

**Subject:** Cons. Journal. Part 2.

**From:** "John Winston" <johnfw@mlode.com>

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This talks about flights to Mars.

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But if there is a hardware problem, the "flight may no longer be continued," Popovkin said.

"If there is a problem with the engine itself, and the command was in fact sent to the engine and the engine did not fire, very little can be done," said Anatoly Zak, a Russian space historian, journalist and publisher of Russian SpaceWeb.com

A dearth of mission-tracking resources makes recovery work more difficult. Just one communications station in the world - at Baikonur - can send commands to the craft as it passes overhead.

"They need to download data, analyze data, upload data," Zak said. "So they have a very narrow window of opportunity to save the mission."

Early Wednesday, Roscosmos called on amateur satellite trackers to follow the troubled craft. The first of two crucial rocket burns was scheduled while Phobos-Grunt sped over South America, but observers in Brazil did not see the engine fire, Oberg said.

Likewise, astronauts on the international space station, including American Mike Fossum, awoke early to watch one of the rocket burns, said N-SA spokesman Kelly Humphries. The astronauts also could not spot a telltale flare.

Planning for the \$170 million mission began in the 1970s but was interrupted by the collapse of the Soviet Union. It later became an international mission after China added a small, detachable craft, Yinghuo-1, that was to orbit Mars. The French contributed several scientific instruments, and the U.S.-based Planetary Society provided a small disk carrying hardy microbes to see whether life could survive the 34-month round trip to Mars.

Thirty tiny tubes of bacteria, yeast, and near-microscopic animals known as tardigrades, or water bears, are now trapped in space, going in circles.

"It's not a failure yet," said Bruce Betts, the Planetary Society scientist leading the \$500,000 Living Interplanetary Flight Experiment, or LIFE. "It's in limbo. It's a little stressful. It's a feeling of helplessness."

The Russian romance with Mars extends back more than a century, said Cathleen Lewis, a Russian space specialist and curator at the Smithsonian's National Air and Space Museum.

"Some of the earliest Soviet and pre-Soviet era science fiction stories of space exploration were about going to Mars," Lewis said. She pointed to a 1908 novel, "Red Star," by Alexander Bogdanov, as especially influential. In the book, a Russian engineer solves the social problems of a Martian race by introducing the aliens to socialism.

If engineers can't light the Phobos-Grunt rocket, the huge spacecraft will eventually crash to the ground.

"If it comes in, it's going to be a nightmare," Oberg said. "It will probably be the most toxic satellite ever. It's got at least five tons of toxic fuel aboard." The craft carries tanks of hydrazine and dinitrogen tetroxide fuel. Both are "nasty

substances," Oberg said.

#### THE GREAT GALACTIC GHOUL

Traveling to Mars is fraught with difficulty; a number of accidents over the years can prove it. In 1964, NA-A's Mariner 3 was launched from Cape Canaveral Air Force Station. In space, its solar panels failed to open and the batteries went flat. Now it's orbiting the Sun, dead. In 1965, Russian controllers lost contact with Zond 2 after it lost one of its solar panels. It lifelessly floated past Mars in the August of that year, only 1,500 km away from the planet. In March and April, 1969, the twin probes in the Soviet Mars 1969 program both suffered launch failure, 1969A exploded minutes after launch and 1969B took a U-turn and crashed to earth.

More recently, NASA's Mars Climate Orbiter crashed into the Red Planet in 1999 after an embarrassing measurement unit mix-up caused the satellite to enter the atmosphere too low. On Christmas 2003, the world waited for a signal from the UK Mars lander, Beagle 2, after it separated from ESA's Mars Express. To this day, there's been no word.

Looking over the past 48 years of Mars exploration, it makes for sad reading. A failed mission here, a "lost" mission there, with some unknowns thrown in for good measure. It would seem that mankind's efforts to send robots to Mars have been thwarted by bad luck and strange mysteries. Is there some kind of Red Planet Triangle (much like the Bermuda Triangle), perhaps with its corners pointing to Mars, Phobos and Deimos? Is the Galactic Ghoul really out there devouring billions of dollars-worth of hardware?

The "Galactic Ghoul" has been mentioned jokingly by NASA scientists to describe the misfortune of space missions, particularly Mars missions. Looking at the statistics of failed missions, you can't help but think that there are some strange forces at play. During NASA's Mars Pathfinder mission, there was a technical hitch as the airbags were deflated after the rover mission landed in 1998, prompting one of the rover scientists to mention that perhaps the Galactic Ghoul was beginning to rear its ugly head:

"The great galactic ghoul had to get us somewhere, and apparently the ghoul has decided to pick on the rover." - Donna Shirley, JPL's Mars program manager and Sojourner's designer, in an interview in 1997.

Well, there are plenty of answers that explain the losses of these early forays to Mars, putting the Galactic Ghoul to one side for now.

Beginning with the very first manmade objects to land on the Martian surface, Mars 2 and Mars 3, Soviet Union-built Mars lander/orbiter missions in 1971. The lander from Mars 2 is famous for being the first ever robotic explorer on the surface of Mars, but it is also infamous for making the first manmade crater on the surface of Mars. The Mars 3 lander had more luck, it was able to make a soft landing and transmit a signal back to Earth for 20 seconds. After that, the robot was silenced.

Both landers had the first generation of Mars rovers on board; tethered to the landing craft, they would have had a range of 15 meters from the landing site. Alas, neither was used. It is thought that the Mars 3 lander was blown over by one of the worst dust storms observed on Mars.

To travel from Earth to Mars over a long seven months, separate from its orbiter, re-enter the Martian atmosphere and make a soft landing was a huge technological success in itself - only to get blown over by a dust storm is the ultimate example of "bad luck" in my books! Fortunately, both the Mars 2 and 3 orbiters completed their missions, relaying huge amounts of data back to Earth.

This isn't the only example where "bad luck" and "Mars mission" could fall into the same sentence. In 1993, NASA's Mars Observer was only three days away from orbital insertion around Mars when it stopped transmitting. After a very long 337 day trip from Earth it is thought that on pressurizing the fuel tanks in preparation for its approach, the orbiters propulsion system

started to leak monomethyl hydrazine and helium gas. The leakage caused the craft to spin out of control, switching its electronics into "safe" mode. There was to be no further communication from Mars Observer.

Human error also has a part to play in many of the problems with getting robots to the Red Planet. Probably the most glaring, and much hyped error was made during the development of NA-A's Mars Climate Orbiter. In 1999, just before orbital insertion, a navigation error sent the satellite into an orbit 100 km lower than its intended 150 km altitude above the planet. This error was caused by one of the most expensive measurement incompatibilities in space exploration history. One of NAS-'s subcontractors, Lockheed Martin, used Imperial units instead of NA-As-specified metric units. This incompatibility in the design units culminated in a huge miscalculation in orbital altitude. The poor orbiter plummeted through the Martian atmosphere and burned up.

Human error is not only restricted to N-SA missions. The earlier Russian Phobos 1 mission in 1988 was lost through a software error. Neglecting a programming subroutine that should never have been used during space flight was accidentally activated. The subroutine was known about before the launch of Phobos 1, but engineers decided to leave it, repairing it would require the whole computer to be upgraded. Due to the tight schedule, the spaceship was launched. Although deemed "safe", the software was activated and the probe was sent into a spin. With no lock on the Sun to fuel its solar panels, the satellite was lost.

To date, 26 of the 43 missions to Mars (that's a whopping 60%) have either failed or only been partially successful in the years since the first Marsnik 1 attempt by the Soviet Union in 1960. In total the USA/NA-A has flown 20 missions, six were lost (70% success rate); the Soviet Union/Russian Federation flew 18, only two orbiters (Mars 2 and 3) were a success (11% success rate); the two ESA missions, Mars Express, and Rosetta (fly-by) were both a complete success; the single Japanese mission, Nozomi, in 1998 suffered complications en-route and never reached Mars; and the British lander, Beagle 2, famously went AWOL in 2003.

Source: The Washington Post  
[http://www.washingtonpost.com/national/health-science/crews-rush-to-save-russian-mars-probe-stranded-in-earth-orbit/2011/11/09/gIQAVHEX5M\\_story.html](http://www.washingtonpost.com/national/health-science/crews-rush-to-save-russian-mars-probe-stranded-in-earth-orbit/2011/11/09/gIQAVHEX5M_story.html)

- A TALK WITH BRAD STEIGER DEPARTMENT -

Part 2.

John Winston. [johnfw@mlode.com](mailto:johnfw@mlode.com)