kinds of science and stunning images

that excites scientists and the rest of us about the Universe.

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