SR-71

“BLACKBIRD” Educator Resource Guide

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Many school-age children have heard of the Blackbird and already know that it is the world’s fastest and highest flying airplane. This strange-looking craft also has the equally strange aircraft designation: SR-71. Most military aircraft follow a certain sequence. For example, the F-14 was followed by the F-15, followed by the F-16, followed by the F-18. In these cases, the “F” stands for “fighter,” and each subsequent aircraft would have a subsequent number. With the Blackbird, the “SR” stands for “strategic reconnaissance”.

There are NO other “SR” designated aircraft in the military, so where did the “71” come from?
High speed, high altitude aircraft have always been favored for reconnaissance aircraft since their performance prevents them from being intercepted by enemy fighters. In 1958, the CIA introduced Project Oxcart, an aircraft program designed to find a replacement for the U-2 which had just entered service a few years earlier. This new aircraft would have to be able to fly faster, higher, and further than the U-2. Additionally, the CIA requested that the new spy plane incorporate low observation technology to make it more difficult for enemy detection by radar. The term “stealth” had not yet made it to mainstream dialog.

Two companies agreed to bid for the contact. Convair put forth their Kingfish design, and Lockheed put forth their Archangel design. Lockheed’s Skunk Works division was led by Clarence “Kelly” Johnson who had designed the earlier U-2.

Archangel went through several derivatives as it matured. The word “Archangel” was ultimately dropped and the letter “A” was kept. Archangel 1 became A-2, A-3, A-4, and so on.
Lockheed initially settled on the A-11 design and submitted this aircraft to the CIA. Initially, the CIA rejected the A-11 because it focused more on speed than low radar cross section. If Lockheed could make their design more “stealthy”, they would be better likely to compete with Convair’s Kingfish program. Johnson’s team immediately returned to the drafting table and modified the A-11’s airframe to reduce the radar cross section. This resulted in the A-12 which introduced the tell-tale chine around the fuselage. Ultimately, this is the design the CIA approved for development and construction.
The structure of the A-12 would have to withstand the aerodynamic and thermodynamic pressures of Mach 3 flight (3 times the speed of sound) for hours at a time. No other aircraft in history had ever flown in this regime, so new technology had to be invented. New fuels, new lubricants, new tooling, new sealants, new fittings, and new materials had to be fashioned. The aircraft was later painted with a radar absorbing coating that reduced the radar cross section.

At sustained Mach 3, most of the airframe would heat up to 500-600°F. Conventional aluminum would soften at these temperatures, and stainless steel was far too heavy to build an entire plane with. Titanium was the only logical building material, but that came with its own problems. It was prone to scratching, difficult to weld, and demanding to drill. To make matters more complicated, an entire tool inventory had to be created to maintain the titanium airframe. Typical tools made from conventional metals could contaminate the metal with their residue, so an entire stock of tools had to be constructed from titanium. With all these difficulties in its use, the greatest challenge was the fact the United States did not have a sufficient supply of this material. Ironically, several front companies were set up by the CIA to buy Titanium from the Soviet Union. The Russians did not care where their titanium went. All they wanted was western money. In the end, approximately 90% of the Blackbird's airframe would be constructed from titanium.

The first A-12 had its maiden flight in 1962, though because of a lengthy test program and delaying engine development, it would not reach its designed Mach 3 speed for over a year. 13 A-12s were built. Some saw operational combat missions over Korea and Vietnam. Despite its operational use, the existence of the A-12 remained classified until 1982.
For higher threat environments, Lockheed developed a smaller unmanned drone called the D-21. The D-21’s family resemblance to the Blackbird is apparent with its spiked engine intake and the landmarked chine. The drone was powered by a ramjet and had to be air launched from a parent aircraft, either a Blackbird or a B-52. There was no landing gear on the D-21. At the end of each mission, the reconnaissance package was jettisoned by parachute, and the airframe self-destructed. At least three reconnaissance missions were flown over communist China between 1969 and 1971, but malfunctions prevented recovery of the camera. D-21, serial number 538 is on display at the Museum of Aviation.
The USAF took interest in this high speed airplane to be used to intercept potential supersonic Soviet bombers. Lockheed modified three A-12 airframes on the production line into fighters in 1963. Modifications included a second seat for a fire control officer to operate the very powerful ASG-18 fire control radar and AIM-47 Super Falcon missiles. Additional stabilizers were also added to the airframe. The new aircraft was initially designated AF-12 but was then changed to YF-12A. The USAF had hoped for a production order for 93 F-12Bs, but the rising cost of development, changes in our air defense strategy, and the need for “tactical” fighters in Vietnam caused the cancellation of the fighter variant. Although the F-12 never entered production, it was used for high speed research for the USAF and NASA until 1979.
While the Air Force was testing the YF-12, they still relied on the U-2 as a spy plane. The A-12 was a CIA asset only. The USAF expressed a need for a high speed reconnaissance aircraft for nuclear missile targeting for a second strike scenario. North America already had a Mach 3 aircraft by modifying and re-designating their XB-70 into the RS-70; “RS” signifying “Reconnaissance Strike”. Lockheed entered the competition by proposing a reconnaissance strike version of the A-12. The new aircraft would be larger, heavier, carry more fuel and better camera equipment than the A-12. Following in sequence, this new two-seat Blackbird was to be designated RS-71, although the first airframe was designated the YF-12C to keep it covert.
Realizing keeping a military program concealed from the public had its own challenges, the White House decided to reveal the existence of the RS-71 before its first flight. During a press conference in 1964, President Lyndon B. Johnson stated “The SR-71 aircraft reconnaissance system is the most advanced in the world.” The source of the letter transposition is disputed. Allegedly, the Air Force Chief of Staff, General Curtiss LeMay, may have prompted Johnson to call it “Strategic Reconnaissance” instead. Whatever the case, once it came out of the President’s mouth, the designation SR-71 stuck. There are rumors that Lockheed engineers had to relabel 29,000 blueprints changing RS-71 to SR-71. The SR-71 would have its first flight later that year and became fully operational in 1966.

While all SR-71s are considered to be the world’s fastest airplane, tail # 17958 is the holder of the official world record of 2193.167 mph. That is faster than a typical rifle bullet. To put that in perspective, at that speed, you could fly from Robins AFB to Atlanta Hartsfield International Airport in 2 min 18 sec. Think about that next time you are stuck in I-75 traffic. 17958 is on display at The Museum of Aviation.

The Blackbird delivered on its strategic responsibilities, providing the United States detailed, mission-critical reconnaissance for decades. Only a select few know the true extent of the role the Blackbird’s intelligence played in the Cold War. But its legacy as a game-changer will be admired for generations. Imagine for a moment if Clarence Kelly Johnson had ended the Archangel development with the A-11. Convair’s Kingfish would have likely won the competition and perhaps this aircraft would have become the SR-71.
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