

We Came. We Saw.

Sooners
aboard NASA's
"vomit comet"
experience
zero gravity
with an Apollo
12 astronaut.



We . . . Floated!

BY
OMER GILLHAM

EDITOR'S NOTE: This spring a team of University of Oklahoma engineering students invited Norman Transcript reporter Omer Gillham, '91 B.A., to accompany them on a thrilling scientific excursion to NASA's headquarters in Houston. Along with representatives of other U.S. schools, the OU students' task was to test a class project under zero gravity conditions; Gillham's assignment was to record the results and their other experiences. The two-week trip was a combination of serious science and delirious fun.



NASA

Obviously feeling no pain, OU engineer Chris Merchant, center, videotapes the joyous weightless experience of colleague Doug Huling, left, and reporter Omer Gillham as they zero-g aboard NASA test plane KC-135.

HOUSTON—Yeeeeeee, haaaaaa!!! Hooga! Hooga! Hooga!

We did it! We flew NASA's "vomit comet" and floated lighter than feathers above the Gulf of Mexico. We bad.

Man oh man! What a two-hour ride on a Boeing 707 that climbs to 35,000 feet then dives to produce about 25 seconds of pure "zero g." It was the chance of a lifetime for college students from 48 schools and their guest journalists. We now have an inkling of what astronauts go through to become American heroes.

We also learned a few of the secrets used by film director Ron Howard and actor Tom Hanks to

shoot weightless scenes in Apollo 13. Our jet was a twin to the aircraft used by Howard's film crew. The mostly seatless aircraft is known as a KC-135 and has been modified by NASA for special astronaut training. Howard shot his zero gravity scenes approximately 25 seconds at a time. That is how long a person can float, flip or giggle as the KC-135 fools Mother Nature as it flies more than six miles above the earth's surface.

As an added bonus to our adventure, moonwalker Charles "Pete" Conrad Jr. shared the zero gravity experience with the OU group and teams from Rice, Colorado, Michigan and Alabama. The science-minded students—half of whom were female—participated in a two-

week program sponsored by NASA and the Texas Space Grant Consortium. We all flew the "vomit comet," so dubbed for the response of many passengers as the KC-135 maneuvers up and down like a roller coaster to simulate weightlessness. The jet climbs on a 45 degree angle to 35,000 feet then arcs over and descends at a 45 degree angle. This maneuver is known as a parabola and takes about three minutes. Zero gravity occurs at the top of the arc.

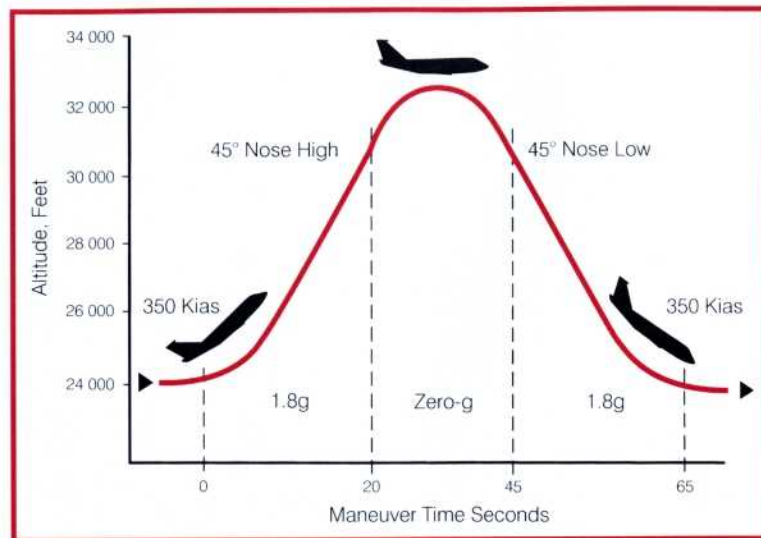
NASA test director Bob Williams informed us that the FAA does not sanction the erratic flight pattern, but it is safe and has been used to train astronauts since the late 1950s. Our pilot, who was strapped into his seat, thank heaven, performed 40 parabolas during a two-hour period.

If you get sick on the first maneuver, guess what? There are 39 to go, plus two more in which the pilot adjusts the climb and dive of the aircraft to simulate Mars gravity and moon gravity. During the lunar parabola, we were hopping up and down on the floor of our padded aircraft much like Commander Conrad must have done in 1969 on the surface of the moon. Lunar gravity is one-sixth of that on Earth, while Mars is approximately half.

Government-issue barf bags and motion sickness pills are given out before each flight. You remove the barf bags from their brown envelopes and place one each in the front pockets of your NASA coveralls, with the tops open, looking kind of like a corsage. But you know you are not going to the prom.

Question: Did this reporter engage in “ralphing,” or did he have the right stuff? I had the right stuff, but it would not stay put after the 30th parabola. Gulp.

Meanwhile, Conrad, now 67, performed like a veteran moonwalker. During the flight, he visited with students and asked questions about their experiments. Conrad lives in Huntington Beach, California, near astronaut buddy Gordon Cooper. As an Apollo 12 astronaut, he is one of 12 Americans to walk on the lunar surface. After leaving NASA, he began his own space consulting business, returning annually to NASA to visit old friends. He had not flown the weightless simulator since 1968. “I haven’t done this in 30 years. I’m back having fun at it.” Conrad also flew a space station mission in 1973.



The NASA diagram above illustrates the typical zero-g maneuver, such as the 40 “parabolas” experienced by the OU student scientists and their guest journalist who visited the Johnson Space Center in Houston. The climb and dive can be adjusted to simulate gravity on Mars or the moon.



The OU team involved two National Merit Scholars, an international student and an NROTC cadet, who will train as a Navy pilot after graduating in summer 1998. The team, under the direction of assistant professor of engineering Ajay Agrawal, wanted to know how several small flames would behave under zero gravity conditions. Agrawal has used drop towers in Ohio for such studies. He predicted the flames would become spherical and sooty from lack of gravity, and the hot gases given off by the flames would not rise as fast as those under normal conditions.

The students Agrawal selected for the KC-135 trip were Don Wicksall, 22, a National Merit Scholar from East Lansing, Michigan; Chris Merchant, 22, a National Merit Scholar from Knoxville, Tennessee; Jiunn-Kim Chong, 24, an honors engineering stu-

dent from Malaysia; and Doug Huling, 30, also from Knoxville and president of OU’s NROTC Future Naval Officers Society.

The OU team matched up well with other top-notch schools from across the United States conducting science experiments in Houston. The two-year-old program attracted engineering teams from nationally recognized schools such as MIT and Riddle-Embry Aeronautical Academy. It also drew national media atten-

tion from “Good Morning America,” “The Today Show,” *The Washington Post* and *The Wall Street Journal*. I represented the 108-year-old *Norman Transcript*, the only one from the Oklahoma media.

OU engineering students worked their tails off during spring break to complete their fire-study experiment, which involves a steel cage that holds several small propane canisters and an elaborate ignition system. The sophisticated construction of the OU experiment ranked it in the top 20 percent of the best built and functioning. It passed NASA’s inspection tests with flying colors, while other schools had to modify their projects before they were allowed onto the KC-135.

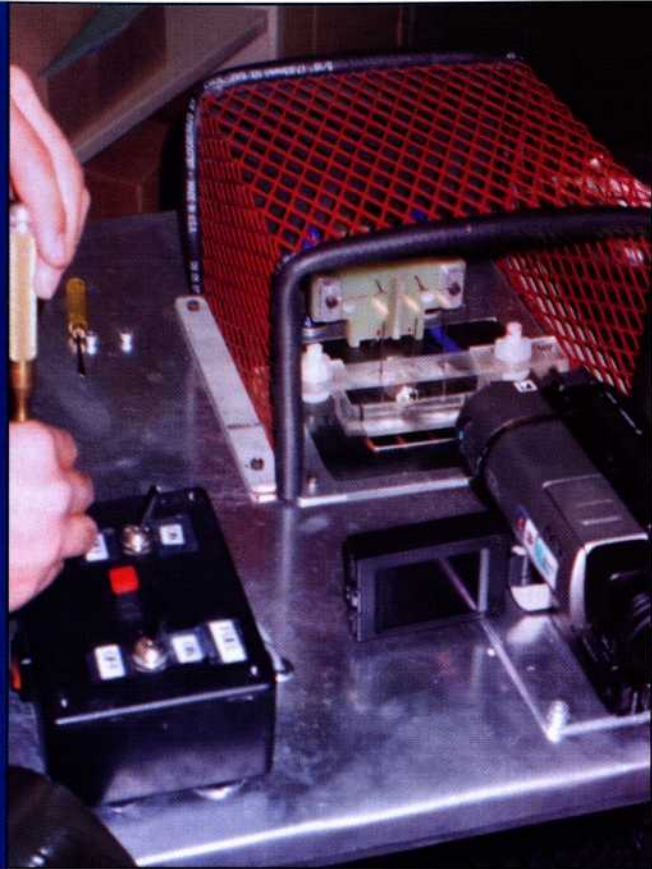
Our trip to Houston began March 22 and ended April 2. We stayed at a hotel three blocks from the Lyndon B. Johnson Space Center and approximately five miles from Ellington Field where the KC-135 is docked. OU’s College of Engineering and the Oklahoma Space Grant Consortium funded the students’ lodging and meals. OU also paid for my NASA flight physical and lodging.

The students and I toured the Johnson Space Center, visited with astronauts and listened to lectures from NASA researchers. We visited the Neutral Buoyancy Laboratory, which features a 6.5 million gallon pool complete with a submerged shuttle loading dock. Astronauts, held underwater by weights, practice shuttle missions there.

In addition to the “vomit comet,” we were subjected to NASA’s altitude chamber, which measures pilots’ ability to handle oxygen-thin air. We were placed in the altitude chamber, which looks like a huge propane tank with 10 seats mounted inside. NASA personnel, who walked around with sneaky grins on their faces, told us to remove our oxygen masks when the chamber reached 25,000 feet of simulated altitude. We immediately developed tunnel vision, confusion and goofiness, which is associated with hypoxia—insufficient oxygen to the brain. For some, hypoxia is a normal state.

Anyway, the normally reserved students, all OU seniors, recovered from the altitude chamber, but I saw the NASA experience changing their attitudes about their careers. Like little boys, they began talking about becoming astronauts. Before, when I asked them what they wanted to do upon graduation, they gave me very impressive answers. “We want to work for an engineering firm or do research,” they said. After NASA, they all want to fly

Before being allowed onboard the NASA test flight, the design and construction of the OU engineers’ fire-study experiment underwent extensive inspection, which it passed with flying colors.



Omer Gillham

shuttle missions. “Oh yeah, Omer. We told you that. Remember?” Fibbers.

Huling, who will train as a naval pilot, may have been changed most by the NASA exposure. After listening to a lecture on how to become an astronaut candidate, he realized flying space shuttles is a reachable goal. “To tell the truth, I never thought much

about it, but it’s really not out of the question,” said Huling, who is married with two children. “With flight school and my engineering degree, I’m right on course to qualify.”

Wicksall, usually the more reserved member of the OU group, also was affected by his experience. He left the “vomit comet” beaming and talkative. “Awesome, awesome. Just awesome,” he said, walking away and gesturing with fellow classmates about their experiment.

Chong offered the international perspective on our trip. “In my country, I would never have a chance to do something like this,” he said. “There, we spend a lot of time in class concentrating on theory. This is very different. I’m actually going up in the KC-135 to see what our project can do. I can’t believe it.”

Chong and Wicksall flew April 1 and conducted 40 experiments. Huling,

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Merchant and I flew April 2, doing the same. Those seeing their breakfast twice besides me were Merchant and Chong.

The experiment results, which were captured on video, were stunning to watch. As the aircraft went into micro gravity, three small flames would combine and become fatter and extremely sooty. At one point they would roll forward like a small, lazy wave, extinguish each other briefly, then rekindle. "Oooohhs and aaahhs" could be heard by the students as they watched video footage on the ground with Agrawal, who had flown to Houston to see the students off on their first flight. "Remarkable," he said. "We wondered if the flames would extinguish each other, but we did not know how much of a possibility that would be. The video is showing some very interesting results."

Agrawal, who is one of the leaders in studying combustion in zero gravity, was awarded a \$400,000 NASA grant three years ago to study combustion behavior. Until now, his findings have come from 90-foot drop towers, where he could obtain two and a half seconds of zero gravity time. The KC-135 gave the students 30 minutes of zero gravity footage when adding together all the weightless time.

The OU experiment and efforts from other schools mean that real science is being conducted by America's future astronauts and space researchers. OU's research could contribute to the understanding of fire control in outer space. That is impor-

tant since NASA and several other countries have made plans to launch the International Space Station within the year. NASA is not predicting fires in space but wants to know how they react if they should occur.

Other zero-gravity projects that show promise include tool research by the University of Colorado, Boulder. Students tested a torque wrench that will let a weightless person do work without spinning around when he or she is tightening a bolt in outer space. The ratchet uses ball bearings rather than the standard click-and-lock feature of Earth-bound tools.



What is it like to be weightless? Let us put it this way. I am 6-feet 4-inches tall and weigh 225 pounds, but a 110-pound woman could pick me up and flip me with one finger. Weightlessness is that feeling you get when a roller coaster begins to drop from a steep climb or when a car goes over a hill really fast. Imagine that feeling lasting 25 seconds as you twirl, flip or just grin. But there is none of the jostling or vibration experienced in a roller coaster or car. And there is no sense of vertigo or falling. You also do not get a sense that the aircraft is climbing or descending. For some reason, the KC-135 seemed level.

But what you think is down is really up or sideways. Inner-ear fluid that helps a person know directions is sloshed around a bit in zero gravity. On one maneuver, I was standing straight up looking at the other side of the aircraft, but my vision said I was looking sideways at the floor. Odd but wonderful.

Each maneuver begins in normal gravity (1 g). The gravity remains constant while the plane climbs with jet engines roaring. The climb takes about one minute, then the engines smooth out, and you are floating until the craft comes down on the other side of the arc.

As if to pay you back, Mother Nature puts you under 1.8 gs. while the airplane descends on a 45 degree angle. That means a person goes from weightlessness to twice his or her weight. Arms and legs become heavy, and it is difficult to stand. I could feel the skin on my face sagging. My crow's feet grew one size.

The transition from zero gravity to gravity takes about two seconds. The aircraft, which is seatless except for those in the tail section used for take-off, is padded on the floor, ceiling and sidewalls. Yet, you are cautioned to not be on your head when the transition occurs.

The flight is organized chaos. About two dozen students, journalists and NASA personnel work around each other in close quarters. Cameras, cables—and people, of course—all float. One experiment by design also floated; all others were bolted to the aircraft floor. Wackiness broke out near the end of our flight with the students doing flips, somersaults and moves I had never seen before. One kid did push-ups with four people on his back.

It is difficult to take notes, shoot pictures and be sick while having fun floating around in a brilliant aircraft with "NASA" painted on its tail piece. But someone has to do it. I will be in line next year. I want to be an astronaut, too.