

## Air and Space this Week

### Item of the Week

# TWO BAD DAYS, TEN YEARS APART

Originally appeared September 18, 2023

**KEY WORDS:** Speed of Sound Mach 3 de Havilland DH 108 Apt X-2

*Flight test is a very dangerous profession, and the world lost two brave fliers on **September 27**, ten years apart. Geoffrey de Haviland Jr., the son of a famous British aircraft designer, died in 1946, attempting to fly faster than sound in one of his father's company's early D.H. 108 "Swallow" jets. The event was one of the factors that fostered the view of the speed of sound being some sort of impenetrable barrier. A mere ten years later to the day, test pilot Milburn Apt died seconds after becoming the first person to fly at Mach 3, in the X-2 rocket plane.*

### THE GEOFFREYS DE HAVILAND

**Geoffrey de Haviland** was born in Buckinghamshire, England, on July 27, 1882. He pursued an engineering education, with an eye to the newly-developed automobile and motorcycle. This led him to learning more about engines and their design. He held a variety of positions relating to the engineering behind the development of wheeled transportation. Then he was bitten by the aeronautical bug, which would guide his professional interests for the rest of his life.

De Haviland's family had a bit of money (his cousins included Olivia de Haviland and Joan Fontaine), and young Geoff borrowed enough of it to build his first airplane in two years of his spare time. He married Louise Thomas during this period. Alas, de Havilland wrecked his plane on its very first flight, in December, 1909. Undaunted, he built another and flew it from a nearby field in September, 1910. He kept designing and building more capable aircraft; by 1912 he held the British altitude record (10,500 feet) in a plane he designed and built. He became the chief designer at Airco, an early British airplane manufacturer, and a number of his designs saw service in WWI. He saw service, too, as a flying officer in the Royal Flying Corps, briefly flying anti-submarine patrols off Scotland. The brass quickly recognized de Havilland's value as aircraft designer was much greater than as a patrol pilot, so back to Airco went the young lieutenant.

After the War, Airco was bought and then shut down. De Havilland, former Airco owner George Thomas, and other Airco alumni formed the de Havilland Aircraft Company. They went to work on developing [engines](#) and a light general-purpose plane, the [Gipsy Moth](#), and other aircraft in the "Moth" family. Geoffrey did much of the flight test for the company's products, as did his brother, Hereward. His company manufactured aircraft and engines for the RAF throughout WWII. One of his designs turned out to be particularly valuable, a light multi-purpose

fighter/bomber called the DH 98 Mosquito, worthy of a future Item in its own right. For more on this fine aircraft, many resources are available, among them is: <http://aviation-history.com/dehavilland/mosquito.html>.

De Havilland received many honors and accolades for his aviation service, including the Air Force Cross, the Royal Aero Club's Gold Medal, and knighthood by George VI. He was also inducted into the International Air & Space Hall of Fame.

Geoffrey de Havilland had three sons: Geoffrey Jr. (2/18/1910), Peter Jason (5/13/1913), and John (1918). There is little information about Peter Jason readily available, apart from his authoring a biography of his father in 1979. Junior and John both served as test pilots for the de Havilland Aircraft Company.

John died in the cockpit of a Mosquito on August 23, 1943, when he collided with another Mosquito on a test flight.

Geoffrey Jr. was DH's senior test pilot. He had made the first flight in both the DH 98 Mosquito, and in the post-War DH 100 Vampire, an early jet with a twin tail-boom design. Like Bell and other aircraft companies in the late 1940s, de Havilland was pursuing ever-faster jets and were starting to investigate aerodynamics near the speed of sound.

I hate to say this, but the German aerodynamicists and aircraft designers of WWII outdid their Allied counterparts in coming up with innovative designs for military aircraft and rockets. The "[Operation Paperclip](#)" guys helped the American military designers directly, and others were inspired by German designs.

De Havilland designer, John C.M. Frost, was one so inspired. In October, 1945, he used the [Me-163 Komet](#) rocket plane as the basis for the DH 108 Swallow, a swept-wing, tailless experimental aircraft. Three prototypes were built, to be used to investigate the aerodynamic properties of a swept-wing at sub-sonic and near-sonic speeds. The first prototype was built to test the basic design at low speeds (its top end was 280 MPH). Junior flew it in a 1946 air show held by the Society of British Aircraft Constructors.

The second prototype had a de Havilland Goblin 3 turbojet engine and was much faster. Junior got the first-flight call again, in June, 1946. Testing led to modification led to more testing. On **September 27, 1946**, Junior was at the controls for a high-speed test flight. The DH 108 had reached Mach ~0.9 in a shallow power dive and was at 10,000 feet altitude, when the aircraft underwent uncontrollable oscillations in pitch. The resulting aerodynamic forces broke the back of the aircraft, its wings folded up, and Geoffrey Jr. crashed into the Thames Estuary.

The third DH 108 prototype proved to be a pilot-killer, too. It had a more powerful DH Goblin 4 turbojet, theoretically powerful enough for supersonic speed in level flight. DH test pilot John Cunningham, a WWII ace, piloted its first flight on July 2, 1947. He also set a new world speed record with the third prototype, 604.98 MPH, on April 12, 1948. The aircraft was turned over to the RAF, but it crashed on February 15, 1950, killing its pilot, Stuart Muller-Rowland, a Wartime squadron commander. The likely cause was a failure in the oxygen system rather than in the plane's flight control.

## MILBURN APT AND THE X-2

Air Force Captain Milburn Grant Apt started his very special day early. He probably didn't know that it was exactly ten years after de Havilland Jr.'s fatal crash. He had bigger, and much faster, things on his mind.

He might have reflected a bit about the career path that brought him to where he was this morning. He was born on April 9, 1924, in a small Kansas town. He graduated high school in 1942 and immediately enlisted in the U.S. Army Air Forces. He served in the Caribbean Defense Command until after the War, then received additional education in aeronautical engineering at the University of Kansas and the Air Force Institute of Technology, which qualified him to enroll in the Experimental Test Pilot School at Edwards AFB, in 1954.

Capt. Apt compiled a solid record and enjoyed a reputation of coolness under stress. In one incident, he was awarded the Soldier's Medal for heroism for pulling another test pilot from a flaming wreck. [The prestigious Soldier's Medal is awarded by the Army for a notably heroic act not involving conflict with an enemy.] By September, 1956, Apt had compiled more than 3,500 flight hours in a variety of hot aircraft, including the F-100, F-101, F-102, F-104, and F-105. His F-105 on one flight suffered a dangerous engine fire, but Capt. Apt opted to fly it back to base rather than eject. Having the intact plane to examine revealed several design flaws that were corrected quickly, something that would not have happened without Apt's stubborn courage.

The Air Force was always working diligently to develop ever-faster and more-capable fighter aircraft. Chuck Yeager and the *Glamorous Glennis* had shown that the sound "barrier" was a myth, and aircraft speeds increased dramatically, to Mach 2 and beyond. The Air Force had an aircraft under development, the Bell X-2, that might be capable of Mach 3! They called it the "Starbuster."

And Mel Apt was going to fly the mission!

The typical X-2 flight profile starts with the X-2 being loaded into the modified bomb bay of a B-50 mothership. After being taken to 30,000 feet, the X-2 is dropped, the rockets fire, and the X-2 lands on the large dry lake bed at Edwards.

Veteran test pilot for Bell, "Skip" Ziegler, made the first flight in the X-2, a non-powered drop test to gain experience with the X-2's glide characteristics, on June 27, 1952. A hard landing on the playa caused damage, delaying the second glide test to October 8. It was successful, piloted by Maj. "Pete" Everest, on October 10.

The X-2 was shipped back to Bell in New York for engine installation. Captive flights were carried out over Lake Ontario. On [one of them](#), an explosion of the X-2 destroyed it, crippled the B-50, and killed both Ziegler and a B-50 crewman.

Two X-2 airframes had been built. An engine was installed in the second and then it was slung below a B-50D replacement for the original X-2 carrier and sent out to Edwards. The X-2 made two flights on August 5, 1954, one was a captive flight (engine fired but X-2 not dropped) and

the second, flown by Everest, was a glide test. Another hard landing and another program delay for X-2 repair.

The X-2 returned to action at Edwards on January 16, 1955. The testing during captive flight program re-started on February 5. Two glide flights followed. Another hard landing. Another trip to the Bell plant. [Why does Monty Python's [Swamp Castle sketch](#) come to mind?]

The X-2 program hit its stride when powered tests began on October 25 1955. Well, not right away, the first attempt at powered flight became a glide flight when a nitrogen leak disabled the rocket. A second failed attempt followed. Frustration had to be running high.

The X-2 had a two-chamber rocket engine. One chamber produced 5,000 pounds of thrust and the other 10,000. Everest finally had a (partial) success with the rocket, igniting the smaller chamber only on the first successful powered flight, on November 18. It was still enough to get him to Mach 0.95. Several more aborted missions followed; the next success was on March 24, 1956, when Everest used only the larger chamber. The X-2 went supersonic for the first time on April 25, using both chambers.

A new test pilot came on the scene, Iven Kincheloe. His first X-2 flight was on May 25, when he went Mach 1.4. The aircraft then underwent a few modifications and was ready again for flight on July 2. Another flight followed on July 23, with Everest at the controls, when he took it to Mach 2.87. Kincheloe then became the project pilot and made one successful flight in three tries. Then NACA came calling...

NASA's predecessor wanted the X-2 for their own high-altitude testing. The Air Force wanted to test the limits of the X-2's capabilities and to have enough time to train up an additional X-2 pilot (Apt), and NACA agreed to hold off the transfer until mid-September. Kincheloe flew five more times in the X-2, with the first being partially successful (it failed to reach the planned altitude), the second was a resounding success, and the final three were mission aborts.

The Air Force wanted data. Apt wanted the speed at Tom Wolfe's "top of the pyramid."

The Air Force didn't tell Apt to go for Mach 3, but the mission plan was sufficiently vague that Apt could justify it. The take-off of the mothership was routine on **September 27**, 1956, exactly ten years to the day after Geoffrey de Havilland's death pursuing Mach 1.

The drop from the mothership was perfect, and Apt hit the throttles for both chambers. The rocket overperformed and Apt and the X-2 hit Mach 3.196!

Aircraft designers had struggled with a mechanism/process that would allow a pilot to leave a damaged aircraft in flight. The problem was especially severe at the speeds reached by the research aircraft of the mid-1950s. The Bell engineers knew an ejecting pilot needed protection from air blast, so they designed the forward part of the X-2 fuselage (with an assist, it might seem, from [Rube Goldberg](#)) to serve as an "escape pod." The pilot could cause it to be detached from the rest of the airframe and be slowed and stabilized by a drogue parachute. Once the speed is low enough, the pilot would open the cockpit and bail out conventionally.

The mission profile for Captain Apt's flight was the same as previous powered flights; it called for him to fire his rocket until it ran out of fuel, then turn toward Edwards for a gliding approach and dead-stick landing. Apt began his turn, but too abruptly, perhaps due to concern that his higher-than-expected speed would carry him too far from Edwards. A phenomenon known now as "inertial coupling" took control of the X-2 away from Apt. Violent movements of the tumbling aircraft battered him, but he detached his escape pod successfully. He was able to open his cockpit and release his harness, but alas, the pod hit the ground before he could jump. He was awarded a posthumous DFC.

## CODA

Iven Kincheloe was flying an F-104 chase plane for Apt's fatal mission. On July 26, 1958, his number came up, and he was killed proving that having a downward-firing ejection seat on the early model of the F-104 Starfighter was a really bad idea. He was a double ace in Korea, won the 1956 Mackay Trophy, and [was enshrined](#) in the National Aviation Hall of Fame.

Pete Everest had a marvelous career, flying all of the hottest jets at Edwards from 1951-1957, including the Bell X-1 and X-2. He held a number of progressively more-responsible positions in the Air Force, and flew 32 combat missions over Viet Nam. He would win both the Harmon Trophy and the Octave Chanute Award, and he, too, was inducted into the National Aviation Hall of Fame (<https://nationalaviation.org/enshrinee/frank-pete-everest-jr>).

Captain Apt left a wife and two young daughters. One daughter, Sharman Apt Russell, posted a poignant open letter to her father here: <https://www.terrain.org/essays/23/russell.htm> and wrote about how his death affected her in an essay in her book, *Songs of the Fluteplayer*.

## DIDJA KNOW?

Traditional wind tunnels were too slow for use in testing designs for high-performance jets, so some of the initial design testing for the X-2 was conducted with rockets launched from what is now NASA's [Wallops Flight Facility](#)! Thousands of sounding rockets for atmospheric research and other studies have been launched there since. Wallops was also the site of the launch of the [LADEE](#) spacecraft to the Moon, and Fred, the [Famous Frogonaut](#). For more on the history of Wallops Island, see: <https://www.nasa.gov/wallops/2020/feature/wallops-75-years-of-exploration-and-technology-development>.

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A movie was made about the X-2, called “Toward the Unknown.” It premiered at the opening of the Edwards AFB Theater on October 20, 1956, and starred William Holden, Lloyd Nolan, James Garner, and Karen Steele. Ironically, the premiere was less than a month after Captain Apt’s fatal flight. See also: <http://www.bellx-2.com/ttu/index.html>. [Steele appeared again with Garner in two 1957 *Maverick* episodes. *ST:TOS* fans remember her as the leader of “Mudd’s Women.”]

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Last Edited on 17 September 2023