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Chapter 4

The No. 2 XB-70 was rolled out on 29 May 1965 at North American's Palmdale, California, facility. AV-2 was distinguishable from its sister ship by a black nose-chin radome and a more pronounced wingtip dihedral. (AFFTC Museum)

The Blackest Day in the History of Edwards

The XB-70 Valkyrie was originally designed as a strategic bomber capable of traveling to its target at Mach 3 speeds and delivering nuclear or conventional weapons. After a succession of policy changes, it became the world's largest research airplane. Capable of flight at 2,000 miles per hour and altitudes of 70,000 feet, it was used to collect flight-test data for use in the design of future military and civilian supersonic aircraft.

The basic idea for the XB-70 arose during a January 1954 study to develop a weapon system capable of delivering high-yield thermonuclear weapons against well-defended targets in the Soviet Union. The study yielded a proposal for a long-range, high-performance bomber that would deliver such weapons with a reasonable assurance of penetrating enemy defenses, and a high-speed, high-altitude supersonic dash capability to ensure that the airplane could escape the blast of its own weapons. By March of 1957, the project called for an aircraft capable of cruising at Mach 3 speeds for the entire mission as opposed to a subsonic-cruise/supersonic-dash mission profile.

In the spring of 1958, Strategic Air Command held a "Name-the-B-70" contest. The new bomber was named "Valkyrie," after the warrior maidens of Norse mythology. An ambitious schedule called for first flight of the aircraft in December 1961. The first operational wing of Valkyries was to be ready by August 1964.

The XB-70 cruises over the clouds with wingtips down. AV-2 eventually demonstrated the ability to maintain Mach 3 speeds for more than 30 minutes. (AFFTC History Office)

In the fall of 1958, however, funding limitations caused schedule delays. Additionally, President Dwight Eisenhower began to doubt the need for the B-70 program, concluding that the bomber made very little military sense, especially in view of new intercontinental ballistic missiles just beginning to enter service. At the same time, there was growing interest in an American supersonic transport (SST) with commercial applications. NASA had several SST studies under way that would benefit from data provided by the XB-70 test program.

Seen from a chase plane, the XB-70 shows off its "six pack" of General Electric YJ93 afterburning turbojet engines, each of which generated 30,000 pounds of thrust. (AFFTC Museum)

After John F. Kennedy succeeded Eisenhower, he found that a feared U.S.–Soviet "missile gap" did not actually exist and that Soviet capabilities had been grossly exaggerated during the heat of the presidential campaign. On 28 March 1961, he directed that the B-70 program be reoriented toward research and development. Except for three XB-70 prototypes, plans for B-70 production were ultimately cancelled.

The contractor, North American Aviation, designated the design NA-278. The three planes would have no weapons provisions and only two crewmembers. A large delta-winged aircraft with a long forward fuselage and canards, the XB-70 was powered by six General Electric YJ93 afterburning turbojet engines, each providing up to 30,000 pounds of thrust. The gross weight was around 500,000 pounds. To achieve Mach 3 performance, the XB-70 was designed to "ride" its own shock wave, much as a surfer rides an ocean wave. For this waverider concept, the outer wing panels were hinged. During takeoff, landing, and subsonic flight, they remained in the horizontal position to increase lift and improve lift-to-drag ratio. The wing panels were lowered during supersonic cruise, reducing drag and improving directional stability at high Mach numbers.

The Mach 2, delta-winged TB-58A served as pilot trainer and chase for the XB-70. (AFFTC History Office)

The first XB-70 made its maiden flight from North American's Palmdale facility to Edwards Air Force Base on 21 September 1964. Throughout 1964 and 1965, contractor and Air Force pilots conducted airworthiness and performance tests. Although intended to cruise at Mach 3, the first XB-70 was found to have poor directional stability above Mach 2.5, and it only made a single flight above Mach 3. Despite these problems, the early flights provided data on several issues facing SST designers, including aircraft noise, operational problems, control-system design, comparison of wind-tunnel predictions with actual flight data, and high-altitude, clear-air turbulence.

NASA wind-tunnel studies led engineers at North American to build the second XB-70 (Air Force serial number 62-0207) with an additional five degrees of dihedral on the wings. This aircraft, Air Vehicle Two (AV-2) made its first flight on 17 July 1965 with Al White and Col. Joseph F. Cotton at the controls. The same crew took AV-2 up to Mach 3.05 at 72,000 feet on 3 January 1966 during its 17th flight. The design changes resulted in much better handling, and the airplane maintained full speed for 32 minutes, on a course covering eight states.

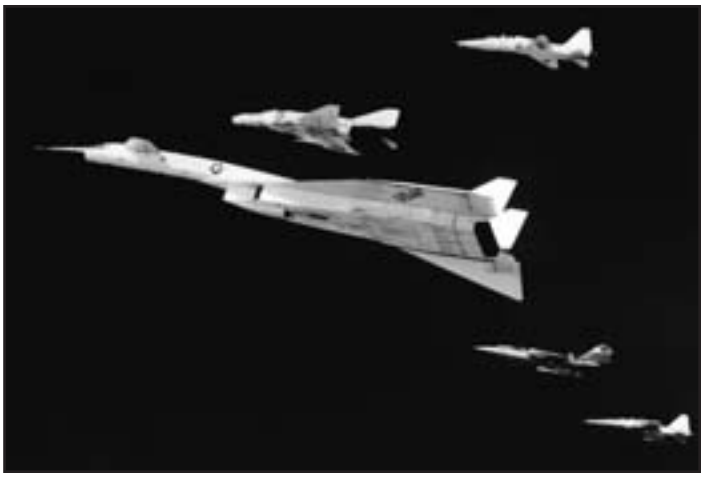
Maj. Carl S. Cross had not flown any delta-wing aircraft prior to his selection for the XB-70 program. In preparation for flying the Valkyrie he logged 17 flight hours in the TB-58A. Cross died during his first XB-70 flight when a chase plane collided with the bomber. (AFFTC History Office via Dennis Jenkins)

The highest-altitude flight of the entire XB-70 program occurred on 19 March 1966, when Al White and Van Shepard took AV-2 up to 74,000 feet. The fastest speed achieved during the program, also in AV-2, was Mach 3.08 on 12 April 1966. By early June 1966, AV-2 had completed 45 flights, including nine Mach-3 cruise demonstrations.

At the same time, NASA and Air Force officials signed a joint agreement that would allow the second prototype to be used for high-speed research flights in support of the SST program. AV-2 was selected due to its superior aerodynamics, inlet controls, and a superior instrument package, as compared to the first aircraft. NASA research flights to evaluate typical SST flight profiles and study the problems of sonic booms on overland flights were to begin in mid-June, following completion of Phase I contractor tests of the vehicle's airworthiness. NASA research pilot Joseph A. Walker was selected as the project pilot. He began preparing for his role by flying chase during contractor and Air Force test flights.

A Starfighter for NASA

The story of the second XB-70 was destined to intersect with that of another airplane, one also flown by Joe Walker.



The XB-70 leads a formation of aircraft, each powered by General Electric engines, for a publicity photo opportunity. The F-104N, flown by Joe Walker, is positioned just below and behind the bomber's right wingtip. (AFFTC History Office)