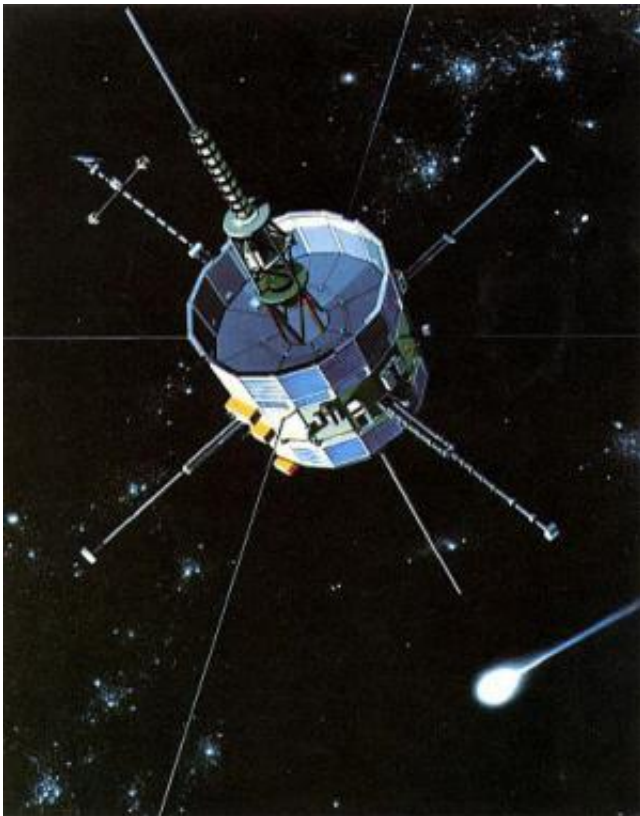


Bid to 'reboot' aging NASA satellite is scuttled as fuel system fails

July 10 2014, by Monte Morin, Los Angeles Times



ICE (ISEE-3). Credit: NASA

ISEE-3 will not be returning home after all. Authors of a plan to revive the forgotten NASA satellite and return it to Earth orbit conceded Wednesday that a failure in the spacecraft's propulsion system has made it impossible to change its flight path.

"There's only so much you can do before you have to say, 'It's dead, Jim,'" said Keith Cowing, a former NASA astrobiologist and a spokesman for the private, crowd-funded ISEE-3 Reboot Project.

Unable to budge the probe from its current orbit around the sun, project engineers say they have switched the spacecraft to "science mode" and will collect data from it for as long as they can - perhaps a couple of months.

After ISEE-3 makes a near Earth flyby on Aug. 10, the spacecraft will continue to orbit the sun and will pass by the Earth again in roughly 17 years.

News of the propulsion failure surprised one of the chief architects of the satellite's orbital path, Bob Farquhar, a retired NASA engineer. He said he had been highly skeptical the effort would work, but not because of an equipment malfunction.

"I was always worried about orbital determination and things like that," Farquhar said. "I always thought the spacecraft would work OK though."

Farquhar plans to be at the Reboot Project's headquarters - a converted McDonald's restaurant at NASA's Ames Research Center in Mountain View, Calif. - during the spacecraft's Earth flyby.

"I'll know where it is in the sky and at what time, and I'm just going to look up and wave goodbye to my old friend," Farquhar said.

The realization that ground controllers could no longer control the satellite's flight path came one day after engineers succeeded in making a minute change in the probe's orbit.

But shortly after that initial burst of thrust, ISEE-3's engines stopped

firing entirely.

On Wednesday, members of the ISEE-3 Reboot Project spent two hours attempting to diagnose and repair the problem by "jiggling" fuel valves on and off and instructing the 36-year-old craft to fire several of its 12 thrusters.

When these attempts failed to work, engineers concluded that the satellite's fuel system had lost critical pressure.

"We have exhaustively tested the [propulsion system](#) with no good results," Dennis Wingo, chief executive of Skycorp Inc. and leader of the privately run project, said on his Twitter account.

The satellite, which was officially retired by NASA in 1997, uses hydrazine fuel to maneuver. The hydrazine is stored in eight separate fuel tanks.

Pressurized gas forces fuel through the system when the engines are instructed to fire. Once the hydrazine flows down the fuel line, and through an open valve, it comes into contact with a catalyst. The catalyst breaks down the hydrazine, which results in a blast of hot gas.

If the tanks are no longer pressurized with nitrogen gas however, the [fuel](#) cannot be forced to flow through opened valves and will not contact the catalyst.

Cowing said it was possible there was an extremely small leak in the system that allowed the gas to escape.

"Even if you had a leak where stuff came out only a molecule at a time, over the course of 36 years it would add up," Cowing said. "There may still be some stuff in there; it's just not enough."

The half-ton, drum-shaped satellite has been orbiting the sun since the 1980s.

As the probe neared Earth this year on a prearranged flyby, NASA gave permission to a group of former agency employees and engineers to take control of the [spacecraft](#) - a historic first.

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