

The Rise and Fall of Joseph Kittinger, Jr.

Joseph Kittinger was born on July 27, 1928. He was fascinated by airplanes and so joined the Air Force in 1949. At the time, it wasn't understood if people could survive being in space—there were many concerns including cosmic rays (which we'll talk about) and psychological stresses. In 1955, Project High Man was started to help answer these questions and Kittinger was recruited for it. The project consisted of putting people in balloon gondolas and taking them very high up into the atmosphere. The balloons they used weren't the standard hot-air variety, but helium balloons, which are capable of getting to very high altitudes—above 99% of the Earth's atmosphere, for instance. They used balloons because they are passive—they can sit up at obscene altitudes for very long times without the needs of fuel, which would limit the time an airplane could stay aloft.

Kittinger made the first High Man ascent to an altitude 29,261 m (96,000 ft) in a 52.6 M (172.6 foot) diameter balloon, that had a volume of 56,634 m³ (two-million cubic feet). The gondola was tiny and cramped and he stayed up there like a sardine for seven hours.

Kittinger continued to do risky test flights and balloon ascents with some high-altitude sky diving. By August 16, 1960, he decided it would be really keen if he went higher than anyone before and jumped out of the balloon. So he went up to 31,333 m (102,800 ft), opened the door of the gondola and jumped out. Up at that altitude, the surrounding air is at minus 70 degrees Celsius (negative 94 degrees Fahrenheit) and almost non-existent¹. About his experience falling, he wrote in his book in a National Geographic article:

No wind whistles or billows my clothing. I have absolutely no sensation of the increasing speed with which I fall. [The clouds] rushed up so chillingly that I had to remind myself they were vapor and not solid.

During the first 3,900 m of his descent, he accelerated up to his maximum speed. So how fast was that speed?

We know enough to predict how fast he would have accelerated and how long it took. Since he didn't feel any wind whistling or billowing his clothing, we can

¹The extreme cold isn't too extreme when you consider that parts of Antarctica get down to minus 80 degrees Celsius in the Austral winter, so he had the appropriate clothes to keep him warm.

assume he was freefalling: there was no air to slow him down². At such a high altitude, the acceleration due to gravity is not 9.8 m/s², but more like 9.72 m/s² (as discussed in class). Using the fact that he free-fell for 3,900 m before reaching his peak speed, we can use one of our favorite equations:

$$distance\ fallen = \frac{1}{2} \times acceleration \times (fall\ time)^2$$

$$3,900\ m = \frac{1}{2} \times 9.72\ m/s^2 \times (fall\ time)^2$$

$$fall\ time = \sqrt{802\ s^2}$$

$$fall\ time = 28.32\ s$$

So if he fell for 35 seconds, how fast was he moving? We can use our other favorite equation:

$$change\ in\ speed = acceleration \times fall\ time$$

$$change\ in\ speed = 9.72\ m/s^2 \times 28.32\ s$$

$$change\ in\ speed = 275\ m/s = 615\ mph$$

Well, he didn't quite get to 615 mph, he only achieved a speed of about 614 mph, so our crude calculation assuming a free-fall condition over 3,900 m made us be off by nearly 0.16%! D'oh! OK, so hopefully, you're thinking this is a pretty impressive demonstration of what you've learned!

No matter how it's calculated, 614 mph is pretty impressive—it's approaching the speed of sound for that altitude (which varies with air temperature and pressure) and marks the the fastest speed that an unprotected human has ever gone before or since. To see the video, go http://www.guzer.com/videos/space_parachute.php.

Kittinger is currently Vice President of Flight Operations for Rosie O'Grady's Flying Circus, and lives in Orlando, Florida.

For more information, google or see Kittinger, Jr., Joseph W. "The Long, Lonely Flight." National Geographic, February 1985, 270-276.

²Indeed, the air pressure is only about 1.5% of sea level up there!