

Pioneers and Prototypes

For decades, experimental aircraft have pushed the envelope. Some led to classic designs, while others became historical footnotes. Here are a few.



Photos via Warren E. Thompson
Text by Evan A. Milberg

In the late 1940s, the XF-12 Rainbow high-speed, high-altitude reconnaissance aircraft cruised at more than 450 mph, with a ceiling of 45,000 feet. Republic built two prototypes. Competing aircraft powered by jet engines led to this project's demise.



Will it work? Test, research, and unique prototype aircraft all attempt to answer this question for their manufacturers and the military. The early series of experimental "X-planes," in particular, achieved significant milestones: breaking the sound barrier, flying above 300,000 feet, carrying out maneuvers that pushed the envelope, and validating new materials used for construction. Other, less famous, experimental aircraft have contributed to advances in military aviation as well. **111** Evolving from the P-43 Lancer, the Republic XP-47, shown here, went on to become the Thunderbolt, the dominant close air support fighter of World War II. **121** During the Cold War, Republic Aviation's F-84 Thunderjet tested the Zero Length Launch and Mat Landing concept. Called ZELMAL, it would have enabled aircraft to launch, even if runways had been destroyed.



1 National Archives photo



National Archives photo 2

131 Martin Marietta's X-24A tested the feasibility of using a manned, wingless vehicle to land on Earth after a trip into space. This lifting body X-plane underwent testing at Edwards AFB, Calif., between 1969 and 1971. **141** McDonnell built two XF-88s for a 1946 contract competition to build a long-range "penetration fighter" to protect bombers. Although McDonnell won the flyoff, the advent of long-range, high-speed bombers such as the B-47 and B-52 made penetration fighters unnecessary. The XF-88 design, however, served as the basis for the F-101 Voodoo.



3 Photo by Max Spielberg



4 Photo by Al Crull



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Photo by Dick Petercheff 1



Photo by Al Crull 3



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1|1 On Oct. 14, 1947, Capt. Chuck Yeager made history when he broke the sound barrier while flying the Bell X-1. It was the first X-plane. Some six years later, Yeager set a speed record, flying this X-1A. He went beyond Mach 2 (1,650 mph) at nearly 75,000 feet before the X-plane went out of control. Yeager recovered the X-1A at 25,000 feet. **12|** The Flying Pancake truly looked like one. This Chance Vought design tested how to maintain wing lift at low speed; the V-173 had a top speed of 138 mph. The sole proof-of-concept aircraft flew from 1942 to 1947. **13|** XB-52 suffered damage in ground testing in 1951, so a second prototype, the YB-52, had the honor of first flight, April 15, 1952. As the B-52H, the Boeing Stratofortress continues in service today. **14|** The mission for this X-plane? Explore aerodynamics to speeds of Mach 2. Douglas Aircraft's X-3 Stiletto never surpassed Mach 1.2, but it pioneered the use of titanium as a heat-resistant material, and its data was used in designing the F-104 Starfighter.

11 Aircraft designer Jack Northrop's quest for a perfect airplane resulted in the Flying Wing, an effort to eliminate weight and drag. The XB-35 first flew in 1946, but design problems and other challenges led the government to end the program in 1949. As the B-2 Spirit, however, Northrop's flying wing concept has been in service since 1993. **12** This B-66 Destroyer served as a test bed for General Electric's CJ805—the civilian version of the military's J79 engine. Testing involved a free-running turbine aft of an existing turbojet, with double-stacked blades. **13** Wind tunnel testing suggested that the F-107's chin air intake would cause air flow problems, so North American Aviation engineers moved it on top of the fuselage. First flight came in 1956, but Republic's F-105 Thunderchief emerged as a strong competitor, and the F-107s became test aircraft. **14** The rocket-powered North American X-15 has been called the most important high-performance research aircraft. All three of these first manned hypersonic X-planes set speed or altitude records between 1959 and 1968. X-15A-2 was the second X-15, modified.



1 National Archives photo



2 Photo by Al Crull



3 Photo by Al Crull



4 Photo by Carl Burger



National Archives photo **1**



Photo by Max Spielberg **2**



National Archives photo **3**



USAF photo **4**

1 A contract for a vertical takeoff and landing aircraft pitted Convair's XFY Pogo, shown here, against a Lockheed competitor in 1951, but only Pogo made successful VTOLs, with transitions to horizontal flight. Designed to operate from small warships, Pogo proved too difficult for the average pilot to fly, and the program never advanced beyond the first prototype. **2** Beginning in 1948, Northrop's X-4 Bantam tested a jet fighter minus a horizontal stabilizer. This

X-plane proved that the design didn't work for supersonic aircraft. **3** The first US jet fighter came from Bell Aircraft: the XP-59 Airacomet. It made its first flight at Muroc Dry Lake, Calif., where this photo was taken, in October 1942. Bell produced 66 of these airframes, but they didn't make it into combat. Airacomet nevertheless provided training and data for development of other jets. **4** Before Pearl Harbor, the US military sought a bomber that could

fly nonstop to Europe, drop its bomb load, and return. Consolidated Aircraft's XB-36 met the requirements; however, production of other bombers pushed aside its development. XB-36 eventually took its maiden flight in 1946 and, as the B-36 Peacemaker, was USAF's largest bomber ever. Not all experimental airplanes made it past the testing phase, but each provided essential research and data used to develop future USAF aircraft. ■