by Jonathan Eberhart

On December 17, 1903, Orville Wright climbed aboard a spidery craft at Kitty Hawk and took off on the world's first successful flight of a powered, heavier-than-air machine. In 12 seconds aloft, he traveled a little more than 120 feet, covering the ground at a bit less than seven miles per hour.

On September 17, 1959, test pilot Scott Crossfield sat strapped into the black, dartlike X-15 rocketplane as a B-52 bomber carried it up 35,000 feet above the Mojave Desert in California, and let it go. On this, its first powered flight, the X-15 shot up to 50,000 feet, then roared through a 100-mile course at more than 1400 miles an hour.

The Wright brothers' plane will never fly again. Since 1948 it has hung from various ceilings in the Smithsonian Institution in Washington, D.C., another museum relic along with the dinosaur bones. Now the ultramodern X-15—still the fastest thing in the sky except for space vehicles and a very few missiles—is also near the end of its life.

The villain, of course, is the war in Vietnam, which has been draining dollars away from programs all over Greatsocietyland. The X-15 program has been costing something on the austere side of six million dollars annually to run—a single Boeing 707 jetliner costs about seven million—but a good bit of the plane's research could easily be written off as too esoteric, if one were hurting for money to spend elsewhere.

The National Aeronautics and Space Administration, which finished taking over the program from the Air Force at the beginning of this year, is definitely hurting. A few more flights may still be made before the program trickles out altogether late this year, but the money is already being aimed elsewhere, such as at NASA's quiet engine program to cut aircraft noise.

There have been three X-15's, of which only No. 1 is still flyable. The second has not been up since last October, when a test mockup of an experimental ramjet engine, mounted externally on the vehicle, caused unexpected shock wave patterns that burned a hole through the plane's ventral fin. The third was destroyed in a crash Nov. 15.

For sheer altitude and speed nothing could outfly the X-15's. In 1963, No. 3 set an altitude record that still stands, when it climbed to a towering 354,200 feet—more than 67 miles. Of the dozen men who have flown the X-15, eight have taken it higher than 50 miles. The five military pilots who passed that mark were awarded astronaut's wings.

The No. 2 plane holds the speed record, 4,520 miles per hour, more than seven times the speed of sound. The X-15's records are all listed unofficially, however, since the plane cannot take off from the ground, but must be carried aloft by a mother ship.

The X-15 has been by far the most successful and longest-lived in the trailblazing "X" series of experimental aircraft, but its ancestors were pioneers in their own right. The first plane ever to fly faster than sound was the X-1 in 1947. The X-5 was the first aircraft to incorporate variable-sweep wings, a feature now part of the F-111 fighter and Boeing's supersonic transport.

Because of the unique stresses it places on materials, components, instruments and pilots, the X-15 has been invaluable as a flying test bed. Special metal-working techniques developed for the X-15's Inconel alloy provided vital data for similar problems facing the builders of the giant B-70. Both aircraft were built by North American Aviation in California.

Inertial guidance techniques, perfected largely in the X-15, will certainly be included in the supersonic transport, and are even now being evaluated by a commercial airline.

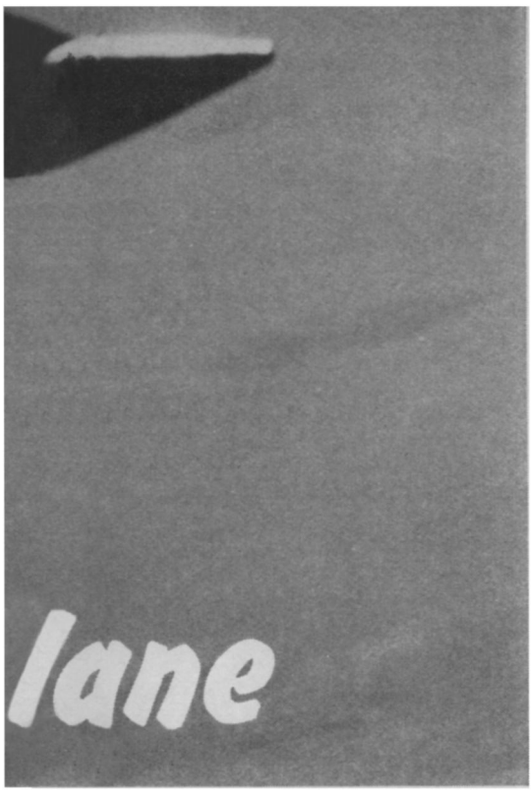
The almost-wingless X-15's need for precise control at high speed caused its designers to adopt a control system using tiny reaction rockets. First tested in the F-104 fighter, the system was refined and perfected to such a degree in the X-15 that NASA says it helped North American's chances in the bidding for Apollo control rocket contracts.

Some strange experiments have been carried out by the X-15. A wingtip pod, controlled by the pilot from the cockpit, has been used to gather dust paricles and micrometeoroids from the edge of space. Special instruments have been fastened to the craft to help scientists measure the effects of the sun's radiation on spacecraft.

NASA has been meeting with the Air Force to decide the X-15's fate. At best the rocketplane will be kept around on a shoestring for a few flights later this year. Then it will be put in mothballs until after Vietnam or until needed for future projects.

At worst the whole program will simply be beheaded, and the remaining healthy X-15 will be shipped off to the Smithsonian to join the other antiques.

Requiescat in pace.



William H. Dana joined NASA in 1958, where he served as project pilot on the agency's study of SST operating conditions. In addition to many jet aircraft, he has also flown NASA's M2-F1 lifting body. He first flew the X-15 on Nov. 4, 1965, and has piloted the rocketplane 10 times since then. He has taken it as high as 306,900 feet, more than 58 miles, and as fast as 3,693 miles per hour, 5.34 times the speed of sound.

From the pilot's seat

Before describing the specific sensations of flight in the X-15, let me put these comments in context. The X-15 is the most marvelously-engineered piece of hardware I have ever flown, and by listening to the remarks of my fellow pilots who have flown it, I conclude that they share my sentiments. The X-15 operates in an environment that varies from the pure vacuum of near space to the heavy air loads of 2,200 pounds per square foot near the earth. Shock waves strike on its control surfaces from the time it crosses Mach 1 on its way up to its maximum speed of seven times the speed of sound and until it decelerates to subsonic speeds again. During no two seconds of supersonic flight are these shock impingements identical. Yet the X-15 remains totally responsive to the commands of the pilot from launch to landing.

So flying it is a piece of cake, right?

Wrong. The very nature of the airplane's design mission dictates that an X-15 flight will be a challenge to the men who work with it, and ultimately, to the man who flys it. Hundreds of hours are spent in the precise planning stage that precedes every flight. Once the complicated flight plan is completed, another 50 hours are spent practicing the 10-minute flight in an electronic simulator. The last two hours prior to launch are spent in ground checks and inflight system checks that are so routine that they mock the forthcoming events.

The launch itself provides the first surprise of the flight. The act of leaving the wing of the mother ship in free fall gives the X-15 pilot the sensation that he was fired off the mother ship's shackles by some hidden cannon. This sensation is not eased until the rocket engine lights one to two seconds after launch.

Then begins as busy a minute-and-a-half as most pilots ever want to experience. In that short time, the X-15 accelerates from subsonic speed to about six times the speed of sound. A myriad of events take place in this 90 seconds: the pullup to climb altitude; the maintaining of this climb angle to the designated pushover point; monitoring of speed, altitude, and air loads to ascertain that the planned flight is being flown; manipulation of switches to trigger the experiments onboard; and finally shutdown of the engine at the prescribed maximum velocity. All of these events are performed under an acceleration that presses the pilot into the back of his seat with two to four times the force of gravity.

A time deviation of one second in the performance of any of these events can mar the quality of the important data being acquired.

Engine shutdown brings some relief of physical stress, but the workload continues. If the flight is an altitude mission, that is, if it leaves the atmosphere, the pilot must operate attitude control rockets to keep the X-15 upright and weathervaned along the flight path until the atmosphere is reentered.

Then come the loads of re-entry; the pilot is forced down into his seat with five times his normal weight as the X-15's fall is broken. If the mission is a heating research flight, the craft remains within the atmosphere, and at the speed it travels the air loads are massive, usually half to three-quarters of a ton per square foot. Any maneuvering transmits these loads to the pilot; at Mach 5, for example, a simple twenty-degree change of heading requires a 5 "g" turn for ten seconds.

Whatever its mission, eventually the X-15 decelerates and maneuvers to a position over the dry lake near NASA's Flight Research Center at Edwards, Calif., and the pilot finds himself once again in an environment familiar to him. The craft is now subsonic, and the pilot has practiced the X-15 approach pattern hundreds of times in an F-104 jet. The approach is relaxed and the landing is straightforward.

The flight has ended and the pilot invariably reflects that the mission was challenging indeed. Therefore, the satisfaction of its successful completion is great, and, more than at any other time, the pilot longs for the next flight.

by William H. Dana