

Originally designated RS-71, the Skunk Works was forced to change about 29,000 blueprints to SR71 when Lyndon Johnson accidentally turned the letters around during his 1964 announcement acknowledging the existence of the airplane. Called the Blackbird, the SR-71 was so far ahead of its time that to this day very few (such as the X-15 and the Space Shuttle) airplanes can't outperform it. Everything about this airplane's creation was gigantic: the technical problems that had to be overcome, the political complexities surrounding its funding, even the ability of the Air Force's most skilled pilots to master this "incredible wild horse of the stratosphere." It was a gigantic leap over the U-2 in every way.


In the words of Kelly Johnson, "It makes no sense to just take this one or two steps ahead, because we'd be buying only a couple of years before the Russians would be able to nail us again. No, I want us to come up with an airplane that can rule the skies for a decade or more." He wanted to design an airplane that used conventional engines and fuel, but still be able to outrace any missile.

The Blackbird, code-named Oxcart during its development, flies on a tremendous 65,000 lbs. of thrust at an altitude of $100,000+$ feet at Mach 3.5, and has a range of four thousand miles. That is not only four times faster than the U-2 but seven miles higher - and the U-2 was then the current high-altitude champion. For a long time the Air Force claimed a maximum speed of Mach 3.2 and an operational ceiling of 85,000 feet, but we now know that the SR-71 can soar above 100,000 feet. Some military pilots claim altitudes in excess of 125,000 feet but this is probably stretching it a bit. Compared to the fastest jet fighter America had at the time, the SR-71 flew at least 60 percent faster than its maximum speed on afterburner. Experimental rocket engines had flown this fast for only two or three minutes at a time before running out of fuel. But the Blackbird can cruise at more than three times the speed of sound, and fly coast to coast in less than an hour on one tank of gas. The aircraft can also survey more than 100,000 square miles of the Earth's surface in one hour. The Blackbird actually stretches a few inches during flight, due to the massive temperatures on its titanium hull. To many, the Blackbird is the epitome of grace and power, not to mention blinding speed.

As of January 1st, 1997, two SR-71 air crews and planes were declared mission ready for the first time since the plane's retirement, seven years ago. In 1994, Congress appropriated funds to put two aircraft back into service, and these airplanes were taken out of storage, refurbished, and delivered to the USAF. (One was located at NASA's Dryden research facility and the other at the Skunk Works.) These two Blackbirds and their crews are now based at Edwards Air Force Base, though administratively, they are part of the 9th Recon Wing at Beale. These SR-71s are equipped with reconnaissance sensors, including the Advanced Synthetic Aperture Radar system that provides near real-time, all-weather, day or night imagery.
"My goal was to bring the SR-71 back quickly, within budget, and most importantly, in a safe manner," said Brig. Gen. Robert Behler, 9th Reconnaissance Wing commander at Beale. "I'm proud to say we've accomplished this goal and we look forward to demonstrating a mobility capability later this year."

Another of Lockheed's Kelly Johnson's creations, the SR-71 Blackbird set the world speed record in 1965 and has held it ever since. Originally called the RS-71 by Lockheed, it was mistakenly referred to as SR-71 by President Lyndon Johnson and no one wanted to correct him, so the SR designation stuck. The secrecy that surrounded this aircraft was astounding, as the Air Force would never formally acknowledge the SR-71's until well into the 1970's. The aircraft is constructed totally of titanium alloy and incorporates original stealth technology. The plane flew so high and so fast that many technical problems had to be overcome during production. Not really black but deep indigo blue, the paint is special, heat dissipating and radar absorbent, as skin temperatures can reach $1100^{\circ} \mathrm{F}$ in flight. Heat causes the fuselage to expand six inches in flight, requiring flexible fuel tanks. The plane literally leaks fuel on the ground until high speeds are reached in flight. The SR-71 uses a special JP-7 high temperature jet fuel and at top speed needs refueling every 45 minutes. The fuel doesn't burn easily and it takes a chemical reaction to start the engines. Cameras in the SR-71 can map 100,000 square miles in less than one, and wears out its tires in six landings. A fighter interceptor version was contemplated, but since it takes three states to turn around at top speed, the idea was not deemed feasible. Upon retirement, an SR-71 was donated to the Smithsonian Institute and in a farewell flight, flew from Los Angeles to Washington DC in 68 minutes, again setting a world speed record. The true capabilities of this plane may never be known since security and human pilot limitations restrict the aircraft.


How fast does the SR-71 really go.......?
The fastest published speed of the SR is Mach 3.5. There are several factors that limit the speed of the SR, one is the shock waves generated by various parts of the plane, at around Mach 3.6-3.8 the shock wave off the nose of the aircraft narrows enough to go into the engine, while there is the inlet spike (which slows the air to subsonic before it enters the engine), the shock wave bypasses the spike and causes the engine to unstart.
Second is the heat generated by the plane moving through the atmosphere, even titanium has it's limits, and the heat generated by the SR brings the fuselage to the brink. Just recently I found out that during a Lockheed Skunk Works study to see how much money and development it would take to get the SR to go faster than it's designed top speed 3.2-3.5, the designers discovered (among other things) that the metal divider between the windshield was heating up so much above mach 3.5 that it was affecting the integrity of the windshield, and at that point they had stretched the glass technology to the max! So Mach 3.2 to a max of 3.5.

Now according to Richard Graham: "The design Mach number of the SR-71 is 3.2 Mach. When authorized by the Commander, speeds up to Mach 3.3 may be flown if the CIT limit of 427 degrees C. is not exceeded. I have heard of crews reaching 3.5 Mach inadvertently, but that is the absolute maximum I am aware of."

How high does the SR really fly, and do the Pilot and RSO get astronaut wings after flying the SR? The SR doesn't fly quite that high, the highest altitude l've heard attributed to the SR was $100,00 \mathrm{ft}$ ( 18.93 miles), all the Air Force and Lockheed admit to is above $80,000 \mathrm{ft}$. To get astronaut wings you have to fly at least 264,000 ft (50 miles). Which the SR (even though it's a fantastic aircraft) doesn't get close to that altitude!

Richard Graham contributes: The SR-71s engines require a sufficient quantity of air in order to operate. The maximum altitude limit is 85,000 feet unless a higher altitude is specifically authorized. Again, I have heard of crews inadvertently reaching 87,000 feet, but no higher.

## What does it cost to fly the SR-71?

There are lots of numbers floating around about how much it costs to fly the SR, I've heard figures over $\$ 100,000$ an hour to fly the SR-71, and a $\$ 1,000,000$ a picture. The figures are all over the place, it's especially hard, because you can figure it so many different ways....do you include Tanker support, flight proficiency ops (SR "B" model and T-38), and numerous other expenses. I like to figure it as what it actually costs to fly the airplane itself, no training, tanker support, etc. So with that said.....The numbers that l've been told by people that know is $\$ 38,000$ per flying hour. The costs can be lower to a rock bottom price of $\$ 27,000$ per hour if the annual flying time gets above 300 hours total. So the actual cost is probably somewhere in between 38 and 27 thousand an hour.

Well after the latest Wings episode "Spyplanes" on recently, some interesting errors! Well here goes....

## "The SR takes off with almost dry tanks"

Well not exactly empty, the SRs tanks hold 80,000 lbs. of fuel, the SR-71 usually takes off with $45,000 \mathrm{lbs}$. of fuel on board. Not what I call almost dry! The SR takes off with either 45,000 lbs., $55,000 \mathrm{lbs}$., or $65,000 \mathrm{lbs}$. of fuel. Almost all flights are refueled by KC-135Q's (now "T"), there are a few exceptions though... one was called the "Rocket Ride", which were flown from Kadena AB, Okinawa and then on to Northern Korea, on $65,000 \mathrm{lbs}$ of fuel. The only SRs that launched with a full fuel load were the test flights from Palmdale, CA


SR-71 for FS98 (764kb)

## YF-12A



Two other planes, the A-12 and the YF-12, could easiy be mistaken for the SR-71. The A-12 was the first plane developed out of the three. It is actually a host plane for the smaller, faster, and higherflying D-21 drone, code-named Tagboard, which sat piggyback on the A-12 and used a ramjet engine once released for flight. The project was soon cancelled, however, due to a fatal accident, and the D21 went on to use the B-52 as a transport host. The YF-12 was an SR-71 with an internal bay carrying three Hughes GAR-9/ AIM-47A air to air radar guided missiles, designed to shoot enemy airplanes flying at lower altitudes. Only three YF-12s were ever built.


Summary of YF-12 test missile firings

| Test date | Speed of <br> YF12 | Altitude of <br> YF12 | Altitude of <br> target |  |
| :--- | :---: | :---: | :---: | :---: | :---: |
| March 1965 | 2.19 M | 65000 ft | 40000 ft | destroyed |
| May 1965 | 2.18 M | 64800 ft | 20000 ft | missile gyro <br> failure |
| September <br> 1965 | 3.22 M | 75200 ft | 20000 ft | destroyed |
| March 1966 | 3.16 M | 74000 ft | 1700 ft | destroyed |
| April 1966 | 3.20 M | 75200 ft | 1700 ft | destroyed |
| May 1966 | 3.20 M | 76000 ft | 20000 ft | destroyed |


| September <br> 1966 | 3.20 M | 74400 ft | 500 ft | destroyed |
| :--- | :--- | :--- | :--- | :--- |

## A-12, D-21, Specifications

|  | D-21A/B | A-12 |
| :---: | :---: | :---: |
| Construction: | Titanium (Beta-120/Ti-13V-11Cr3A1) <br> Monococque with some super-high-temperature plastics. | Titanium (Beta-120/Ti-13V-11Cr-3A1) Monococque with some super-high-temperature plastics. |
| Length: | 42 ft 10 in | 102 ft 3 in |
| Height: | $7 \mathrm{ft} \mathrm{1/4} \mathrm{in}$ | 18 ft 6 in |
| Wingspan: | $19 \mathrm{ft} \mathrm{1/4} \mathrm{in}$ | 55 ft 7 in |
| Wing Area: |  | 1,795 square feet |
| Maximum take-off weight: | 11,000 pounds | 117,000 pounds |
| Maximum Speed: | 3.35 M | 3.2 M |
| Armament: | - | - |
| Ceiling: | 95,000 ft | 85,000 ft |
| Powerplant: | Marquardt RJ43-MA-11 Ramjet with 1,500 pounds thrust | 2x Pratt \& Whitney J75 with 17,000 pounds thrust each (test flights) <br> 2x Pratt \& Whitney J58 (JT11D-20A) high-bypass ratio turbojets with 20,500 pounds thrust each |
| Production: | 38 | 15 |



