

Fabulous Flyer

In the high desert of California, engineer and test-pilot Jon Karkow '84 designs an amazing aircraft—and makes aviation history

By Gordon Young

When Jon Karkow '84 was growing up north of Baltimore, Maryland, he mowed lawns to pay for flying lessons. Renting planes for training proved too expensive, so he started building his own from a kit in his parents' garage. The aircraft was known as a Quickie, the brainchild of legendary aerospace designer and engineer Burt Rutan. Karkow didn't know it at the time, but he was beginning an apprenticeship that would eventually take him to the Mojave Desert to help create some of the most ambitious and daring flying machines ever invented.

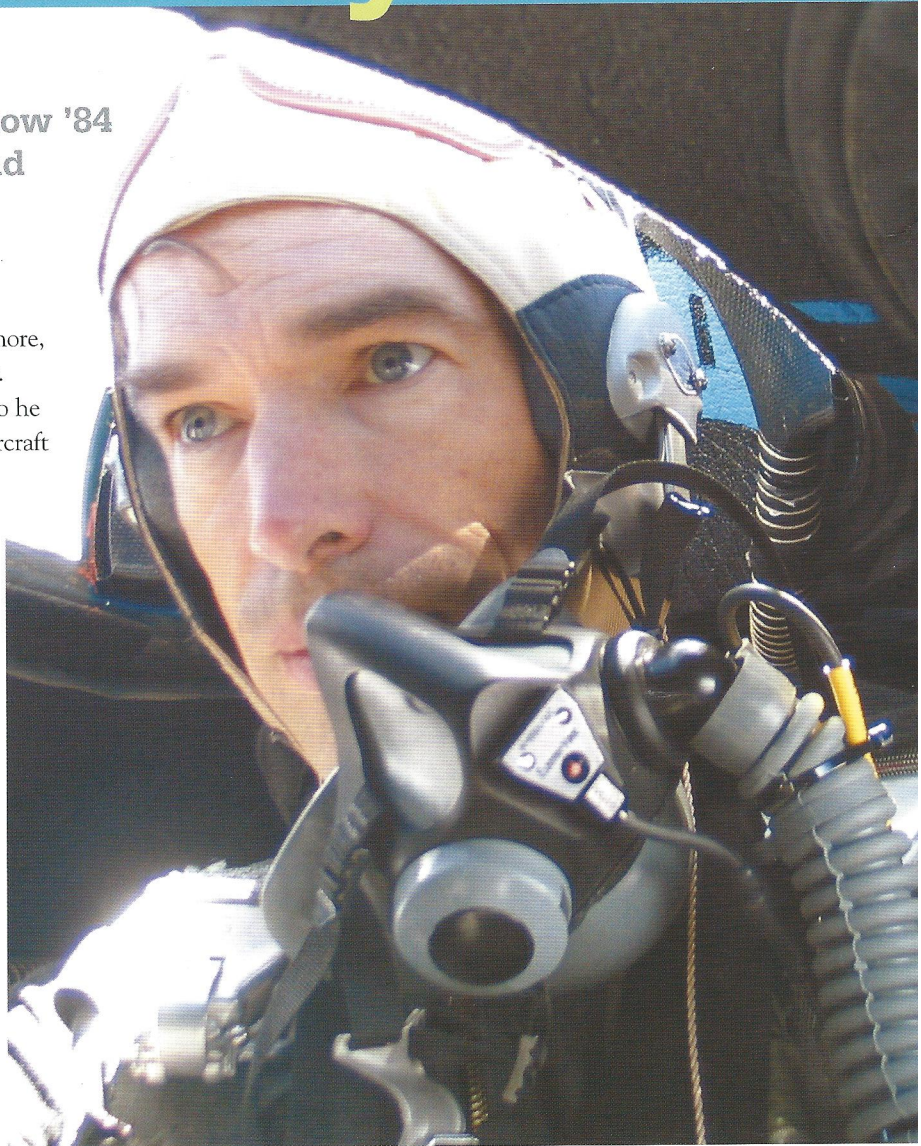
"I only got the structure finished before I went off to college," Karkow remembers, "but I did learn an awful lot, and doing that work helped me get the job I have now."

Karkow has been working at Scaled Composites, Rutan's company, since 1986. In that time, the forty-three-year-old aeronautical engineer has been an integral part of several high-profile projects. Case in point: SpaceShipOne, a futuristic craft that would be at home on the cover of a sci-fi paperback, won the \$10 million Ansari X-Prize when it completed the first private flight into space last October and took a giant leap toward making space tourism a reality.

More recently, the Virgin Atlantic GlobalFlyer completed the first solo flight around the world without stops or refueling. Pilot Steve Fossett completed the journey on March 3, covering roughly 23,000 miles in sixty-seven hours. Karkow was the project engineer for the historic mission, responsible for the design and construction of the aircraft while overseeing five engineers and more than two dozen shop workers.

He was also the test pilot. "It's an experimental airplane, so we didn't have to meet many of the standards that a certified aircraft would have to meet," Karkow says. "Of course, there was some nervousness on the first flight, but at the same time I knew more about the plane than anyone else. I knew things were done correctly and it was safe to fly."

As an engineer, Karkow labored to create an aircraft with an extremely efficient engine, as little aerodynamic drag as possible, and enough fuel capacity to circle the globe. The result was a single-seat,



Engineer and test pilot Karkow at the controls of the GlobalFlyer.

triple-bodied jet made of carbon fiber and epoxy composite with a 114-foot wing span. At takeoff, the GlobalFlyer carried 18,194 pounds of fuel—making up 83 percent of its total weight—to power a single Williams FJ44 engine. Best of all, the flying gas tank handled just fine.

"As it turned out, the airplane does fly really well," Karkow says. "I'd liken it to flying a large sailplane, a large motor glider."

This is a plane that evolves during flight as it burns fuel and gets lighter. Early in the flight, the wing bends upward dramatically, supporting the huge fuel load. The initial wing tip deflection is more than eight feet. The deflection reduces throughout the flight as fuel is consumed. All of this means the GlobalFlyer becomes more responsive—banking and rolling more easily—as the journey progresses.

"A standard mid-sized automobile has about the same empty weight as GlobalFlyer," Karkow explains on the Web site dedicated to the flight. "Imagine driving this car when light, then imagine it with an additional load equivalent to six more cars. It would drive like an entirely different vehicle, if it could even drive at all. You can therefore see that the pilot's flying experience when light is going to be very much different than when heavy—it's like flying two different aircraft, GlobalFlyer-Light and GlobalFlyer-Heavy."

Karkow and the Scaled team monitored the flight from a mission control center set up at Kansas State University. "There were some nerves," he remembers. "If the airplane did not achieve the record, it was pretty much going to be my fault. It was the culmination of three years' work."

During the flight, Karkow talked regularly to pilot Steve Fossett and helped analyze reams of data transmitted from the aircraft. There were some tense moments when the Global Positioning System reception became erratic, and "a huge panic" when the GlobalFlyer began to lose fuel unexpectedly. Karkow estimates he got about five hours of sleep during the three-day mission. When the GlobalFlyer made it to within a half hour of mission control, Karkow flew out in a small plane to accompany Fossett on the final leg of the momentous journey.

"This was a special time for me," Karkow remembers. "I felt that Steve and I had developed a unique personal relationship during the flight. We spoke each hour and discussed the progress of the trip through times of discouragement and elation. He was just a voice in the phone, and then suddenly there he was for real, flying an airplane that I helped develop starting from when it was just an idea."

Karkow's career as an engineer really began as an innovative dual-degree program that combined a liberal-arts education with technical training. He spent three years at Kenyon before moving on to Rensselaer Polytechnic Institute (RPI) in Troy, New York. The program gave him two degrees: in 1984, he graduated from Kenyon with a degree in physics, and a year later he earned a degree in aeronautical engineering from RPI.

"I think having a well-rounded perspective on life is a good thing no matter what field you choose," he says. "So I really value the education I got from Kenyon."

Karkow's faculty advisor at Kenyon was physics professor Thomas B. Greenslade Jr., who has a strong interest in aerodynamics.

Greenslade encouraged Karkow to pursue a senior thesis dealing with Anton Flettner, a German engineer who experimented in the 1920s with spinning vertical cylinders to propel ships. Karkow also studied with English professor Gerrit Roelofs, who during World War II had flown an aircraft carrier-based dive bomber known as a Helldiver. "He loved flying and academics, so he gave me some fortification for continuing my approach to liberal arts and aeronautics," Karkow says.

Graduating from Kenyon and RPI, Karkow had no shortage of job offers, except the one he really wanted. In the years since Burt Rutan sold airplane kits to enthusiasts like Karkow, he had formed Scaled Composites, an outfit that *Popular Mechanics* credits with creating "more cool airplanes than any other place on the planet." There was only one problem: Scaled didn't have any openings.

"I looked around for other options," says Karkow, who interviewed with big aviation outfits like Grumman, Douglas, Fairchild, and Boeing. But raised in bucolic rural Maryland and spoiled by the campuses of Kenyon and RPI, he wasn't thrilled with the corporate environment. "I went in the big buildings and the huge rooms with a sea of cubicles, and that jungle of concrete and metal and glass just didn't seem appealing to me."

Instead, Karkow spent the summer and fall after graduation back at his childhood home. "I worried my parents by just hanging around and tinkering on my Volkswagen Beetle and hoping that something would save me and I'd get a job that I'd really like."

Eventually, Karkow decided to join the Navy in hopes of becoming a Naval aviator. He was two weeks away from making a seven-year commitment when Scaled called with a job offer. "I sometimes wonder how things would have been different if I'd

gone the other route back then," he says.

Now, Karkow is working on the next phase of SpaceShipOne, with a goal of getting passengers into space instead of just a single test pilot. And he's getting airborne whenever he gets the chance. He's a member of the Society of Experimental Test Pilots and is certified to fly instrument planes, single- and multi-engine planes, sea planes, gliders, and helicopters. It's hard to imagine him ending up in a better place than the high desert of California.

"There's no super Wal-Mart here, no Starbucks," Karkow says. "But if you're an airplane enthusiast, this is a great place to be. We've got 360 clear days a year to fly." 