

The Greatest Leap, part 5: Saving the crew of Apollo 13

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Video shot by Joshua Ballinger, edited and produced by Jing Niu and David Minick. [Click here for transcript.](#)

As Apollo 13 astronaut Fred Haise floated in the tunnel snaking between the Lunar Module and Command Module, he heard—and felt—a loud bang. Around him, the two vehicles began to contort. Then, the metal walls of the tunnel crinkled as the spacecraft shuddered.

Apollo: The Greatest Leap

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Wide-eyed, Haise scrambled from the tunnel into the Command Module alongside Jack Swigert and their commander, Jim Lovell. From his customary position at Lovell's right, Haise quickly assessed something was drastically wrong with the spacecraft's cryogenic tanks—the oxygen was just *gone*. Fortunately, there didn't seem to have been a chemical explosion, because only a thin wall separated the oxygen tank from the propellant tanks used to power the spacecraft's main engine.

"It really didn't explode like something you think of with shrapnel," Haise told Ars, in an interview. "It just over-pressurized, and then it let go some steam. If it had been a shrapnel-type explosion, I wouldn't be here today."

The incident took place April 13, 1970, near the end of the second full day of the Apollo 13 flight. The crew aboard NASA's third mission to the surface of the Moon had just completed a live television broadcast. They were tired but also excited. They were supposed to go to bed soon, and when they woke up, the spacecraft would enter lunar orbit. Within about a day, Lovell and Haise were set to become just the fifth and sixth humans to walk on the surface of another world.

Mission commander James A. Lovell Jr., (left) and lunar module pilot Fred W. Haise Jr., (right) prepare to participate in water egress training.

But now, seated in the Command Module *Odyssey*, contemplating the loss of an oxygen tank, Haise's first thought was not for any danger Apollo 13 might face returning home. In the

immediate aftermath of the accident, death did not seem so imminent. Rather, Haise lamented the lost opportunity to set foot on the Moon.

“I was just sick to my stomach with disappointment,” Haise recalled. “I knew we had an abort, and I’d lost the landing. That was my main feeling. We thought we had a second tank that was intact.”

But the damage was such that the second tank was also affected. It may have been leaking oxygen more slowly, but the leak had begun all the same. Soon, the spacecraft would lose both of its oxygen tanks. This didn’t matter so much for oxygen inside the Command Module, as the astronauts had enough to breathe. But without the oxygen tanks, the spacecraft could not operate its fuel cells. The crew of Apollo 13 would have no power. They faced the prospect of freezing to death in outer space.

As the astronauts and flight controllers in Mission Control realized they could not stop the leak in the second oxygen tank, the mission suddenly changed. No longer would Apollo 13 seek to land on the Moon. Their mission had become one of survival.

“So many chances”

Even before the Apollo 13 accident, some senior NASA managers had wondered how long they could get away with the grave risks posed by going to the Moon. Given all of the different aspects of a lunar flight—from the Saturn V launch vehicle, to the Command and Service Modules, and finally the Lunar Modules—an awful lot of very complicated components had to work just right for mission success.

At the outset of the program, NASA had formally established the target probability of overall success for each Apollo mission—a landing and return—at 90 percent. Overall crew

safety was estimated at 99.9 percent. But a 1965 assessment of these risks had found that, based upon the current plans and technology, the probability of mission success for each flight was only around 73 percent, while rated per-mission crew safety sat at 96 percent.

Few people lived day-to-day with these risks and concerns more than Robert Gilruth. His fame may have receded in recent decades, but Gilruth stood above all others in America's efforts to send humans to the Moon and back. After NASA's creation, the fledgling agency had turned to Gilruth to lead the Space Task Group to put a human into space before the Soviet Union. Later, after President John F. Kennedy called for Moon landings, that task fell to the Manned Spacecraft Center in Houston, which Gilruth directed.

Enlarge / Cigars and US flags dot the Mission Control Center in Houston on May 26 after successful completion of the Apollo 10 Moon mission. Among the celebrants are Alan Shepard (left), who was the first US man in space, and Robert Gilruth (right), Director of the Space Center.

Getty Images / Bettmann

An aeronautical engineer from a small town in Minnesota, Gilruth had a more pragmatic view of human spaceflight than Kennedy's grand vision. As he saw it, after NASA had successfully put astronauts into orbit with the Mercury program, the next logical step toward a permanent presence in space would have been to build a space station there.

"But that didn't have the flair that was needed at the time, in the eyes of Mr. Kennedy," Gilruth, who died in 2000, recalled in an oral history. "He thought going to the Moon was about as good a thing as you could possibly do. I think LBJ liked that, too. Nobody in NASA would say they couldn't. I at least said that 'I'm not sure we can do it, but I'm not sure we can't.'"

Gilruth had no illusions about the challenge of reaching the Moon. Moreover, once Neil Armstrong and Buzz Aldrin stepped onto the Moon before a global television audience, NASA had achieved Kennedy's mandate. If each mission had a one-quarter chance of not landing on the Moon and a non-negligible chance of losing a crew, why keep at it? That feeling only grew within Gilruth as NASA accomplished more Moon landings.

"I put up my back and said, 'We must stop,'" Gilruth said. "There are so many chances for us losing a crew. We just know that we're going to do that if we keep going."

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