

Rocket Man

Christian Science Monitor

February 11, 2004

Aviation legend and convention-buster Burt Rutan leads the charge among civilians out to claim the point position on manned spaceflight. Will such barnstormers of space supplant NASA?

By Bruce V. Bigelow | Contributor to The Christian Science Monitor

The high desert 90 miles northeast of Los Angeles was once the bottom of an ancient sea. Today highways run arrow-straight through the desolate terrain, past crooked Joshua trees that stand like sentinels. At an airport near the old mining town of Mojave, rows of mothballed jetliners bake in the desiccating heat.

In vivid contrast, the Mojave Airport also offers a window on the future. Here sit the Civilian Flight Test Center and some of the most advanced aircraft in the world. For more than 60 years, the real attraction of this place has been the azure dome overhead, where a flier can see for 30 miles, 360 days a year. It is pilot heaven, home of Edwards Air Force Base, and the birthplace of the sonic boom.

Mojave also is home to Burt Rutan. In a world that celebrates test pilots and fighter jocks, Mr. Rutan has attained his own special status as one of the nation's most visionary aircraft designers.

To the public at large, Rutan is best known as the creator of Voyager, the willowy plane that hangs in the lobby at the National Air and Space Museum in Washington. The propeller-driven aircraft made aviation history in 1986, flying nonstop around the world on a single tank of gas.

To aviation enthusiasts, Rutan is renowned for creating designs that marry lightweight materials with sophisticated ideas. His home-built craft have set new standards for speed, distance, and fuel economy.

Now 60, the crusty engineer with the trademark muttonchops is poised to again seize the public imagination by applying his do-it-yourself approach in a quest for space - one that deliberately excludes NASA. And even as Washington dreams - one year after the loss of Columbia - about moon bases and missions to Mars, some experts maintain that it is private individuals like Rutan who will shape the race for the final frontier.

Bankrolled by Microsoft billionaire Paul Allen, Rutan plans to send three civilian test pilots in a rocket plane to the threshold of space. By making the suborbital flight to an altitude of 100 kilometers (62 miles) twice within two weeks, Rutan hopes to win the \$10 million X Prize, an international contest created by a group of space enthusiasts eight years ago. The idea was modeled after the contest with a \$25,000

quest that spurred pioneer aviator Charles Lindbergh to prove in 1927 that it was possible to fly a plane alone across the Atlantic.

Rutan not only wants to set records and make history, but also to shatter conventional notions about the near-impossibility of private ventures sending ordinary folks into space.

"He's motivated by a desire to be different and startling as much as anything else," says Peter Garrison, a contributing editor at *Flying* magazine who has known Rutan for 30 years. "He's certainly the most prolific and imaginative designer of his time."

Mindful of his role on the global stage, Rutan wants to show that he has developed the world's first private program for manned spaceflight - and then hand the keys to a new generation of pioneers he calls "the barnstormers of space."

His vision of the future of space travel includes a visceral antibureaucratic streak that Rutan expresses with blunt candor. He has emphasized that his space program, which cost an estimated \$25 million, has used no government money and relied on no government labs.

"We have no government customers and no government technical interface," he told a group of test pilots in Los Angeles in September. "That's fun."

When Rutan first unveiled his experimental spacecraft for the public last April, he also was, consciously or unconsciously, conjuring up the lost gonzo spirit of the Right Stuff.

In the 1950s, the United States was developing two different ways of launching astronauts into space. One was the Mercury Redstone rocket, a ballistic missile topped by a manned capsule that test pilots back then derisively called "Spam in a can." The other was the X-15, a rocket-powered aircraft carried to high altitude by a B-52 bomber. The X-15 dropped away from the mother ship, the rocket engine ignited in midair, and the pilot aimed for the great yawning void.

This was the way Chuck Yeager had punched a hole in the sky in 1947 when he broke the sound barrier in the X-1, the ship that was the primogenitor of all the winged rockets that followed.

With the ascendancy of NASA, however, the idea of reaching space in a rocket plane evaporated like a contrail in the sky.

Now Rutan has returned to that path not taken. With no B-52s at his command, he created a stunningly unusual mother ship, the White Knight, to carry his rocket plane and launch it at about 50,000 feet.

The star-spangled rocket plane, SpaceShipOne, has made at least eight flights since last April, when Rutan announced his quest at Scaled Composites, the company he founded in 1982. This lightweight spaceship, made of graphite and epoxy, has short

wings and twin vertical tails that flip up to act like a giant air brake, enabling the aircraft to drop like a shuttlecock as it reenters the atmosphere.

After several glide tests, SpaceShipOne broke the sound barrier in its first powered test flight Dec. 17, a milestone that coincided with the 100th anniversary of the Wright Brothers' first flight.

As the rocket ship reached near weightlessness at 68,000 feet - the apex of its flight - ground observers heard test pilot Brian Binnie exclaim over the radio, "Wow! That was a wild ride!"

But Rutan isn't ready to step up to the microphones just yet. The rocket man has rebuffed media requests to discuss his work in progress in recent months. Instead, he has burrowed into his Mojave lair, sending strong signs that he won't reappear until he has accomplished the 21st-century equivalent of landing at Le Bourget field.

Even if Rutan is successful, the extent to which private barnstormers could displace NASA's role in the future of manned spaceflight remains uncertain.

Daniel Goldin, the former NASA administrator who got into a rancorous tiff over space tourist Dennis Tito's \$20 million ride to the international space station in 2001, professes great respect for Rutan.

"I think Burt Rutan is just one of the great engineers of our time," says Mr. Goldin. "He has done wonderful things. That Voyager, nobody thought it could be done, and Burt pulled it off."

Goldin would not discuss how aerospace entrepreneurs, wannabe tourists, and other space buffs have embraced Rutan's venture.

Still, even the last man to walk on the moon seems to doubt NASA will be the one to send his successor there. In an interview with Australian Broadcasting in 2002, 30 years after his mission, Apollo 17 astronaut Harrison Schmitt spoke of mining the moon as a logical step toward sending humans to Mars.

"There's a lot of engineering, exciting engineering that has to be done to make it possible and economic to do," Mr. Schmitt said. "We need to find a way to create that technology base without asking the taxpayer to do it for us."

Such thinking is what makes Rutan's venture so appealing.

"Burt Rutan's project is huge for the alternative space community," says Greg Klerkx, author of "Lost in Space," a recently published book that describes NASA as a bureaucratic monopoly that strangles private initiatives in its realm.

"For the first time, really, you have the combination of a company with a strong track record in aircraft and spacecraft development paired with significant private backing," Mr. Klerkx explains. "If Scaled Composites is successful with SpaceShipOne,

it will be a simple, relatively inexpensive template upon which other vehicles can be built."

At NASA headquarters in Washington, spokesman Michael Braukus calls Rutan's work "phenomenal." But he says the space agency doesn't really have an official position concerning manned spaceflights undertaken by the private sector.

"What the X Prize is trying to do is stimulate space tourism, and that's wonderful," Mr. Braukus says. But space tourism, he adds, "is not something that NASA's geared toward."

Saying that he is not familiar with the alternative space community or its specific complaints about NASA, Braukus maintains that "what NASA does is high-risk research. That's what we've done since we were founded... We do things that are dangerous, that deal with exploration, in aviation as well as in spaceflight."

But Rutan's views about NASA have only sharpened with scorn through the years. To Rutan, NASA's culture of denial has led to too many accidents, its technology is too expensive, and its programs have grown - ironically - too risk-averse.

"We seem to be making acronyms for engineering welfare, rather than having the courage to actually fly something," Rutan said last April.

In his presentation for test pilots in Los Angeles last fall, Rutan referred to NASA as "Nay-Say" and promised the brotherhood of fliers that his quest to reach space would create "a whole bunch of new jobs."

"And I mean fun jobs," he said, with another jab at the aerospace bureaucracy, "and not just a job to test the latest software upgrade for the F-18."

Elbert L. "Burt" Rutan was born June 17, 1943, and raised in Dinuba, in California's Central Valley. As the youngest of three children, he paid close attention as his brother Dick, who was five years older, took flying lessons in 1954. Their sister Nell later became a flight attendant for American Airlines, although Dick says she did not share her brothers' fixation.

"Both of us had an abnormal fascination with aviation," recalls Dick Rutan, who would go on to fly 325 combat missions in Vietnam.

"Of course, his particular interest was in the design and structure and the flying products and stuff," adds Dick. "And me, I just wanted to fly."

Dick remembers their mother taking Burt to buy a model-airplane kit, but even then his younger brother didn't want to build planes from a kit. He wanted balsa wood so he could build his own airplanes, "so that was his focus from Day 1."

At 16, Burt soloed in a single-engine Aeronca Champ after logging only five hours and 44 minutes in flight training. He attended California Polytechnic State University, San Luis Obispo, and graduated with an aeronautical engineering degree

in 1965. For the next seven years, he worked as a civilian flight-test project engineer at Edwards Air Force Base.

In 1974, after a two-year stint as test-center director for the Bede Aircraft Co. in Newton, Kan., Rutan returned to Mojave, where he founded the Rutan Aircraft Factory to develop his own designs for the growing market in home-built aircraft.

At the time, home-built aircraft took a lot of metal fabrication and woodworking skills in mini machine shops. Blueprints practically required an engineering degree to read, and there was little text for guidance. But Rutan's small company came on the scene with bold new ideas for aircraft made of lightweight composite materials, and it offered customers an extraordinary level of service and technical support.

In 1975, when the prototype VariEze landed at the annual fly-in convention at Oshkosh, Wis., "it practically caused a mental meltdown," says Dan Patch, a pilot who lives in San Diego. "This amazing little plane just 'dropped in' after flying all the way from California, and proceeded to break the closed-course endurance record for its weight class four days later," says Mr. Patch. "No loud talk, no self-promotion, just, boom, right in front of the world's largest gathering of aviators."

Patch says he later heard Rutan give a talk about his VariEze prototype, and found elements of the aerodynamic design extremely sophisticated. Having a doctorate in engineering physics, Patch says he had a pretty good idea that Rutan knew what he was talking about. He bought a set of plans the week they came out.

"Well before I finished my plane, VariEzes were setting records for range and efficiency," says Patch. "It flew circles around the increasingly overpriced and old-fashioned 'factory built' planes."

Another VariEze owner, Rich Steck of Roswell, Ga., remembers attending an open house that Rutan regularly held for home-built enthusiasts at the Mojave Airport. After patiently answering their questions, Rutan rolled out his VariEze prototype. Rutan fired up the Volkswagen-engine conversion, recalls Mr. Steck.

"It quit just as he lifted his long left leg into the cockpit," Steck writes in an e-mail. "He glanced at the instrument panel, grinned, and said: 'Runs longer with the fuel switch on.' "

To visiting pilots, the episode made Rutan seem fallible, and human, Steck recalls. "Made it seem possible we could build what he had designed."

Rutan followed the success of his VariEze design with a series of other remarkable aircraft, including the Defiant and Long-EZ. By the early 1980s, however, he decided to transition out of the home-built aircraft market, mostly because of mounting pressures arising from his exposure to liability.

"I always felt that [I should take] very good care of those that I did sell plans to, and help them ethically and safely build and fly their airplanes," Rutan said in an online

interview about five years ago with Air & Space magazine. "The guys that I was at risk from - and still am - are people that buy an airplane someone else has built, and the relatives of whoever he may take for a ride."

In 1982, when Rutan founded Scaled Composites as a separate business, it was chiefly to make proprietary designs and composite scale models of prototype aircraft designs for various customers. For the next 20 years or so, he became involved in a number of projects, including his biggest failure - developing an aircraft for Beech Aircraft in 1985 called the Starship. The project was intended to replace the Beechcraft King Air, but commercial production proved to be too complicated and costly for the Raytheon subsidiary.

By the following year, Rutan was overseeing test flights of the Voyager, with his brother Dick and copilot Jeana Yeager at the controls. While Burt Rutan oversaw the design and construction, his brother and Yeager oversaw fundraising for the \$2 million mission, with much of that donated by fellow aviators.

"It was a very informal thing, very much like a private 'skunk works,' if you will," said Jack Norris, who served as technical director in mission control for the Voyager flight. "He can do a couple of calculations and wing everything in between because he started out as a kid designing and building model airplanes."

Yet Mr. Norris, who spent his career in the aerospace industry, says he also was struck by how quickly Burt Rutan could absorb information. During a Voyager test flight off the California coast, Norris realized nobody had prepared a press release that included all the key information about the flight. So he wrote a draft and showed it to Rutan after he returned from an out-of-town trip.

"I never saw anybody in any circumstance read a dense piece of paper, thoroughly digest it, and come back with the exact answer anywhere near that quick," Norris says. "In about 30 seconds he had read the whole thing, digested it, and said, essentially, these 11 things are right, these seven things are wrong, and here's what you want to say. Boom. Boom. Boom."

In the years following Voyager's flight, Rutan's career soared as Scaled Composites produced scores of startling and imaginative designs for aircraft. The company also developed a wing-type sail for an America's Cup catamaran in 1988, a General Motors Ultralight show car in 1992, and a 40-meter wind-power turbine.

Rutan also took on a number of military contracts, including "black budget" work - military research done under extreme secrecy - on a 40 percent scale model of the B-2 Stealth bomber. Rutan's company also designed a high-altitude, remotely piloted vehicle for the Ballistic Missile Defense Organization. It built a 62 percent scale prototype of an advanced transport plane for the Defense Advanced Research Projects Agency.

"He was a pioneer in the use of composite materials in private aircraft," says Dick Rutan. What defines his brother, he says, is his ability to "dive into his pool of nonsense and chaos" and find the perfect solution way out in a corner someplace.

Today, Burt Rutan has overseen designs for more than 300 aircraft. Forty have been built and flight-tested. But the only Rutan design ever certified by the Federal Aviation Administration is Starship, which was discontinued shortly after Beech entered production. The rest are classified strictly as experimental aircraft designs.

"It would be a waste" to seek certification, says Dick. "He's an innovative, creative designer. Why should he waste all of his time trying to certify an airplane with a bunch of know-nothing bureaucrats?"

As it is, his intensity may have carried a cost. Burt Rutan has been married four times. He had health problems in 1998, and since then only flies with a second pilot seated next to him.

"That really was his own fault," says his brother. "He was just so engrossed in his designs and in running the company that he just gave himself a heart attack. He was drinking about 20 cups of coffee a day, sitting ... in front of a computer, eating tacos, and popping Roloids."

"Burt can be funny and pleasant and sometimes he can even be modest," says Flying magazine's Mr. Garrison, "[but] he has a big ego and he wants things to go his own way. People who work for him don't always have the most adoring reports."

At the same time, Garrison says, Rutan's health problems "gave him a sense that he has a limited amount of time to establish his place in the firmament. And that's what this [space program] is all about."

It may also be helping to drive his participation in another big-budget project: to build a plane to fly nonstop around the globe with a single pilot - and in a third of the time it took Voyager. Test flown last month, Virgin Atlantic-backed GlobalFlyer was designed by Scaled Composites to loop the earth in 80 hours.

After 10 months, Scaled Composites still has given no indication when SpaceShipOne will attain its ultimate goal in the thermosphere. But Rutan's team appears close - and the timing could provide another, more poignant, contrast for the people who live and work beneath the celestial sphere.

In 1986, after Rutan's Voyager was two or three days into its around-the-world flight, people "started to catch onto the idea that this thing was real," says Norris, "and maybe it's going to happen." It was just before Christmas, the same year in which the shuttle Challenger was lost. "So where the Challenger was a big downer," Norris remembers, "the Voyager turned out to be this big uplifter."

Now Rutan is poised to do it again with SpaceShipOne, just as the nation recalls the loss of Columbia one year ago. If he has his way, his base in this ancient landscape could soon be designated a legal spaceport.

The high desert north of Los Angeles really is a place of vivid contrasts.