

## Notable mistakes in computational physics: spaceflight

Rockets need guidance systems; spacecraft flying through the solar system need to know where they are and which way they are going. Software, both on-board and on the ground, is an integral part of the aerospace industry. There may be fewer errors than usual in the code which supports spacecraft ... but when mistakes occur, they tend to garner a **lot** of attention.

Look carefully at several famous mistakes in this area, and please try to learn from them.



 Original Astronauts in Space Suits  
NASA Langley Research Center 1/10/1989 Image # EL-1996-00089

The Mercury astronauts were America's first men in space. They put their lives on the line when they entered their tiny capsules. One of the programs used in the guidance systems for the Mercury rockets was copied for the more powerful Gemini rockets ... and that program contained a glaring error! Fortunately, an alert programmer caught the error during testing before it was actually used.

- [Read the specifics](#)
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## Unmanned European rocket explodes on first flight

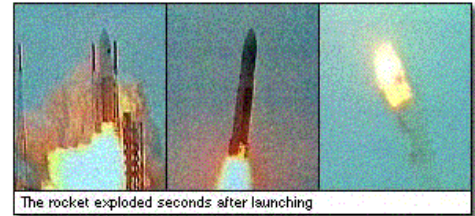
June 4, 1996

Web posted at: 12:00 p.m. EDT (1600 GMT)

[KOUROU, French Guiana](#) (CNN) -- Europe's newest unmanned satellite-launching rocket, the Ariane 5, intentionally was blown up Tuesday just seconds after taking off on its maiden flight.

A spokesman for Arianespace said the rocket was destroyed by its controllers.

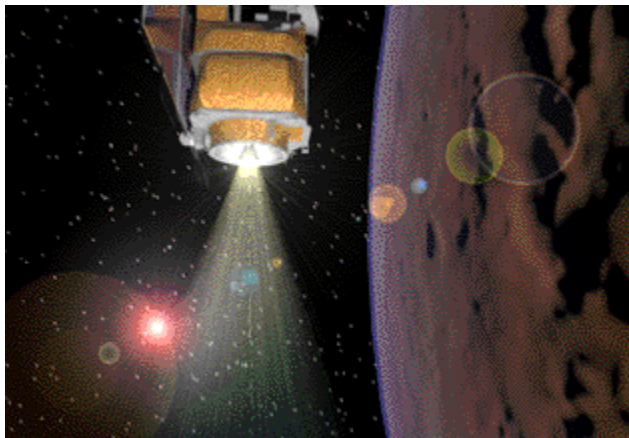
"It's been confirmed that the vehicle was deliberately destroyed by the safety people," said spokesman Ian Pryke. "Why? I don't know. There were no, repeat no, injuries. Most of the debris came down in the mangroves and the sea, and the winds carried the fumes away from the people out over the sea."



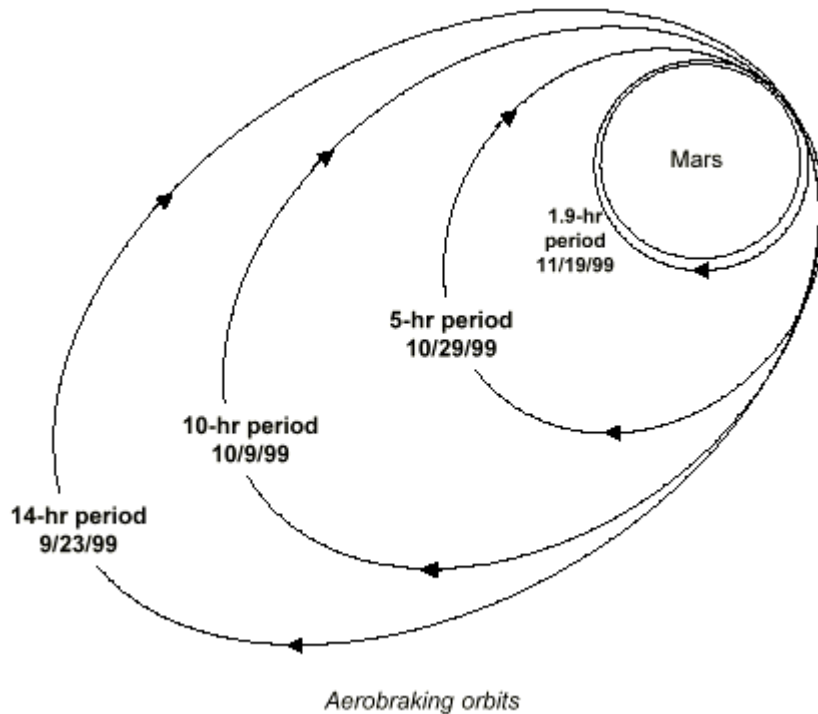
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The maiden launch of the European Space Agency's most powerful booster, the Ariane 5, ended in disaster when it blew up seconds after leaving the pad. Why? Because code used for Ariane 4 rocket was copied into the Ariane 5 control system ... and a numerical value which **used** to fit within 16 bits didn't fit any more.

- [Read the specifics](#)
- 



The Mars Climate Orbiter spacecraft was supposed to use the atmosphere of Mars to "aerobrake", slowing the craft down so that it could preserve its fuel supply.



However, due to a misunderstanding of the units used in two different software systems, the spacecraft got a little behind where the controllers believed it to be. Instead of staying more than 100 km above the surface, it passed much lower in the Martian atmosphere ... so low that it crashed into the surface.

Source: <http://spiff.rit.edu/classes/phys317/lectures/boom/boom.html>