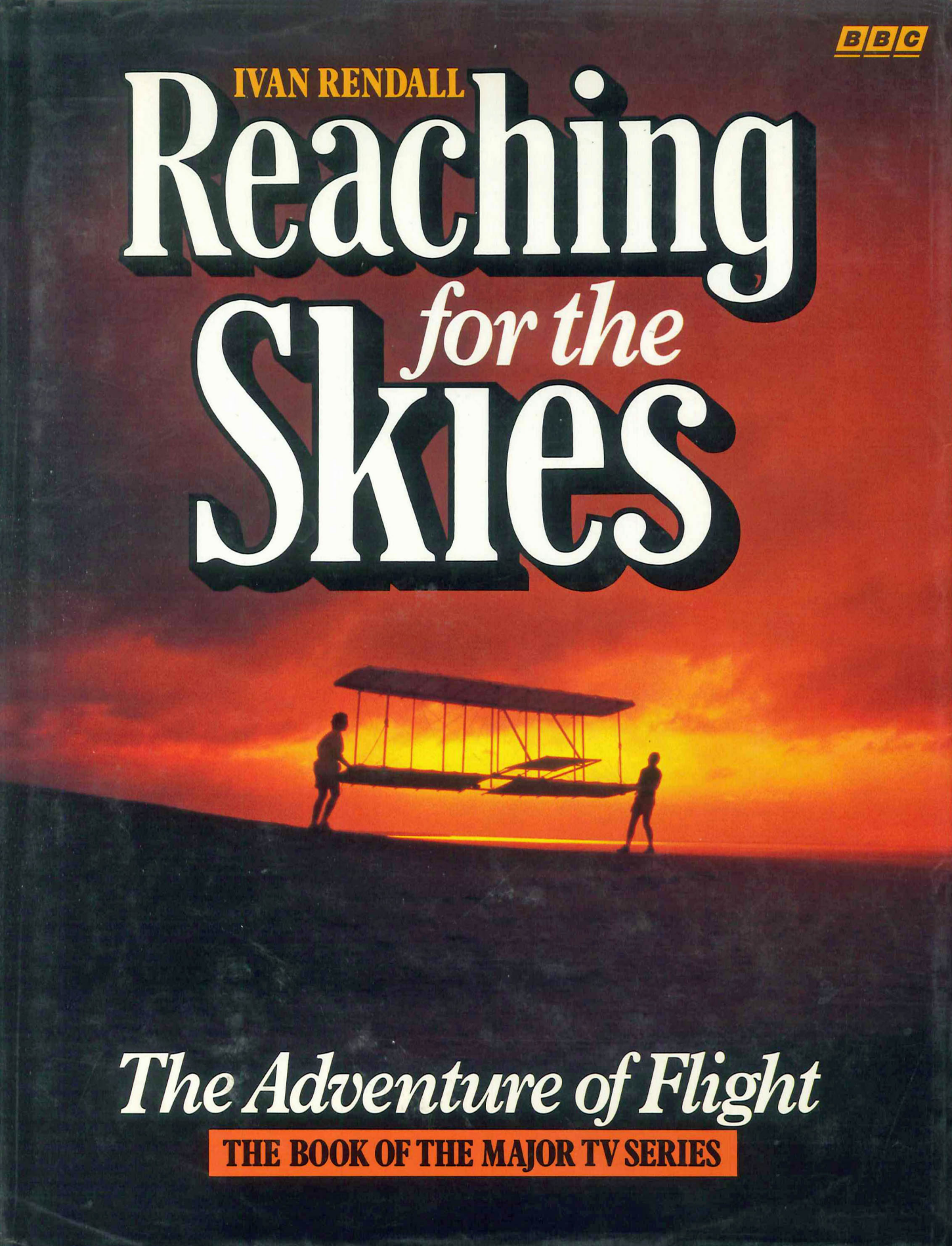
BBC

IVAN RENDALL

Reaching for the Skies



The Adventure of Flight

THE BOOK OF THE MAJOR TV SERIES

TITLE-PAGE
The Lockheed SR-71 Blackbird: the fastest production aircraft in the world

HALF-TITLE
Learning to ride the wind: Otto Lilienthal, pioneer glider pilot

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INTRODUCTION

As a piece of applied science the aeroplane has a place alongside the wheel, gunpowder, the printing press and the steam engine as one of the great levers of change in world history. The effect of aircraft on the way we live has been profound: they have shrunk the world, mingling previously isolated cultures, they have added a new and menacing dimension to warfare, spawned new technologies, created new economic zones and given us a toehold in Space.

The speed of the technical advances which have wrought those developments is startling: a single lifetime is all that separates us from a generation for whom aeroplanes were little more than a centuries-old dream. Interviewing pioneer aviators for the television series *Reaching for the Skies*, we heard a number of variations on the story: 'I met Louis Blériot, the first man to fly across the Channel in 1909, and John Young, the first Shuttle pilot in 1981.'

The impetus behind the scale and pace of the progress in aviation has been people – people of ingenuity, people with stark, physical courage, people who persisted with their ideas, often in the face of failure and ridicule, people of vision. Benjamin Franklin, the American statesman and scientist famous for his experiments with kites as lightning-conductors, watched Professor Jacques Charles launch his first hydrogen balloon in Paris in 1783. 'What use is it?' asked a scornful onlooker. Franklin's response went straight to the heart of scientific experiment: 'What use is a new-born babe?'

Vision coupled with a scientific mind and an ability to tinker and experiment are the very stuff of the pioneers of aviation. An English baronet, Sir George Cayley, had just such a mind. As a young man he grappled with the problems of heavier-than-air flight and by 1799 he had mastered the principles. He embodied his ideas in a drawing of a glider which he inscribed on a silver disc for posterity. Then he set about testing his theories with experiments. By 1809 he had built the world's first model glider and wrote up his work in a series of seminal articles. Today he is acknowledged as the father of the science of aeronautics but his work caused barely a ripple in established scientific circles at the time.

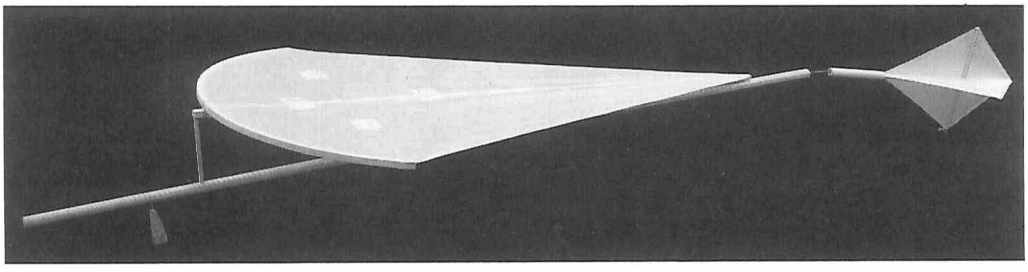
The world had to wait a century before Orville and Wilbur Wright combined a glider with an internal com-

OPPOSITE: The Grumman X-29: the latest in America's X Series of experimental aircraft which are constantly increasing our understanding of the art and science of flight

THE FATHER OF AERONAUTICS

In 1809 Sir George Cayley wrote that the problem of heavier-than-air flight was 'confined within these limits – to make a surface support a given weight by the application of power to the resistance of air'. What he lacked was the power. In 1853, aged 80, he built a glider which carried a man on a short flight.

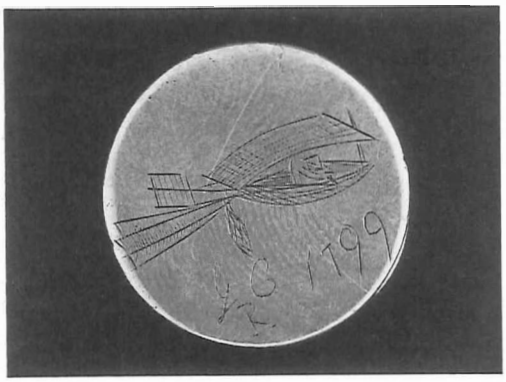
RIGHT: Sir George Cayley
OPPOSITE: One side of the disc bears his idea for a glider; the other the forces of lift, drag and thrust
BELOW: A replica of Cayley's model glider: it had a movable tailplane and an adjustable weight to change its centre of gravity

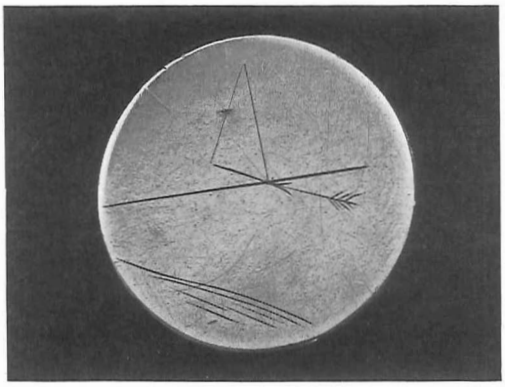


bustion engine to usher in the aviation age. Like Cayley they were methodical and scientific in their approach but they had, too, the raw courage needed to put their work to the test and make the first powered and manned flights. A young American engineer, Ken Kellett, reconstructed one of their gliders (page 50) and flew a replica of their famous Flyer for *Reaching for the Skies*. One of the few people to have experienced anything like the Wrights, it was their 'bravery' which struck him. He is a trained pilot; they were testing the ungainly machine for the first time while still learning to fly themselves.

Engine power has always been at the heart of progress in aviation. Less than thirty years after the Wright Brothers' flights a young RAF officer, Frank Whittle, realised that piston engines would reach the limit of their ability to power aircraft ever faster, higher and further, and with ever bigger loads. A new power source would be needed and in 1930 he patented the gas turbine, or jet, engine. He told us how the established interests of the aircraft industry were sceptical of a young man whose ideas would make their products obsolete, but he persisted on his own and produced the power which opened up a second age in aviation – the Jet Age.

Each hurdle in the story of aviation has been overcome by a mixture of inquisitiveness, persistence, ingenuity and courage. After the war, the next great hurdle was to fly faster than sound. In an interview for the programme 'The Quest for Speed', the British test pilot Capt. Eric 'Winkle' Brown likened the challenge to a combination of splitting the atom for the scientist while climbing Mount Everest

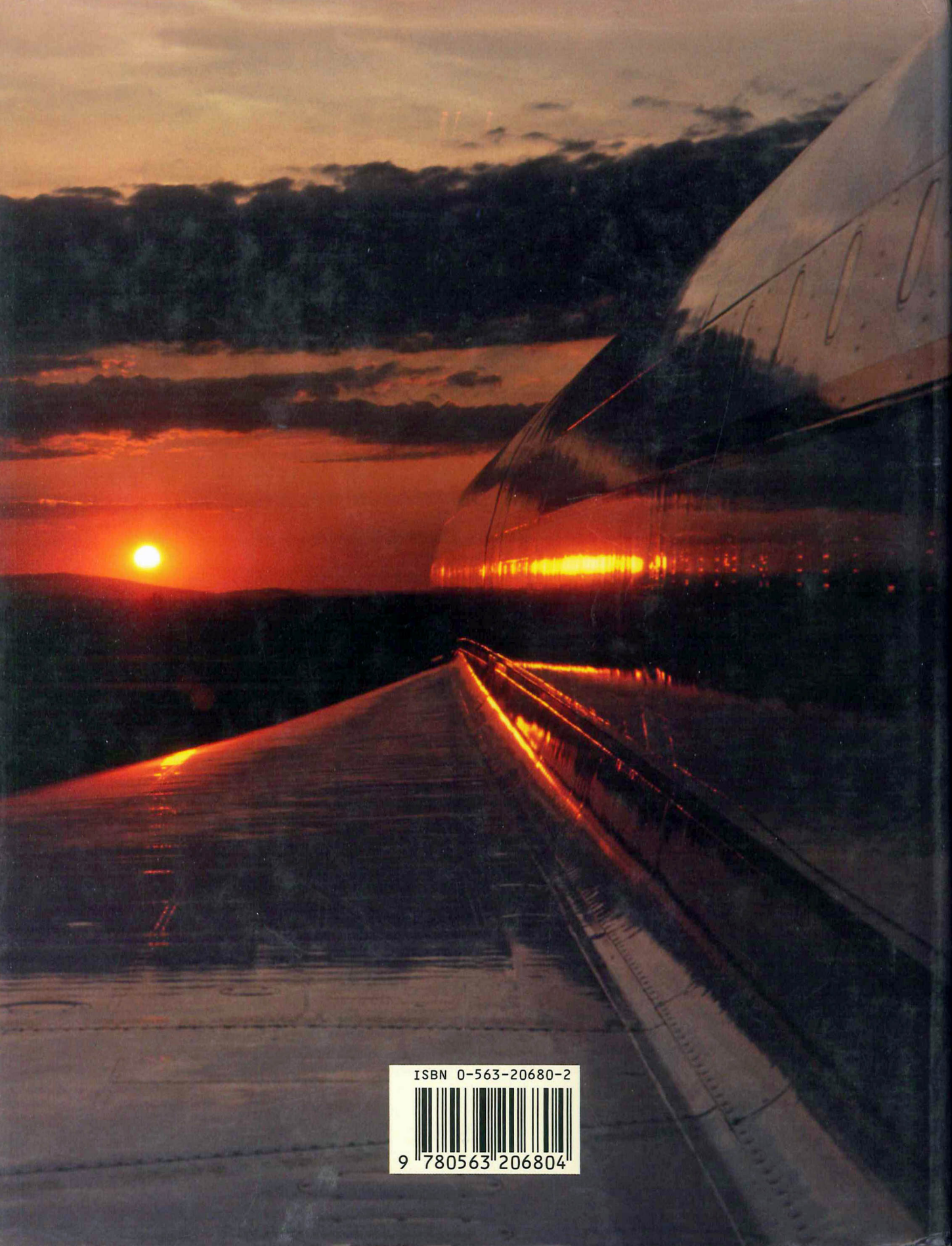




for the pilot. It was a step into the unknown every bit as great as Christopher Columbus setting out across a flat Earth and sailing ever westwards. The man who did it for the first time, General Charles 'Chuck' Yeager, was fatalistic about the risks. He told us: 'It didn't make any difference to me whether the X-1 blew into a million pieces or not because I couldn't do anything about that, so you put it out of your mind.' Within days of the fiftieth anniversary of the Wright Brothers' flights, 'Chuck' Yeager flew at two and a half times the speed of sound. Less than a decade later Man was in Space.

Pioneering in aviation is a continuous process though the goals change. The simple pursuit of more speed, height, range and size has given way to research into new materials, new technologies and new ways to solve old problems. The X-29 (see p. 6) has been built to explore forward-swept wings, an idea which originated nearly half a century ago but which has had to wait until stronger materials than metal alloys had been developed. In America Lockheed has undertaken many high-technology projects, some of them secret. Its SR-71 Blackbird strategic reconnaissance aircraft (title-page picture) flies for hours at a time at over three times the speed of sound on the verge of space. The intricate web of technologies which enable it to do so were developed specially for the purpose by a team of engineers and pilots led by a legendary figure in aircraft design, Kelly Johnson. Lockheed's Ben Rich told us: 'If you can think of it, we can do it, but the question is can we afford it?'

If the human qualities needed for pioneering aviation have not changed, what has changed is the cost. When the Shuttle flew in 1981, it had taken the financial muscle of the world's richest economy combined with the technical expertise of thousands of people in hundreds of companies in the world's most technically advanced country to build it. Yet even as the Shuttle was being built, an aeronautical engineer in California, Burt Rutan, was pioneering small lightweight aircraft with new shapes and new materials which could be built by enthusiasts at home. They were lighter, more efficient and above all cheaper. In 1986 his brother Dick, with copilot Jeanna Yeager, flew an experimental aircraft based on that work, Voyager, round the world on a single tank of fuel. They returned to much acclaim and enthusiasm. But there were echoes of 1783. 'What good is it?' asked the sceptics. Benjamin Franklin should have been at Edwards Air Force Base to tell them.



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