NASA's Voyager 1 Resumes Sending Engineering Updates to Earth

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NASA's Voyager 1 spacecraft is depicted in this artist's concept traveling through interstellar space, or the space between stars, which it entered in 2012.

Credit: NASA/JPL-Caltech

After some inventive sleuthing, the mission team can — for the first time in five months — check the health and status of the most distant human-made object in existence.

For the first time since November, NASA's Voyager 1 spacecraft is returning usable data about the health and status of its onboard engineering systems. The next step is to enable the spacecraft to begin returning science data again. The probe and its twin, Voyager 2, are the only spacecraft to ever fly in interstellar space (the space between stars).

Voyager 1 stopped sending readable science and engineering data back to Earth on Nov. 14, 2023, even though mission controllers could tell the spacecraft was still receiving their

commands and otherwise operating normally. In March, the Voyager engineering team at NASA's Jet Propulsion Laboratory in Southern California confirmed that the issue was tied to one of the spacecraft's three onboard computers, called the flight data subsystem (FDS). The FDS is responsible for packaging the science and engineering data before it's sent to Earth.

After receiving data about the health and status of Voyager 1 for the first time in five months, members of the Voyager flight team celebrate in a conference room at NASA's Jet Propulsion Laboratory on April 20.

Credit: NASA/JPL-Caltech
Full Image Details

The team discovered that a single chip responsible for storing a portion of the FDS memory — including some of the FDS computer's software code — isn't working. The loss of that code rendered the science and engineering data unusable. Unable to repair the chip, the team decided to place the affected code elsewhere in the FDS memory. But no single location is large enough to hold the section of code in its entirety.

So they devised a plan to divide the affected code into sections and store those sections in different places in the FDS. To make this plan work, they also needed to adjust those code sections to ensure, for example, that they all still function as a whole. Any references to the location of that code in other parts of the FDS memory needed to be updated as well.

The team started by singling out the code responsible for packaging the spacecraft's engineering data. They sent it to its new location in the FDS memory on April 18. A radio signal takes about 22 ½ hours to reach Voyager 1, which is over 15 billion miles (24 billion kilometers) from Earth, and another 22 ½ hours for a signal to come back to Earth. When the mission flight team heard back from the spacecraft on April 20, they saw that the modification worked: For the first time in five months, they have been able to check the health and status of the spacecraft.

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During the coming weeks, the team will relocate and adjust the other affected portions of the FDS software. These include the portions that will start returning science data.

Voyager 2 continues to operate normally. Launched [over 46 years ago](#), the twin Voyager spacecraft are the longest-running and most distant spacecraft in history. Before the start of their interstellar exploration, both probes flew by Saturn and Jupiter, and Voyager 2 flew by Uranus and Neptune.

Caltech in Pasadena, California, manages JPL for NASA.