Mars Climate Orbiter

The Mars Climate Orbiter was a $125 million spacecraft built by Lockheed Martin and launched from Cape Canaveral on December 11, 1998. It was due to enter orbit around Mars on September 23, 1999, but contact with the spacecraft was lost as it tried to enter orbit. NASA determined the spacecraft had approached Mars on a trajectory that was too close to the planet which caused the spacecraft to pass through Mars' upper atmosphere and disintegrate.

The cause of the failure was traced to a miscommunication about the force exerted by thrusters on the spacecraft to maintain its attitude. These data were gathered by Lockheed Martin, the manufacturer, and reported to the Jet Propulsion Lab, NASA's mission control center for this mission, after each firing. The navigation unit at JPL used these data to calculate the location of the spacecraft. **The Software Interface Specification between these two computer systems required the data be reported in metric units (Newton-seconds).** However, the numbers Lockheed Martin sent to JPL were in the English measures used by US aerospace corporations (pound-seconds) One pound-second is 4.45 Newton-seconds.

Attitude adjustments happened once or twice a day during the nine-month journey to Mars, and the actual effect of each adjustment was 4.45 times greater than JPL's navigation team calculated. The cumulative effect of the error was that the spacecraft was actually much closer to Mars than calculated by JPL, by more than 100 miles.