

# THE X-15 ROCKET PLANE

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*Flying the First Wings into Space*

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 Michelle Evans

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FOREWORD BY JOE H. ENGLE

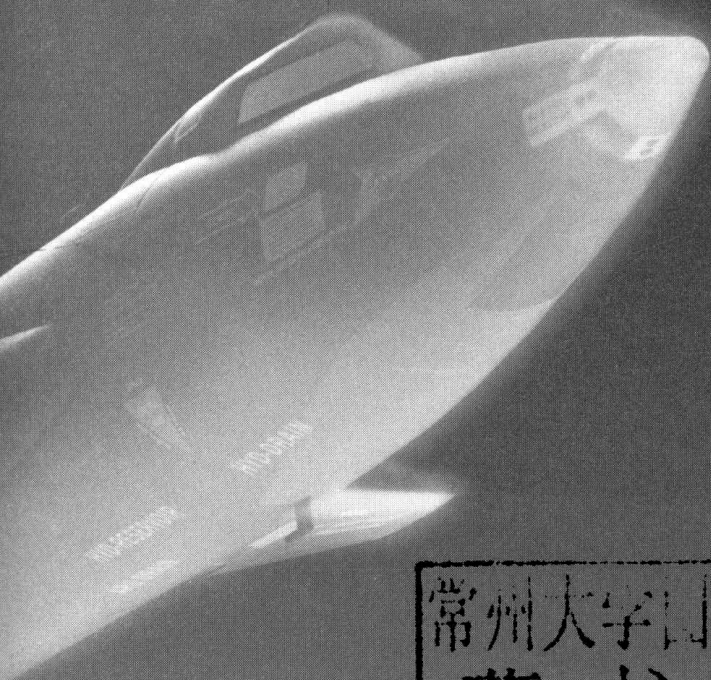
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**Michelle Evans**

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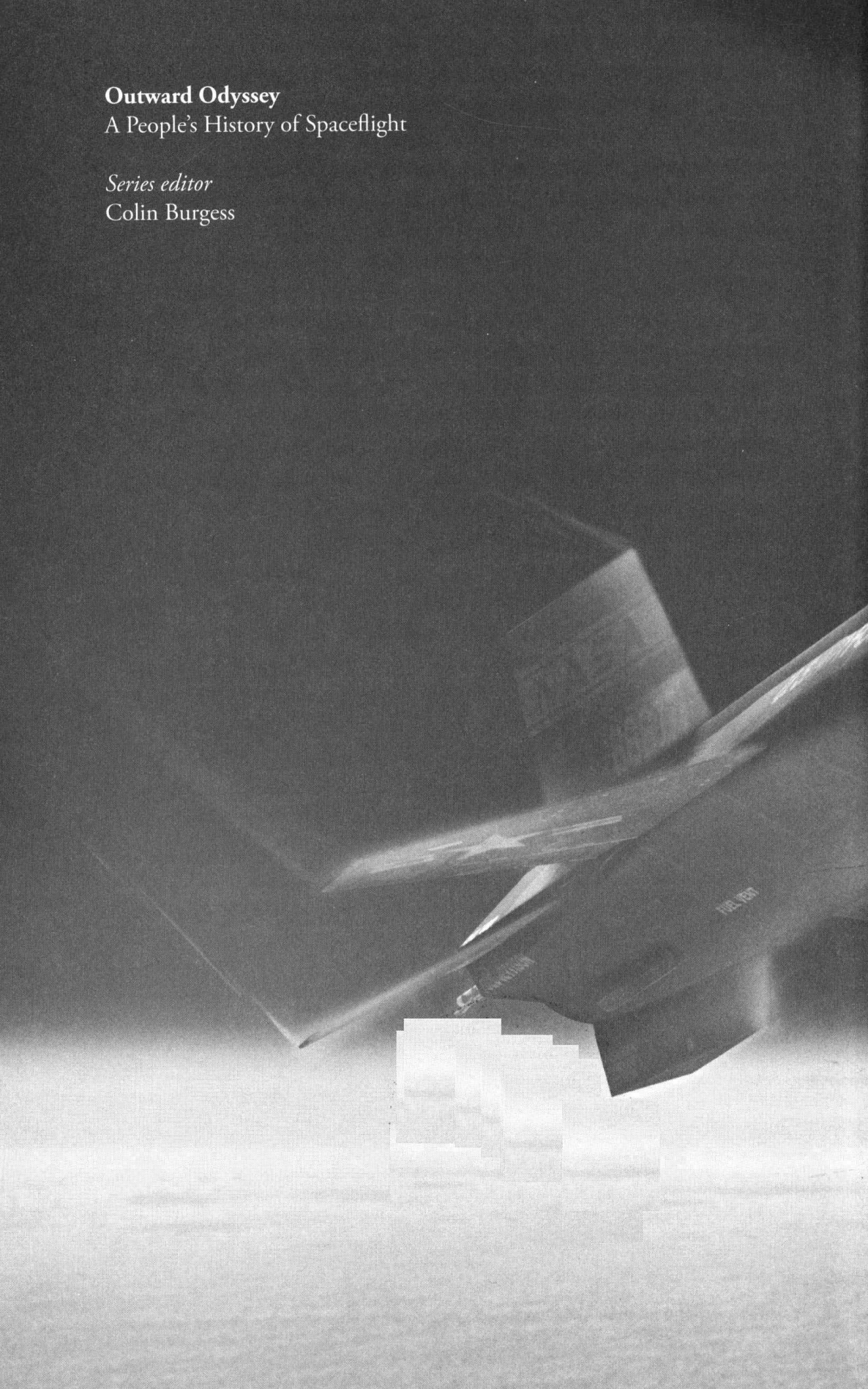
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# **The X-15 Rocket Plane**



**Outward Odyssey**  
A People's History of Spaceflight

*Series editor*  
Colin Burgess



This work is dedicated to all the men and women who made the X-15 possible, in flight, on the ground, and behind the scenes, and to Milt Thompson for giving me that first interview.

And a very special dedication to Cherie, my partner in life, my wife, my muse, without whose love and support this book would have never found light. And to Fluffy and Max, who stood vigil at my computer for so many years.

[Man] is a tough creature who has traveled here by a very long road. His nature has been shaped and his virtues ingrained by many millions of years of struggle, fear, and pain, and his spirit has, from the earliest dawn of history, shown itself upon occasion capable of mounting to the sublime, far above material conditions or mortal terrors.

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Winston Churchill (1874–1965)

# Foreword

As test pilots within the Flight Test community, my colleagues and I tend to associate significant advances in our world of flight in terms of hardware, specifically the airplanes. We give those airplanes names and personalities, and we speak of them respectfully (or sometimes not so respectfully) as living things. We often overlook the fact that it was people who conceived the ideas and goals, designed the often beautiful yet functional mold lines, the often critical but not visible systems, and gave these airplanes the ability to fly—with a little help from the laws of physics.

In this truly unique book, Michelle Evans has focused on those people, giving us a wonderful insight into who they were and what it was that drove them to dedicate their careers, and sometimes their very lives, to expanding our knowledge of flight. As I read the manuscript, I was familiar with many of the stories and incidents, but the accompanying details that Michelle's thorough research unearthed has made them so much more meaningful, fascinating—and fun! (I can't wait to retell them.) I've often joked that my X-15 stories get better each time I tell them. Now, at least for those told here, it'll be true.

Thankfully, the book is not limited to the pilots, who often receive the bulk of the credit and attention. We are introduced to engineers, technicians, mechanics, managers, administrative support folks, and people who, at times, were carrying out tasks far beyond (and sometimes beneath) what they were originally hired to do. But they did whatever it took to make the flight program safe and successful. The people you will read about in this book are a wonderful reminder of why this nation enjoys such a proud aviation heritage, and why we have been able to take the next steps in our continual quest for more speed and to go ever higher—even into space. They also represent why Edwards Air Force Base is universally recognized as the world's greatest flight test facility. Sure, the ideal weather and an abun-



dant array of dry lakebeds providing emergency landing areas doesn't hurt, but it's the people of Edwards and their spirit, unmatched anywhere in the world, that made it happen.

The X-15 was the greatest airplane I have ever had the privilege to fly. It was an honest, beautifully handling airplane and, most of the time, a real joy to fly. It was also the most rewarding airplane I have flown, while requiring the pilot's continuous, undivided attention throughout the entire flight profile. At subsonic, and even low supersonic speeds, the X-15 handled like a really good fighter. Because of its incredibly effective vertical stabilizer, and the fact it used differential elevons instead of ailerons mounted out on the wings for roll control, it exhibited little of the yaw-roll coupling experienced on most aircraft. The lower ventral part of this very effective directional control surface, which had to be accommodated and even removed during the high angle of attack entries on altitude flights, is discussed in this book.

The information and techniques developed in the X-15 program literally laid the groundwork for the Space Shuttle. Hardware, flight control systems, operational flight techniques, physiological data, crew operations with a full pressure suit, data monitoring of both aircraft and biological parameters, simulation, and real-time mission control were all direct beneficiaries of the X-15 program. But perhaps the most significant contribution was the airplane's demonstration of the ability to routinely manage energy of an unpowered, low lift-to-drag winged vehicle through reentry from space to a precise touchdown on a runway or lakebed.

During the design development phase of the Space Shuttle, many key engineers and managers at NASA felt it was necessary to have deployable air-breathing engines to provide go-around capability, or at least a shallower and more benign final approach to touchdown after reentering from space. Because the lift-to-drag final approach angles and the approach pattern and touchdown speeds of the X-15 and Space Shuttle were nearly identical from about Mach 5 to touchdown, those concerns were answered and put to rest. The significant resources, development time, and weight impact of air-breathing engines on the useable payload of the Space Shuttle were thus avoided.

It would be incorrect to suggest that if we did not have the information and experience of the X-15, we would never have been able to fly the Space

Shuttle. However, the x-15 was a critical step toward that goal, allowing us to get there safer, quicker, more efficiently, and with more confidence.

It will be a very long time—if ever—before we once again have a research aircraft so capable. This magnificent airplane taught us how to fly at hypersonic speeds and to routinely fly out of the atmosphere, conduct experiments, then reenter to make a precision landing.

The x-15 was a cutting edge airplane with a powerful rocket engine. This combination gave us the ability not only to go incredibly fast but to attain high enough altitudes to fly our first wings into space.

*Maj. Gen. Joe H. Engle, U.S. Air Force (ret.)*

*x-15 pilot (sixteen missions)*

*Space Shuttle commander: ALT-2, ALT-4, STS-2, STS-511*

# Acknowledgments

So many people helped make this book a reality. As with any work of a historical nature, it will always be true that an author cannot work in a vacuum. There are interviews, research, travel, and more interviews. Each person you meet along the way helps get you to that finish line. However, the biggest hurdle in any book is to get off the blocks. With that in mind, I acknowledge Dr. Richard Hallion, who answered my first phone call on the day I got the idea to pursue this project. His response was to come directly to Edwards Air Force Base so he could point me in the right direction. I grabbed my gear and headed up to meet with him the next day. Dr. Hallion went on to make introductions with several key people, who all eventually sat down to endure my questions.

Milt Thompson was the first in a long line of interviews. He and Jack Kolf visited with me several times. I will be forever saddened that neither of these fine gentlemen survived to see this work published.

Much later, I found a good friend in Dave Stoddard, formerly of the NASA rocket engine shop. We met after a long hiatus from my writing. He opened more doors than anyone else. For that, and so much more, thank you, Dave.

Others I must note include Sheri McKay-Lowe, daughter of X-15 pilot Jack McKay. One of eight children, Sheri spent a lot of time with me in her home, and on the telephone, sharing memories of her parents and her life with seven siblings.

Francis French was the one who first put me in touch with my editor, Colin Burgess. I am forever grateful to Francis for getting the ball rolling that night at “Killer Pizza from Mars” and to Colin for believing in me, even when he could have easily given up and gone elsewhere. Colin, you put up with a lot from me throughout the gestation process, reassuring me I was the only person who could tell this story. You are amazing.

Thommy Eriksson first contacted me many years ago, telling me of his love of the X-15 and of his special skill in creating photo-realistic computer images. The marriage of those two skills is seen throughout this book with the amazing images he conjured while skillfully manipulating pixels. My gratitude in what he created is as high as the altitudes reached by the X-15.

Special thanks go to all those people who shared their time and stories of the X-15: Brent Adams, Freida Adams, George Adams, Bill Albrecht, Johnny Armstrong, Neil Armstrong, T. D. Barnes, Florence Barnett, Larry Barnett, Roger Barniki, Paul Bikle, Phil Brandt, Dean Bryan, Stan Butchart, Vince Capasso, Scott Crossfield, Sally Crossfield Farley, Bill Dana, Meryl DeGeer, Joe Engle, Frank Fedor, Fitz Fulton, Billy Furr, Charles Gerdel, Byron Gibbs, Don Hallberg, Bob Hoey, David Knight, Pete Knight, Jack Kolf, Eldon Kordes, Terry Larson, Wade Martin, Charlie McKay, John McKay, Mac McKay, Mark McKay, Sheri McKay-Lowe, John McTigue, Phil Moore, Edward Nice, John Painter, Forrest Petersen, Bob Revert, Ralph Richardson, Daniel Riegert, Jim Robertson, Bob Rushworth, Harry Shapiro, Glynn Smith, Dave Stoddard, Harrison Storms, Bill Szuwalski, Milt Thompson, Daryl Townsend, Jim Townsend, Donald Veatch, Grace Walker-Wiesmann, Gene Waltman, Lonnie Dean Webb, Bob White, Ray White, Walt Williams, and Jim Wilson.

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# Introduction

The x-15 was the first winged rocket ship to take astronauts into space and back again. It was designed in the mid-1950s, at a time when, to the public, rocket ships meant gleaming silver stilettos with swept-back fins, filled with astronauts in bubble-headed spacesuits, doing battle against aliens bent on the overthrow and subjugation — or annihilation — of Earth.

Although the x-15 was sleek from a distant perspective, a closer look revealed construction much heavier than might be expected. Protuberances such as bug-eyed cameras and antennae bulged from the heat-resistant hypersonic skin, while surfaces at the rear were corrugated for strength rather than aesthetics. Seeing the intricate details of the craft reminded one more of an industrial boiler rather than of the sculpted visage people were used to seeing in the science fiction of that period.

Yet the x-15 was still a beauty in its own right, not created to please an audience, but instead was the vanguard of a far-reaching research program that dealt with the real idea of being able to fly a fully reusable spacecraft out of the atmosphere and land it safely back on terra firma under a pilot's control. And even though the experimental data garnered from more than nine years of flight testing often lent itself to technical journals and scientific publications, the program also inspired people about the real excitement and promise of air and space exploration.

A generation earlier, a silver, single-engine, high-wing monoplane, with only a periscope for forward viewing, swung in over the ocean and landed at a small field. Local military men, with arms linked, tried to hold back the swarm of onlookers who attempted to rush the field. Inside the *Spirit of St. Louis*, Charles Lindbergh shut down the engine and organized his materials and thoughts, then climbed out of his airplane to the waiting jubilation of the people. This was not the evening of 21 May 1927 at the Le Bourget

airport outside Paris but instead in St. Thomas, U.S. Virgin Islands, more than eight months later.

In early 1928 Lindbergh was finishing a tour that extended throughout Latin America and the northern parts of South America, culminating with stops in the Caribbean. He was riding the crest of fame and admiration for his feat of the first solo crossing of the Atlantic. As with so many places around the world, the entire island of St. Thomas had been enthusiastic followers of Lindbergh's exploits. Although not on his original itinerary, the territorial governor of the Virgin Islands, Waldo Evans, sent a special invitation for Lindbergh to visit St. Thomas before he returned to the United States at the end of this tour. He was hoping not only to have the famous aviator in his territory but that Lindbergh's presence might help foster aviation throughout the islands and the resultant tourism that would entail. Governor Evans's request had originally been misplaced by the State Department; however, the governor was finally able to make contact while Lindbergh was in Panama. With just a few weeks until he would arrive, Lindbergh accepted the invitation, landing on St. Thomas on 31 January.

The following day was full of festivities, including horse races, tours, and official government receptions. The U.S. Navy was responsible for most of the arrangements, which included having their official photographer record the events. He was Milton Barron McKay, or simply "Cap Mac" to close friends and family. His twin sons were Jim and John, although John preferred the nickname Jack. The boys were just past their fifth birthday when Lindbergh landed.

Eighty years later, Sheri McKay-Lowe, daughter of Jack, said that after the great aviator's visit, both boys immediately fell in love with the idea of flying into the clouds. They started making small popsicle-stick airplanes. As they grew, so did their ambitions to emulate what they had seen in Lindbergh. They built proper model airplanes, and both hoped for later careers in aviation. Jim eventually became an aeronautical engineer, working for the National Aeronautics and Space Administration (NASA) at the Flight Research Center. Jack was able to enter test flying, becoming the fifth pilot of the X-15 research aircraft.

My passion for exploration began at about the same age as the McKay twins. When I was a young child in kindergarten and on into grade school, my

father worked for a company called Sangamo Electric, setting up expensive, multitrack data tape recorders at government locales such as the Naval Weapons Center at China Lake and the Flight Research Center at Edwards Air Force Base in the Mojave Desert of California. His instruments acquired telemetry from military tests of missiles and weapon systems; most of what he did he could not share with me. One morning before going to school, my father asked if I would like to tag along on one of his day trips to Edwards. I jumped at the chance, although for a five-year-old kid, it was a scary proposition to head into the desert with fighters, bombers, and everything else under the sun thundering through the clear, bright sky. I waited outside my classroom at the appointed time for my father to pick me up to begin my adventure—one that continues to this day. The trepidation of that first trip quickly turned to awe as I saw the wonders in store. It was the first of many such excursions over the next several years.

This was the era of spaceflight, when we could go everywhere and do everything. The moon was within our grasp. The rockets being launched at Cape Canaveral were wonderful, but I saw them only on television; whereas, on these trips to the other NASA at Edwards, I could see the real stuff up close. I also had a young child's delight in getting to meet the men who flew the test flights, and lots of other people on the ground who truly made it all happen.

Since my father also had work to do, he often found a friend who could walk me around on behind-the-scene tours. We'd wander through the hangars or out on the flightline to see what was on the ramp being prepared for a future flight or what may have just come back from a sortie. I vividly recall watching with fascination as the X-15 was slung under the wing of a B-52 and made ready for flight. There was so much going on: the jumble of equipment, personnel going about their jobs, everyone often doing things where I had no idea of their purpose. It was paradise for a curious kid with lots of questions and a yearning for excitement.

On one such trip, my father's designated friend decided to take me to see the X-15 simulator, known as the "Iron Bird." He knew it was currently in use and thought I might like to see its operation. It was a long contraption, with pipes and wires and sheet metal, looking like something a child such as myself might cobble together out of an Erector Set. We stood and watched for a bit, then the pilot finished his "mission" and exited the cock-

pit. Instead of walking directly away to some debriefing or to his office, he saw me there and decided to come over, say hello, and shake my hand. I have no idea who my guide was that day, but I will always remember that moment when he introduced me to the research pilot who had just exited the simulator. His name was Neil Armstrong.

When I was first getting the idea to write the book you now hold in your hands, I contacted Neil for an interview, writing a letter asking to set up the appointment. Neil called me one morning to let me know he was willing to get together. After a couple months of planning, I drove into a tiny Ohio town on a rainy Thursday afternoon in early May, looking for his office. Somehow the address was off by a digit, and I ended up blocks away from where I should have been. The place just didn't look right. I knocked on the door and for a long time no one answered. Had he forgotten our appointment? Finally, the door creaked open and a very old man was standing there. When I said I was there to see Neil, he thought for a long moment, scratched his head, then said, "Oh, you must be looking for that astronaut fella." I told him I was, and he explained the mistaken address number, directing me to the right location down the street.

Soon afterward I was knocking at the correct door, and his secretary immediately answered and invited me in out of the rain. My first glimpse of Neil in his office that afternoon—the first time I had seen him in person since that day with the X-15 simulator—was him standing in the middle of his office with a wastebasket in hand, trying to place it to catch the rain coming in through leaks in a bad roof. The can was just one of several I saw scattered about the room. Introducing myself, we shook hands, then he set the can on the floor under a drip. Looking around the room at the mess, he suggested we find a new location for the interview, so we walked across the street to a neighborhood ice cream parlor. We found a corner table near the front window and sat down to talk for a couple hours. I recall that meeting fondly and can now listen to that tape of his mild but assured voice answering my queries. In the background are the various sounds of the parlor: chairs scratching on the tile floor, the cash register ringing up, the low murmur of other patrons, the tinkling of the tiny bell as the door is opened and closed.

This is just one of my many vivid memories from all the interviews conducted for this book, part of my personal journey with regard to the X-15.