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Chapter 1

Four prominent vertical stabilizers and wing fences marred the YB-49's clean aerodynamic lines. Test pilots found the flying wing design somewhat unstable as a bombing platform. (AFFTC History Office)

How Edwards Got its Name

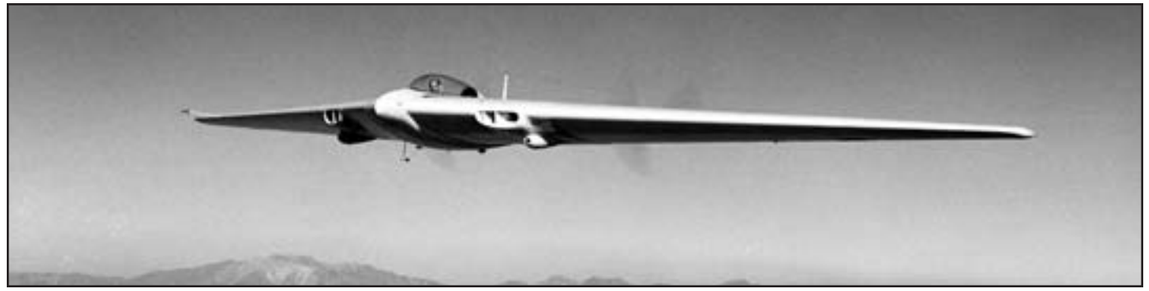
The most exotic airplanes of the early 1940s included John K. "Jack" Northrop's flying wing designs. Tailless airplanes lacking any sort of conventional fuselage, they looked much like boomerangs.

Northrop's first true flying wing, the N-1M, first flew in 1940. Although initially overweight and underpowered, it was considered a successful concept demonstrator. This led Northrop, in May 1941, to propose a flying wing bomber for the Army Air Corps.

Several months later, Northrop met with officials from the Army Air Force Materiel Division to discuss feasibility studies for designing a long-range flying wing bomber capable of cruising at around 40,000 feet, with a desired range of 10,000 miles, while carrying a 10,000-pound bomb load. His efforts resulted in a handful of subscale demonstrators and several full-scale prototypes.

Tale of the Tailless Technology Demonstrators

The first subscale demonstrator, designated N-9M, was a one-third-scale flying mock-up designed to mimic the flying qualities of Northrop's XB-35 bomber prototype. The N-9M was built to provide flight-test information from which the maneuverability, controllability, and performance of the XB-35 could be accurately predicted. Four of these aircraft were built: the N-9M-1, N-9M-2, N-9MA, and N-9MB. The Secretary of War approved construction and flight-testing of the flying mock-up on 3 October 1941.

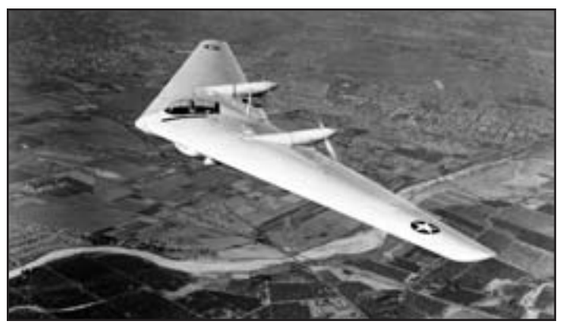


Northrop test pilot John Myers tested the N-9M-1 over the Los Angeles basin in December 1942. Subsequently, test operations were moved to Muroc Army Airfield in the Mojave Desert. (AFFTC History Office)

The N-9M was constructed mostly of wood, with some aluminum, steel tubing, and fabric. It had a wingspan of 60 feet and weighed 7,000 pounds. Powered by two 260-horsepower Menasco C6S-4 propeller-driven pusher engines, it had an endurance of 3.2 hours with 100 gallons of fuel and a service ceiling of 21,500 feet.

Instead of a control stick, the N-9M-1 had a control column and wheel. This cumbersome arrangement was consistent with the aircraft's role as a bomber mock-up. Flight controls consisted of elevons, rudders, and trim tabs, but no vertical control surfaces.

Hydraulically operated, retractable tricycle-type landing gear were supplemented by a fourth retractable wheel extending from the trailing edge to just aft of the canopy in order to protect the propellers in the event of an extremely tail-low landing.



Northrop's N-9M-1 was the first of four subscale flying mock-ups designed to mimic the flying qualities of the XB-35 bomber prototype. The N-9M series provided flight-test data that engineers used to predict the bomber's performance characteristics. (AFFTC History Office)

On 27 December 1942, the N-9M-1 was ready for its maiden flight from Northrop Field in Hawthorne, California. The airplane's chrome yellow skin gleamed in the morning sunlight as test pilot John W. Myers climbed into the cramped cockpit and began preflight preparations. Each Menasco engine started with a puff of white smoke, and the spinning twin-blade propellers noisily cut the air.

Myers taxied to the end of the runway, released the brakes, and took off into the hazy, blue-gray sky. He spent nearly an hour flying over the Los Angeles Basin, checking the airplane's general airworthiness and flying qualities.

For safety and security reasons, Northrop's test operations were later moved to Muroc Army Airfield. Over the next several months the N-9M-1 completed 43 more flights. With a few exceptions, most were terminated by mechanical failures of one sort or another. The Menasco engines were particularly troublesome. Consequently, Northrop's test crew obtained very little data relative to drag, stability, and control during initial flight trials.

Spin Accident

In April 1943, Northrop hired Max Constant to fly the N-9M-1. An experienced aviator, Constant had worked for years as a flight instructor at Burbank Airport. Born in Bordeaux, France, in 1899, he had been a writer and director in the Hollywood movie industry until turning to aviation. Active on the air-show circuit, Constant also participated in Bendix Trophy air races in the 1930s.

On 19 May 1943, Constant prepared to take the N-9M-1 up for its 45th flight. His test plan included aft

center-of-gravity stability and control tests, as well as determining the airplane's stall characteristics. Following takeoff from Muroc, Constant headed west to conduct his tests in the vicinity of desolate Rosamond Dry Lake.

During one maneuver, the N-9M-1 apparently entered a right-hand, 60-degree nose-down spin. Constant attempted to recover by deploying the left-hand spin chute and lowering the flaps. Realizing that those efforts were futile, Constant set the propeller brakes and released the canopy. He unfastened his safety harness, but never left the cockpit. Whether he was prevented from bailing out by lack of time or by some unknown physical circumstance was never determined. Post-accident investigation suggested that aerodynamic forces might have developed full-aft pressure on the control column, exceeding Constant's strength and trapping him in the cockpit, where he perished when the aircraft spun into the ground.

The N-9M-1, with just 22.5 hours of accumulated flight time, was a complete loss. Its shattered remains were found in a gully about 12 miles west of Muroc.

Winged Wonder

Tony and I had been interested in Northrop's flying wing airplanes for many years. We each had visited the YB-49 crash site north of Edwards and were anxious to search for the remains of the N-9M-1.

Little information was available in the AFFTC history office or in any of the books I had read about flying wing aircraft. Eventually, I found a photograph of the wrecked N-9M-1 in a book called *Winged Wonders: The Story of the Flying Wing* by E.T. Woodridge. It showed the airplane lying in a gully with a few small rock outcrops and sparse vegetation. There was a distinctive hill on the horizon.

On 13 March 1993 Tony and I took a copy of the photo into the desert and lined up the only visible landmark. Getting the distance right was a challenge, but not an insurmountable one. After a few hours of searching the desolate terrain, we found the site. It was unmistakable because the rocks in the immediate vicinity were clearly the same as those in the photo. The ground was littered with small pieces of metal and wood. Many of the wood fragments, remnants of the airplane's laminated mahogany skin, were still covered with yellow paint. Without question, we had located the N-9M-1 crash site. We gathered a selection of parts and took them to the AFFTC Museum, where some remain on display today.

Producing Reliable Data

After the loss of Max Constant, John Myers returned to the N-9M program as the principal pilot. The second N-9M had a longer career than the first, but it nearly ended badly right at the start.

On 24 June 1943, Myers took the N-9M-2 up for its first flight. Just after takeoff from Hawthorne, the canopy suddenly ripped away. Myers circled the field and brought the airplane in for a safe landing about five minutes later. A post-landing inspection revealed that the N-9M-2 had also sustained minor damage to the radio mast and yaw meter, as well as a landing gear door. Repairs set the test program back another month.

As with its predecessor, engine trouble plagued the N-9M-2. It wasn't until 21 September that the airplane began providing the first reliable drag data. The flight-testing results revealed that the full-scale XB-35 would suffer between 7 and 12 percent greater drag than had been predicted in wind-tunnel model tests. At last, Northrop could provide Materiel Command officials with guaranteed performance figures.

The N-9M-2 exhibited satisfactory longitudinal and lateral stability, but there was some difficulty with directional control. The pilot also noted severe elevator control-reversal forces at high lift coefficients as the airplane approached stall conditions.

Crash recovery personnel use a mobile crane to remove the cockpit section and engines of the N-9M-1. The remains of the airplane were scrapped following the accident investigation. (AFFTC History Office)