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Soyuz TM-5 Space Stranding Near Miss (September 5, 1988)

In September 1988, the Soyuz TM-5 was headed back to Earth. It was commanded by veteran cosmonaut Vladimir Lyakhov, but the copilot was an Afghan man. He had been given six months of hurried space training and then sent up as a publicity stunt to encourage the pro-Soviet puppet regime in Kabul in its losing war against rebels. The entire space mission had been thrown together quickly, without thorough planning or training. The Russians knew that the Afghan was only along for show, and they expected him to be on his best behavior.

The spaceship's autopilot counted down to the rocket burn that would send it back to Earth. Shortly before the scheduled burn, the autopilot "armed" the rocket engine and prepared to send the "fire" command. Just seconds before ignition, however, infrared horizon sensors on the spaceship became confused by the setting sun, and an "ignition inhibit" command was generated. The "fire" command had also just been issued, however, and the two commands canceled each other out.

The cosmonauts spent several minutes puzzling over the absence of the rocket burn. Meanwhile, the sun had fully set and the horizon sensors were no longer in disagreement. The "inhibit" command was removed, and the "fire" command unexpectedly went into effect. The engines lit, startling the cosmonauts, who manually shut them down within a few seconds. Had the burn been completed after such a delay, the capsule would have splashed down in the northern Pacific Ocean, far from any possible rescuers.

After two additional orbits around Earth and intensive consultations with Mission Control, the crew was ready to try again. They reconfigured their navigation system to ignore the horizon sensors entirely.

But seconds after starting the planned 230-second-long rocket burn to head back to Earth, the spaceship's computer detected a malfunction in a navigation instrument. It shut off the engine again, halted the automatic sequence, and sounded an alarm.

Mission Control Center director Viktor Blagov later explained that "it is clear that a link between programs came into operation in the computer which had not been envisaged by the programmers." In English, there was a software command error. It originated in the rushed and careless flight plan preparation.

Lyakhov quickly determined that the spaceship's orientation was proper, and he assumed that the shutdown was simply a leftover problem with the navigation device. He ordered the computer to resume the program for descent. The rocket engine fired a second time.

But then, 49 seconds later, the computer again detected an error and shut off the rocket engine for a third time.

“When the engine cut itself off for the second time, I felt very much like starting to descend, and I restarted it,” Lyakhov later told a press conference. “Naturally, I was conscious of the fact that the restart might not be without consequence. That was indeed my mistake, and I admit it, but there was very little time then, merely seconds, to make the decision. And I also wanted to land very much, and it was already the second attempt, after all.”

At this point, when the engine stopped for the third time, Lyakhov did what according to Blagov “he should have done from the outset, curtail dynamic operations and await communication with the control center in order to report on the situation.” Mission Control would provide new instructions in 10 or 20 minutes, and the landing could resume on the next pass.

But the Afghan pilot, Abdul-Ahad Mohmand, had a different idea. He knew from his own combat flying experience that the first thing a pilot in a contingency situation must do is to assess the status of his vehicle. While Lyakhov relaxed and waited for radio contact with Moscow, Mohmand ran his eyes over the control panel and its gauges and timers. And then he nearly shouted with alarm.

Although the computer had shut off the rocket burn the last time the burn was aborted, it was still following Lyakhov's command to ignore its earlier automatic shutoff. Thus it was continuing with the normal descent sequence of the other commands. It had already concluded (falsely, of course) that the ship was descending toward Earth after a completely successful full-duration burn. This meant that after it had received the expected cue of "rocket shutdown," it knew that the next step was to fire the explosive bolts to separate the Soyuz's Descent Module from its Equipment Module.

But the ship was still in orbit, and the rocket engine in the Equipment Module was the only way to get home. Mohmand saw that the clock showed less than a minute to the firing of the explosive separation bolts!

Shocked into action, Lyakhov was able to shut down the sequence with another command. If he had waited for advice from Moscow, and if the Afghan had obeyed his instructions to sit quietly and trust in the Russian commander, the Soyuz modules would have separated while the spaceship was still in orbit. The two men would have had battery power and air for only a few hours, and then both would have died.

“By his timely actions he prevented very serious trouble that might have happened in orbit,” a veteran cosmonaut explained later, referring to Lyakhov's button pushing. “[He] shut the program down and averted—well, let us not speak of it at this stage—but possibly very serious trouble in which the crew might have found itself in orbit.” The euphemism “serious trouble” refers to their suffocating to death.

Yet a decade later, the official Russian Soyuz flight safety report to NASA mentioned only the Soyuz TM-5's delay in landing (the crew was able to complete the descent the following day). No mention was made of the confused computer that had brought the men to within seconds of death. The story was only vaguely hinted at in public, but it was common knowledge among the cosmonauts, who told their European colleagues the whole story. Mohmand, too, described the incident in detail to an interviewer in Germany, where he was living in exile following the collapse of the Soviet-backed Afghan regime that he had served. He now works as a laborer in a print shop, where his coworkers humor his wild tales of space flight.

“But I had performed well, had made a good flight and had overcome difficulties,” he had said. “I had assisted my commander during the difficulties. After the engine had stopped, I had said that we should first try to find out what was going on, because at the time, we didn't have contact with [Moscow]. I told the commander once, twice, three times. Later, on Earth, I heard that we had had only twenty seconds before the vehicle would have separated. The second time, we even had less—only two seconds. I did all that, so after the landing, I was happy.”

I arrived at a preliminary reconstruction of this near-disaster based on interviews that were vague when taken one by one but that when taken together painted an alarming picture.

Independent space journalists in Moscow were also working on this story. On the tenth anniversary of the incident, in mid-1998, the biweekly space magazine *Novosti Kosmonavtiki* (News of Cosmonautics) printed an article on the incident. A space engineer named Aleksandr Fyodorov provided his own version of the events. He reported that when the automated jettison sequence advanced to within two minutes of execution, a warning tone sounded and an indicator light came on. Fyodorov states that it was these signs, and not Mohmand's cries, that warned Lyakhov, the Russian pilot. At least, that was Lyakhov's story, and he was sticking to it. Other Soyuz cosmonauts I've talked to, however, are unaware of any such alarms.

At this point, Fyodorov continued, Lyakhov called the control center by radio and requested permission to manually issue a “stop” command and switch some sensors off. He waited a full minute or more but received no answer from Moscow. The article makes no mention of any of Mohmand's warnings.

Finally, Lyakhov stopped waiting and entered the commands on his control panel, stopping the sequence. In this account, the clock had reached 79 seconds before jettison, which would have spelled certain doom for both men. Fyodorov quoted Lyakhov as saying that only after the sequence had been aborted did the crew realize the depth of their peril in those critical seconds.

They had to spend an extra day in space, wearing protective space suits designed for only a few hours. They had emergency rations, but they had nothing to do except sit in their seats and think about Earth. Finally, their orbit brought them back across Russia.

On Moscow TV, cosmonaut Vladimir Dzhanibekov was asked how the foul-up could have happened. "Well, evidently, a kind of blunting of vigilance, frequent in success, plays its part here," he explained. "Some caution and vigilance was lost. Perhaps there was a little less attention, a little less concentration." Vladimir Semyachkin, a senior operations specialist at Mission Control, was blunter: "The main cause of the crew's daylong torments was acknowledged to be a combination of incorrect actions of the crew commander and mission control personnel." I've worked with Semyachkin and trust his judgment, since he struck me as a ferociously candid "take-no-prisoners" kind of operator.

Whichever version of the crisis is closer to the truth, one alarming aspect stands out: The computer foul-ups nearly killed two men, and they would have worried any potential commercial clients interested in using the Soyuz capsules. So the Russians quietly fixed the computer problem and never bothered to tell NASA about the incident.