

Lockheed SR-71 Blackbird

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SR-71A #971 on the Ramp.

Unofficially, the SR-71 carried many nicknames, including the "Habu," "SR," "Lady in Black," and "Sled;" but most of us know the SR-71 as the "Blackbird." The SR-71 was developed as a long-range strategic reconnaissance aircraft capable of flying at speeds over Mach 3.2 and at 85,000 feet. The first SR-71 to enter service was delivered in 1966 and due to politics, it was retired in 1990. However, the USAF still kept a few SR-71s in operation up until 1998, after a few were brought back to service in 1995. NASA's DFRC at Edwards AFB, CA flew the SR-71 from 1991 until its final flight in October 1999.

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Introduction:

This page outlines the history of the SR-71 aircraft and its purpose as a reconnaissance platform. It covers from the beginning of the program until the last flight of the SR-71 in 1999.

SR-71 Specifications:

A detailed list of the most important specifications for the SR-71 are listed below. The [SR-71 flight manual](#) provides a much more in depth description of the aircraft and its operation. Many of these numbers were pulled from the flight manual.

SR-71 Specifications

Manufacturer:	Lockheed Aircraft Corporation
Length:	107' 5"
Length of Nose Probe:	4' 11"
Wing Span:	55' 7"
Wing Area:	1,795 ft. sq.
Wing Aspect Ratio:	1.939
Wing Root Chord:	60.533
Wing Dihedral Angle:	0 degrees
Wing Chord:	0.00
Wing Sweep:	52.629 degrees
Inboard Elevon Area:	39.00 ft. sq.
Outboard Elevon Area:	52.50 ft. sq.

Total Vertical Rudder Area: 150.76 ft. sq.
Moveable Rudder Area: 70.24 ft. sq.
Rudder Root Chord: 14.803 ft.
Rudder Tip Chord: 7.833 ft.
Height: 18' 6"
Empty Weight: 59,000 lbs.
Maximum Weight: 170,000 lbs.
Fuselage Diameter: 5.33 ft.
Service Ceiling: 85,000'+
Maximum Speed: Mach 3.3+ (Limit CIT of 427 degrees C)
Cruising Speed: Mach 3.2
Engines: 2 Pratt & Whitney J-58 (JT11D-20A) with 34,000 lbs. of thrust.
Range: 3,200 nautical miles (without refueling)
SR-71 Timeline:

The SR-71 timeline here is a compilation of important dates pulled from many sources. It has been updated to add important dates not contained in any of the sources listed at the bottom of this presentation.

24 December 1957: First J-58 engine run.
 1 May 1960: Francis Gary Powers is shot down in a U-2 over the Soviet Union.
 13 June 1962: SR-71 mock-up reviewed by Air Force.
 30 July 1962: J58 completes pre-flight testing.
 28 December 1962: Lockheed signs contract to build six SR-71 aircraft.
 25 July 1964: President Johnson makes public announcement of SR-71.
 29 October 1964: SR-71 prototype (#61-7950) delivered to Palmdale.
 7 December 1964: Beale AFB, CA announced as base for SR-71.
 22 December 1964: First flight of the SR-71 with Lockheed test pilot Bob Gilliland at AF Plant #42.
 2 July 1967: Jim Watkins and Dave Dempster fly first international sortie in SR-71A #17972 when the INS fails on a training mission and they accidentally fly into Mexican airspace.
 3 November 1967: A-12 and SR-71 conduct a reconnaissance fly-off. Results were questionable.
 5 February 1968: Lockheed ordered to destroy A-12, YF-12, and SR-71 tooling.
 8 March 1968: First SR-71A (#61-7978) arrives at Kadena AB (OL 8) to replace A-12s.
 21 March 1968: First SR-71 (#61-7976) operational mission flown from Kadena AB over Vietnam.
 29 May 1968: CMSGT Bill Gormick begins the tie-cutting tradition of Habu crews neck-ties.
 3 December 1975: First flight of SR-71A #61-7959 in "Big Tail" configuration.
 20 April 1976: TDY operations started at RAF Mildenhall in SR-71A #17972.
 27/28 July 1976: SR-71A sets speed and altitude records (Altitude in Horizontal Flight: 85,068.997 ft. and Speed Over a Straight Course: 2,193.167 mph).
 August 1980: Honeywell starts conversion of AFICS to DAFICS.
 15 January 1982: SR-71B #61-7956 flies its 1,000th sortie.
 22 November 1989: Air Force SR-71 program officially terminated.
 21 January 1990: Last SR-71 (#61-7962) left Kadena AB.
 26 January 1990: SR-71 is decommissioned at Beale AFB, CA.
 6 March 1990: Last SR-71 flight under SENIOR CROWN program, setting 4 world records.
 25 July 1991: SR-71B #61-7956/NASA #831 officially delivered to NASA Dryden.
 October 1991: Marta Bohn-Mayer becomes first female SR-71 crew-member.
 28 September 1994: Congress votes to allocate \$100 million for reactivation of three SR-71s.
 26 April 1995: First reactivated SR-71A (#61-7971) makes its first flight after restoration by Lockheed.
 28 June 1995: First reactivated SR-71 returns to Air Force at Detachment 2.
 28 August 1995: Second reactivated SR-71A (#61-7967) makes first flight after restoration.
 19 October 1997: The last flight of SR-71B #61-7956 at Edwards AFB Open House.
 9 October 1999: The last flight of the SR-71 (#61-7980/NASA 844).
 September 2002: Final resting places of #956, #971, and #980 are made known.

SR-71 Development and Operations:

The SR-71 Blackbird is one of the most spectacular aircraft ever built. It is a long-range, supersonic reconnaissance aircraft capable of flying at Mach 3.2. When it first flew, it was an amazing performer and still is after three decades of unmatched

capabilities.

The SR-71 has serviced the United States for more than 35 years. During that time, it has had a very interesting history. It all began back in the mid 1950s when the United States Air Force and the CIA decided that it would be best to replace the U-2, an aircraft with something that would travel much faster and higher to avoid enemy defenses. Lockheed, the developer of the U-2 was also given the contract to develop this supersonic aircraft after a competition with Convair. The project was called ARCHANGEL and the Skunk Works, a division of the Lockheed Aircraft Corporation went through twelve design proposals before they reached their final design, the A-12.

On January 26, 1960, the CIA ordered twelve A-12 aircraft. The next month, Lockheed began to search for 24 pilots for the A-12. Soon after in May of 1960, Francis Gary Powers was shot down in a U-2 over the Soviet Union. This event resulted in the United States and the Soviet Union signing an agreement not to fly manned vehicles over the Soviet Union again, a treaty that was undermined even before the SR-71 was built.

Research and development continued for a couple years before the first A-12 was completed and taken from Burbank to the Groom Lake test facility on February 26, 1962. A few months later, the A-12 made its first flight on April 25 with Lockheed test pilot Lou Schalk. During this flight, there were a few technical problems with the aircraft so the aircraft did not make its official first flight until April 30, 1962. After this event, a few days later, the aircraft went supersonic for the very first time and reached Mach 1.1 during the second test flight.

The A-12 was primarily an over-flight vehicle that was configured to fly over a target at a very high speed and high altitude. It got all of the coverage that it could and then made it back to the base. Now that the United States signed the treaty with the Soviet Union, the A-12 could never fly over the target that it was designed for. Therefore, the United States Air Force needed something more, the SR-71. The SR-71 was configured to use cameras that were for peripheral coverage. The aircraft did not need to go into enemy airspace. On June 13, 1962, the SR-71 mock-up was reviewed by the Air Force. A month later, the J58, the turbojet engine that is used in the SR-71 and A-12 completed its pre-flight testing.

As all of this was going on, the A-12 still was going through flight-testing. When the A-12 made its first flight, it was with two J75 engines since Pratt & Whitney did not have the powerful J58 completed. On October 5, 1962, with the J58 testing complete, the A-12 flew with a J75 in the left nacelle and the new J58 on the right nacelle. Near the end of that year, Lockheed signs a contract to build six SR-71 aircraft.

Early in 1963, the A-12 made its first flight with two of the J58 engines. During this year, the program experienced its first Blackbird loss when an A-12 crashed near Wendover, Utah on May 24th. Also, the aircraft made its first flight at Mach 3.2, the speed that the aircraft was intended to fly at in November. Due to a political motivation brought on by Barry Goldwater during the upcoming election, President Johnson announced the existence of the Blackbird on February 29, 1964. In June of 1964, the last A-12 was delivered to the Groom Lake test facility. Shortly after, in July, President Johnson makes another announcement, this time it was to make public the existence the SR-71. In October, the prototype SR-71 was delivered to Palmdale, CA at Air Force Plant #42. In December, Beale was announced as the base for the SR-71 and on December 22, 1964, the SR-71A prototype made its first flight with test pilot Bob Gilliland at Palmdale.

Two years later on December 28, 1966, the decision is made to terminate A-12 operations by June 1, 1968. The BoB (Bureau of the Budget) decided that it would be too costly to have both the SR-71 and the A-12 programs at the same time because both aircraft are very similar and do similar tasks. In May of 1967, A-12s were flown to Kadena Air Base on Okinawa, Japan and BLACK SHIELD unit was declared operational. Near the end of May in 1967 was the first flight of the A-12 in a combat mission over North Vietnam, which lasted three hours and thirty-nine minutes. In November of 1967, the A-12 and the SR-71 conducted a reconnaissance fly-off to decide which aircraft was superior and worthy to keep. The final choice was the SR-71 but it is still debatable that the A-12 is superior.

In February of 1968, Lockheed was ordered to destroy all tooling used to create the Blackbirds. Also during this year, the first SR-71 arrived at Kadena to replace the A-12s and it also flew its first operational mission on March 21st. May 8th saw the last operational mission of an A-12, which was over North Korea. After this, all A-12s were sent back to Palmdale to be put into storage for several decades before going to museums around the United States.

During the 1970s, the SR-71 set many speed and altitude records. The SR-71 was also sent to RAF Mildenhall in Great Britain, the third base for the SR-71. In January of 1982, the SR-71B flew its historic 1,000th sortie. Later, in 1989, the Air Force SR-71 program was officially terminated due to budgetary reasons. The argument was that the aircraft could be replaced with today's spy satellites and maintaining the plane was too costly. This early retirement decision was realized to have been a large mistake and in September of 1994, Congress voted to allocate 100 million dollars for the reactivation of

three SR-71s. Then in April of 1995, the first reactivated SR-71A (64-17971) made its maiden flight after being refurbished by Lockheed. In June, the first reactivated aircraft returned to the Air Force inventory. Shortly after, in August, the second aircraft was reactivated (64-17967) and made its first flight after being refurbished by Lockheed.

The SR-71 is a large aircraft that can be compared respectfully to the size of a Boeing 727. The SR-71 is approximately 103.876 feet excluding the nose probe, which is four feet, eleven inches. The wingspan of the airplane is 55.62 feet and the height is 18.5 feet. The vertical stabilizers, which are the two large fins at the rear of the aircraft, have a total area of 150.76 square feet and the fuselage is approximately five and a third feet in diameter. The maximum takeoff weight of the airplane is 170,000 lbs. and without fuel, the aircraft weighs 60,000 lbs. The estimated maximum speed of the aircraft is Mach 3.2 and some sources say that it can accelerate to Mach 3.5. The estimated maximum altitude is 85,000 feet but some sources say that the SR-71 can fly up to 100,000 feet and can probably go even higher.

The SR-71 has accumulated many outstanding achievements. The SR-71 program itself has been a total success based on the fact that the aircraft holds all of the official airspeed and altitude records. On September 13, 1974, an SR-71A set a speed record from London to Los Angeles at an average speed of 1,435.587 mph. On July 28, 1976, an SR-71A set an Altitude in Horizontal Flight record at 85,068.997 feet. On that same day, the aircraft set the Speed Over a Closed Course record of 2,193.167 mph. On July 27, 1976, the SR-71 set a Speed Over a Closed Circuit record at a speed of 2,092.294 mph. On September 1, 1974, the airplane set a record from New York to London in 1 hour, 54 minutes, and 56.4 seconds.

The SR-71 is the fastest and highest flying production aircraft in the world. The only aircraft that is faster is the X-15 that can reach a speed of over 4,000 mph. The only aircraft ever to come close to the SR-71's speed besides the X-15 is the Russian MiG-25 Foxbat. The MiG-25 could only reach speeds of over Mach 3 for a few minutes. The Anglo-French Concorde is the only aircraft besides the SR-71 that can fly at supersonic speeds for hours at a time.

Each J58 engine has 32,500 lbs. of thrust, enough to drive the largest ocean liners. They are the largest of their kind and used to be the most powerful in the world. The engine is one part of a propulsion system, which includes an inlet, and an ejector, each producing thrust. In order for the system to work properly over a long period of time, the inlet must capture the onrushing air properly. To do this, a large spike is placed in the inlet and moves forward and back as conditions change. When the air is not captured properly, an event called an unstart occurs. An unstart is best described as a violent yaw where the aircraft pulls to the side where the engine has unstated. To correct the problem, the pilot must push the spike totally forward and adjust it to capture the air properly, this is called a manual intake. The J58 engines operate as ordinary jets at low speeds, switching to become ramjets at high speeds above 2,000 mph.

The airframe of the SR-71 is very unique. To withstand the friction-generated heat at Mach 3+, over 90 percent of the airframe is made of titanium composite. Also to withstand heat, the main gear tires have been impregnated with aluminum and are filled with nitrogen.

In order for the SR-71 to fly the worldwide missions, it has a special fleet of modified KC-135Q tankers for refueling. SR-71s run on JP-7 fuel, that fills the six large tanks in the fuselage. The component parts of the Blackbird fit very loosely together to allow for expansion at high temperatures. At rest on the ground, fuel leaks out constantly, since the tanks in the fuselage and wings only seal at operating temperatures. There is little danger of fire since the JP-7 fuel is very stable with an extremely high flash point.

Before any flight, the crew would receive a high protein, low residue meal of steak and eggs. After that, the crew would have a brief medical examination. Following the examination, the crew would get suited up and the Physiological Support Division would check the suit integration. The suits that the SR-71 crew members wear are identical to those worn by the crews on the space shuttle. After the crew is suited up, they breathe in pure oxygen and filter out any other gas from their body before takeoff. Then the crew would go out to the van for the trip to the barn where the SR-71 is housed. When the crew arrives at the hangar, they shake hands with the buddy crew and then shake hands with each other before entering the aircraft. The pilot and his RSO enter the aircraft and the pilot will tell the ground crew to start the engines. The pilot will then move up the throttle about half way. TEB is shot into the tailpipe of the aircraft and a green flash is seen out of the ejector. Then there are about 25 minutes of pre-flight checks before takeoff.

When the aircraft has completed its pre-flight checks, it will pull out of the barn and move onto the runway. From there, the SR-71 will perform engine run-ups and then the ground crew will pull the chocks. The SR-71 will start to roll down the runway slowly and then accelerate rather rapidly after the afterburner is lit. The feel has been described as a freight train moving down hill. At approximately 230 knots, the airplane lifts off of the runway.

After the SR-71 takes off, it has a rendezvous with a KC-135Q tanker seven minutes later. The SR-71 takes off with a very light fuel load and after this refueling, the plane can fly up to 2,500 miles without refueling. The aircraft then accelerates to

speed and altitude which is about Mach 3.2 at 85,000 feet. The SR-71 then takes photos of the targeted area and has another rendezvous with a tanker before returning home. After the flight, the photography equipment is removed and is analyzed immediately. The photography is then sent to the CIA, or whomever needs this valuable intelligence.