

**"... Put out my hand, and touched the face of God"**

***The SR-71 Blackbird Story***

By

**Air Force Major Arwin "Daemon" Sumari, S.T.**

*(Assistant Head of Electronic System, Dept. of Electronic, Indonesian Air Force Academy)*

*"Blackbird is singing in the death of night*

*Takes these broken wings and learns to fly .... All your life*

.....

*Blackbird flies ....."*

*("Blackbird" by the Beatles)*

When I heard this sad song, I remembered one of my favorite the most superb aircrafts in the world, SR-71 Blackbird. It has been retired from assignment but its long time service will never be forgotten by US Air Force especially they who have credits to its birth. The Beatles' song at least reflects its tragic retirement because of the US Air Force's shortsighted in 1990 and veto from US President Bill Clinton to stop funding the Blackbird research and operation. The USAF has more than 30 Blackbirds, but now their wings are broken. Will their wish to fly all their life be achieved?

I am not an expert of this kind of aircraft or about the team which first designed and built it more than 40 years ago. When reading a newspaper long before I joined the Indonesian Air Force, my eyes stuck on a short story about the fastest and the highest-flying aircraft in the world named SR-71 Blackbird that was flying over the Vietnam areas. It was doing nothing except taking some photographs of the areas it passed – later I knew that these activities known as reconnaissance. It impressed me and I thought it is the most advanced-in-technology military aircraft I have ever known at that time. It must have a special skin to avoid the heat generated from skin friction when cruising at very high altitude, has a special twin-engine to power at very high speed and the pilots must wear special suits if they do not want to be frozen during the flight. Because of specific and unique features it showed, I wish I had a chance to see it closely someday. Fortunately, my wish came true when I had a chance to study in Salt Lake City, Utah, USA taking my Visual Database Modeler (VDBM) qualification for flight simulation in 1997. I accompanied with other two students and a native guide, visited Hill Aerospace Museum at Hill Air Force Base, Utah not far from Salt Lake City where one of the retired famous Blackbirds was "rest-in-peace" on its tarmac.

## SKUNK WORKS

Not every American knows about the Lockheed-Martin's Advanced Development Project (LADP), the project sponsored by Lockheed-Martin and the US Air Force that exploring the feasibility of a higher-flying, faster and less radar-visible alternative to the U-2 "Dragon Lady" reconnaissance aircraft in 1957. The



LADP that is better known as **Skunk Works** is listed in the Random House Dictionary: "*Often a secret experimental division, laboratory or project for producing innovative design or products in the computer or aerospace field*". This project was very secrecy and highly classified that most people had never even heard what it was all about.

Even the Skunk Works home page does not give very much detail about its project and planes. "Skunk Works" originally called "Skonk Works" which was the name of a secret moonshine distillery in Al Capp's "Li'l Abner" comic strip. The name was changed slightly after Mr. Capp's editor threatened legal action for copying infringement. This name changing, believe it or not, brought successfulness to the team's work. The logo above is Ryan Kirk's perception of the Skunk Works ([www.geocities.com/CapeCanaveral/Lab/3993](http://www.geocities.com/CapeCanaveral/Lab/3993)).

The Skunk Works was started by the legendary Clarence L. "Kelly" Johnson, Chief Engineer of Lockheed in 1943 after designing two of the most famous commercial airliners in the world, the Lockheed Electra and Constellation but the development of the SR-71 itself was between 1959 – 1961. He was also the man who responsible for the U-2 "**Dragon Lady**" spy plane and the F-117 "**Night Hawk**" stealth fighter. The idea of the Skunk Works was to stay away from bureaucratic management, enabling the engineers to work quickly and efficiently with a minimum of corporate oversight, just like what C.L. "Kelly" Johnson said:

*"The Skunk Works is a concentration of a few good people solving problems far in advance – and at a fraction of the cost – by applying the simplest, most straightforward methods possible to develop and produce new products"*

The SR-71 as the successor of the A-12 was designed without the aid of modern computer, – the Intel 486DX2-66 processor was released by Intel in 1990s – but rather using slide rules and the "primitive" drafting techniques of the time. Considering that everything on the airplane including the engines, airframe materials, fuels, lubricants, fluids, tires and navigation systems, had to be designed from scratch and there was no "prototype". The A-12 and SR-71 will probably remain all

the time as the single greatest leap in aviation technology, ever. Its planning and construction were taken in total secrecy. This was one of the best achievements of Skunk Works and the US Air Force for their ability to full-cover the designing, building and completing the program phases of these extremely large and noisy aircraft.



Figure 1. The black reptilian cobra-hooded SR-71A Blackbird with its big noisy twin-engine is preparing to fly (<http://www.fas.org>).

## THE DEVELOPMENT PHASES

The development of the **SR-71 Blackbird** as strategic reconnaissance aircraft program began in February 1963. Most people who know about Blackbird are most familiar with the SR-71 but many do not realize that the SR-71 was the last in a series of aircraft based on the same airframe concept with some modifications in some areas. The first in that series was the **A-12** (not to be confused with the US Navy's A-12 Avenger, otherwise known as the Flying Dorito). The A-12 was built under a project called "**ARCHANGEL**", since it was a follow on to the U-2 which had been built under the project called "**ANGEL**". The first concept in the "ARCHANGEL" program was named the A-1, the next A-2 and then resulting in the single-seat **A-11** (which evolved into more stealthy A-12 code name "**OX CART**") flown by civilian CIA pilots on 26 April 1962, a version called the **YF-12A** and finally the two-seat SR-71, code named "**SENIOR CROWN**" flown by the US Air Force. Lockheed's A-12 was an internal designation that was never adopted by the US Air Force primarily because it was built for the CIA – this statement answers why the A-11 was flown by the CIA. The YF-12s, developed in 1963, were experimental long-range interceptor versions of the same airframe and were first displayed publicly at Edwards AFB on 30 September 1964. The program's existence was publicly announced by US President Lyndon B. Johnson on 24 February 1964 when he announced that an A-11 had flown at sustained speed of over 2,000 miles per hour or 3,200 km per hour during tests at Edwards AFB, California. The successor aircraft was designated the **RS-71** but the letters were reversed to be "**SR**" after US President Lyndon B. Johnson misread the name while announcing the program to the world during press conference on

24 July 1964. The "SR" designation according to the "**Illustration Guide to the Modern US Air Force**" from Salamander Books Ltd is the abbreviation of "**Strategic Reconnaissance**"; other reference says "**Strike/Reconnaissance**". But anyway what is a name, the SR-71 Blackbirds had been successfully able to do their roles as the reconnaissance aircraft. Not a single missile had ever hit the Blackbirds even they flew over very vulnerable places in the whole world and not a single Blackbird ever captured by the US opponents. Remember when an US EC-2 Hawkeye was forced down by the China Air Force after collision with one of its F-9 fighter jet that brought a little hot conflict between those two big countries. Thing like this was never happened to the Blackbirds. The first Blackbird flight was done at the most secret place on Earth named Area 51 based at Groom Lake, Nevada where the shadowy Air Force testing ground inextricably linked to Unidentified Flying Objects (UFO), aliens and all matter of unexplained lights in the night sky. If you have ever seen on TVs, strange things like this that linked to the Area 51 ever pictured in a film named "**Trucks**".

There were reasons why the US Air Force wanted more powerful reconnaissance aircraft especially when the Cold War had just begun. They had seen the vulnerable of the U-2 that when Francis Gary Powers was downed while flying over Russia on 1 May 1960. Second, they also could not always rely on spy satellites whose orbits were on a set orbit and whose time of over flight would be known to the target of the photos, allowing them chance to hide what they were working on. It was said in the Skunk Works that "*.... spy satellites had distinct limitations: their pictures in those days were not very sharp and their orbits were fixed ....*". By knowing the satellites exact orbits, it is very easy to the opponents to shoot them down and million dollars spent to build them is worthless. In the other hand, the delta-wing aircraft SR-71s could fly anywhere, anytime and had a chance to catch the targets off guard; more than that they were equipped with the most sophisticated and unique reconnaissance system for intelligent data gathering purposes. For this mission, the Blackbird was outfitted with an Advanced Synthetic Aperture Radar System (ASARS-I), an optical bar camera and a technical objective camera wet film system. The system can photograph, in great detail and do surveillance from 60,000 square miles (155,000 km<sup>2</sup>) to 80,000 square miles (207,000 km<sup>2</sup>) of terrain in an hour. The Blackbird's cameras are said to be able to resolve an object the size of a golf ball from an altitude of more than 80,000 feet. Impressive!

## **THE FEATURES**

In order to achieve a platform able to succeed the U-2 clandestine reconnaissance aircraft, the Blackbird had to be able to fly over sensitive high-threat areas as height was no longer protection and at speed that could not be able to be chased and hit by enemy's Surface to Air Missiles (SAM). A special high-bypass axial-flow turbo jet engine named J58-1 model JT11D-20B was built by Pratt & Whitney, the same company that built engines for the new generation fighter aircraft, F-16 Fighting Falcon, to power it and is able to develop 32,500 pounds of thrust with

afterburning. The critical problems concerning supersonic flight with air breathing engines are concentrated in the air inlet area. The circular air intakes of the SR-71 contain a center body tipped with a conical spike. The spike is movable, forward for takeoff and climb to 30,000 feet after which, as speed increases, it moves rearward controlling the amount of air entering the 6,000 lbs engine. As it does so, Air Inlet Bypass Doors in the side of the nacelle close to establish the correct flow of air through the engine, holding the supersonic shockwave in its critical position within the inlet. The engine with 9-stage, single spool turbine itself operates at subsonic speed. At Mach 3+, the spike is three feet to the rear of its takeoff position slowing down the incoming airflow establishing an area of pressure within the nacelle, which is now pushing the engine. This action is so powerful that it accounts 58 percent of the total thrust; the engine providing only 17 percent and the ejectors – surrounding the nacelle near the afterburner – is responsible for the remaining 25 percent. Should the shockwave be expelled from the inlet, a condition known as an “Unstart” occurs. Unstarts have been known to be so violent as to crack the pilots helmet from the severe yaw of the aircraft. If unchecked, the resulting yaw is described by SR-71 pilots as though the nose and tail are trying to swap ends. However, this situation has been anticipated by adding an automatic control system that repositions the Spike in milliseconds count. By doing so with great accuracy even though air loads of up to 14 tons are acting on the spike, dealing with the difficulty before the human brain becomes aware of the problem guarantees the Blackbird cruises on faster than the rifle bullet.



Figure 2. Shock diamonds shown expelled from the SR-71's J58-1 twin-engine in airborne position when afterburner is used (<http://www.wvi.com>).

The 107.4 feet long Blackbird weighs about 34 tons empty and can carry another 20 tons of special JP-7 fuel that enough for about two hours of flight time in its fuselage and wing tanks. In flight, the fuel is redistributed automatically to maintain the aircraft's center of gravity and load specifications. The first J58-1s delivered to the Blackbird program, all three models, had all stainless and the oil tank gold plated, “*For better dissipation*” said the designers. After a couple years and the subsequent tear down of engines, it was noted that was an abnormal amount of corrosion caused

by dissimilar metal electrolysis. The gold plated was then removed because the heat dissipation properties did not outweigh the cost of replacing lines as they started leaking. There was a story according to Ronald J. De Lozier about these gold-coated engines when the Blackbird 61-17957 (#957) crashed off the North end of the Runway at Beale AFB on 12 January 1968. After the crash and the pictures were published, there was a howl and cry that came from the civilian segment about all the gold that was on the engine caused quite a commotion, even when it was explained why the gold was there.

The Blackbird development broke into new areas of design and speed. It was built for speed and only speed and evolved into its instantly recognizable cobra-head appearance. It was the first almost stealthy aircraft with black paint containing black ferrites which absorb radar instead of reflecting it and helps dissipate the intense frictional heat resulting from flight through the atmosphere at faster than three times the speed of sound. This black paint gives the plane its distinctive "**BLACKBIRD**" nickname – the first Blackbird, **A-12 Air Force serial number 60-6924**, was not even black. In fact, it attained a much lower radar cross section number than the B-1B was able to attain more than 25 years later. It is believed that the SR-71 Blackbird was the first generation of "**stealth**" aircraft that utilizing Radar Absorbing Material to give it a radar cross section of less than ten square meters. Basic features included a modified delta-wing with pronounced camber on the outer leading edges, extremely large fitting strakes extended forwards along the body and nacelles, twin inwards-canted pivoted fins above the nacelles, outboard ailerons, inboard elevators and main gears with three wheels side-by-side. Aerodynamic control surfaces consist of all-moving vertical tail surfaces above each engine nacelle, ailerons on the outer wings and elevators on the trailing edges between the engine exhaust nozzles. The original A-11 shape also featured fixed ventral fins under the rear of the nacelles and a larger hinged central ventral fin. To withstand the heat generated by sustained Mach 3+ flight, the airframes were built almost entirely of titanium Beta-120/Ti-13V-11Cr-3Al monocoque with some super-high-temperature plastics and titanium alloys. The engineering problems with the titanium-alloy airframe, the unprecedented propulsion system – which at cruising speed glows orange-white at the rear gets most of its thrust from the inlet – and even the hydraulic system which had to use totally new materials and techniques. Although most news reports characterize the SR-71 aircraft as "radar evading", in point of fact, it was one of the largest radar targets ever detected on the FAA's long-range radars. The FAA was able to track it at ranges of several hundreds of miles but actually what was detected was the SR-71's exhaust plume.



Figure 3. Sleek black-painted appearance of the SR-71 Blackbird (<http://www.habu.org>).

The speed being sought by the Blackbird project was thought to be hard enough without the government imposing that its radar cross section had to be decreased. In the end, its velocity was faster than that of a high velocity rifle bullet at mach 3.3. Even when lifting off it was impressive that would reach 200 miles per hour in twenty seconds after take off. In the Cold War, the Russians could track it and often tried to stop the Blackbird, pilots often reported seeing contrails miles back but that was about all. Once, the Russian's most advanced SAMs, named SA-5s, as well as the older SA-2s tried to shoot the Blackbird, but they did nothing more than lock on before the SR-71 throttled up to 2,000+ miles per hour and blazed away from the treat, leaving the missile to "plod along" behind it. Not one plane was ever lost during a mission even though there were more than 11,008 hours of flight logged. No pilots or Reconnaissance System Officers (RSO) were killed in approximately 17,300 total sorties flown. The table below shows the Blackbird specifications as well as its features.

#### **SR-72 Blackbird Specifications**

Contractor:	Lockheed-Martin Skunk Works
Primary Function:	Strategic Reconnaissance
Type	A : Strategic Reconnaissance B, C : Trainer
Power Plant:	Two 32,500 lbs (14,742 kg) thrust Pratt and Whitney J58-1 (JT11D-20B) axial-flow continuous-bleed turbojets with afterburners
Length:	107.5 feet (32.74 m)

Height:	8.5 feet (5.63 m)		
Wingspan:	55.7 feet (16.94 m)		
Wing Area:	1,800 sq feet (167,2 m <sup>2</sup> )		
Weight:	140,000 pounds (52,250 kg) Gross takeoff weight 80,000 pounds (30,000 kg) JP-7 fuel weight		
Speed:	Maximum speed (also maximum cruising speed) about 2,100 mph (3,380 km/h) at over 60,000 feet (18.29 km); world record speed over 15/25 km course, 2,193 mph (3,530 km/h) or Mach 3,31		
Altitude:	Over 85,000 feet (25,910 m) Maximum sustained height (also world record), 85,069 feet (25,931 m)		
Range:	Over 2,000 miles (3,200 km) unrefueled 78,740 feet (24 km) at 1,983 mph (3,191 km/h, Mach 3) on internal fuel		
Endurance:	1 hour 30 minutes At loiter speed, up to 7 hours		
Armament:	None		
Reconnaissance System:	Classified		
Unit Cost:	Classified		
Total Flight Hours:	53,490		
Total Mach 3+ Time:	11,675		
Total Sorties:	17,300		
Total Operational Sorties:	3,551		
Total Operational Hours:	11,008		
Total Air Refueling:	25,862		
Crew:	2 (1 Pilot, 1 RSO)		
Inventory:	Built	Lost	
	A-12	13	5
	M-21	2	1
	YF-12	3	2
	SR-71A	29	11
	SR-71B	2	1



## THE HABU MISSIONS

After several changing and testing, finally the Blackbird did the first flight on 22 December 1964 with Lockheed's test pilot Bob Gilliland in the driver's seat. Following this successful flight, other Blackbirds were manufactured for the US Air Force. Total 32 SR-71s were built and assigned the Air Force serial numbers 61-17950 through 61-17985. Serial numbers 61-17982 through 61-17985 were not used. The first SR-71A was assigned to a new unit, the 4,200 Strategic Reconnaissance Wing (SRW) at Beale Air Force Base, located outside the twin cities of Marysville and Yuba City, California, that later became the home of the SR-71s and their crews in 1966. In 1971, the 4,200 SRW was restyled the 9<sup>th</sup> SRW with two squadrons under its command. The SR-71 Blackbird flew two types of missions on a daily basis; training missions at Beale AFB in California and worldwide intelligence gathering missions, called "Operational" missions. All operational sorties were flown under the rules of Peacetime Aerial Reconnaissance (PARPRO), specially established aerial reconnaissance during peacetime. Even though the home base was on Beale AFB, the majority of operational missions were flown from other locations around the globe which called Detachments or "Det" for short. It was rarely more than two aircraft being dispatched to any overseas theatre and missions normally were being flown by single aircraft.

The first SR-71 Operational sorties was flown out of Det-1 at remote base Kadena Air Base or the "Rock" in Okinawa, Japan in March 1968, where they then continued to be flown from until the program was terminated in 1989. The operation to transfer the SR-71s from Beale AFB to Kadena AB was known as "**GLOWING HEAT**". The US Air Force insiders called the Blackbird as



"**HABU**". The name of "Habu" emerged when the A-12s (and later the SR-71s) were first flown to Kadena AB. The local people thought that this strange and somewhat wicked-looking cobra-hooded airplane was shaped like the Habu snake – a Pit Viper (*Trimeresurus flavoviridis*) snake. They started calling it the Habu airplane, and later just Habu. Crews who flew the airplane were also called Habu and the name came to be recognized with the Blackbird program and even incorporated into the insignia worn by the crews on their uniforms. The HABU patch was only awarded to crews who had

flown operational sorties. Over time HABU has come to be associated with all Blackbird pilots and crews, but in the truest sense of the word, it represents only those who flew operational sorties. The HABU patch shown above is dedicated to who fly the SR-71 on Operational missions, the pilot and the RSO. USAF SR-71 pilot and former SR-71 Squadron Commander of 1<sup>st</sup> Strategic Reconnaissance Squadron (SRS) Colonel (ret) Richard H. Graham explained, "*You had to fly an SR-71 on an Operational Sortie to earn the HABU patch!*"

Next days after the Blackbirds officially serviced the US Air Force; they were impressively flying over all the major hot zones in the world including Russia, China, North Korea, Vietnam, Cuba and Libya as well as any other point that recognition was deemed necessary for. Even in the face of risks, the information gained was invaluable such as learning the Air-to-Air batteries, SAM sites, supply routes, troop movements and the like which then used to plan strikes by the US to minimize the losses. With the information provided by the Blackbird, international incidents were avoided, war stopped quickly and bluffs called. The Blackbird also helped to keep a small incident in 1968 becoming a large international incident. On 23 January 1968, North Koreans boarded the USS Pueblo, a Naval Surveillance ship in international water. The US government was caught by surprise and had no idea what had happened to the ships and the crews onboard. There were only two feasible solutions to resolve the problem; one was to bomb the North Koreans to show that the US government meant business about getting the USS Pueblo back and in the process most likely killing hundreds, possibly the ship's crews. The second was to send in a Blackbird to locate the ship. An SR-71 was then launched from Kadena AB and in less than 25 minutes' time had reached the North Korea, made up its first run up the coastline gathered intelligence data, took photographs, turned around completely and back to the base. The US government then confronted the North Koreans with these photographic proofs which ended up resolving the incident without blood shed. The USS Pueblo mission was one of the most successful SR-71 Blackbird operational mission by providing the most recent and accurate intelligence data on a hot zone for making a decision on a critical situation. These silence reconnaissance capabilities impressed US Senator John Glenn who then gave a statement:

*“The SR-71 provides coverage on demand with little or no warning to the reconnaissance target – it is a highly flexible system .... the SR-71 is able to penetrate hostile territory with comparatively little vulnerability to attack unlike other reconnaissance platforms”*



Figure 4. Inside the cockpit of SR-71C Blackbird (photo courtesy of Nick Kiriokos)

The successful of missions not only depends on the Blackbirds and the crews onboard but also all the people who take care of the flight details and make sure each mission ran smoothly that called the “mobile” crew. They played important roles and duties before and during every Habu flight. The importance of these crews was shown when the 61-17976 was forced to land at Takhli RTAFB instead of returning to the remote base Kadena AB on April 1968. The SR-71 crewed by Pilot Buddy Brown and RSO Dave Jensen, was flying the Operational sortie into North Vietnam. Upon descent from altitude, the left generator was lost and both engines flamed out. A restart of both engines was accomplished and the aircraft landed safely at Takhli RTAFB, Thailand. “Mobile” crews from Kadena flew in and performed the repairs. The aircraft returned uneventful to Kadena AB. Long-time and far-distance flying for gathering intelligence information gave refueling problem to the Blackbirds when they were far away from the base. The fuel-thirsty SR-71 would need much more JP-7 when it had to fly sustained Mach 3+ in certain situations. In such situations, the need of special tanker to air refuel them was very important which then resulting in modification of 56 Boeing C-135 aircrafts to become special tanker KC-135Qs “**STRATOTANKER**” series loaded with JP-7 fuel. These tankers were assigned to the 100<sup>th</sup> Air Refueling Wing (AFW) stationed at Beale AFB, the same base as the SR-71 Blackbirds.



Figure 5. The special tanker KC-135Q was delivering special JP-7 fuel streams to the SR-71C no. 61-17981 via its receptacle during a flight training (<http://www.wvi.com>).

Flying at high altitude at high speed where the outside temperatures reached -60 degrees Celsius and leading edges of the aircraft rose to +300 degrees Celsius from skin friction gave some consequences that had to be coped. From scientific view, the higher we climb the colder the temperature of the outside air and the thinner the oxygen we can breathe. The minimum oxygen available in high altitude locations can cause a hypoxia and worst, a black out – a situation where a pilot loses his consciousness during flight – that is very dangerous in flight. In order to prepare the crews who flew the Blackbirds, the US Air Force had high requirements resulting in the chamber training for crews that significantly different from other aircraft’s crews. The training was done

under direction and supervision of the Physiological Support Division (PSD) of Beale AFB, California. The primary objective of initial chamber training was to expose crews to simulated altitude so that they would learn about their own physical limitations and the dangers of operating in that environment, but the purpose of the high flier's training was to familiarize them with their suits and demonstrate the dangers of the altitude at which they routinely flew.



Figure 6. The astronaut-like full-pressure suit of SR-71 Blackbird pilot (<http://www.wvi.com>).

The glossy Habu accommodates two crew members in tandem cockpits – front and back seats. The pilot flies the aircraft from forward cockpit while the RSO monitors sensors and experiments in the rear station. For high-speed more than Mach 3 and high-altitude up to 85,000 feet flight missions, both crews must wear full-pressure suits that resemble those worn by the early-astronauts. About this special flight suit, the former 9<sup>th</sup> Strategic Reconnaissance Wing (SRW), Colonel (ret) Richard H. Graham revealed how it feels to be cocooned in one for hours on end in his book “**The SR-71 Revealed: The Inside Story**”. Before flight, the crews must do pre-flight check that insure all systems are well-prepared including the suit and the helmet must be latched and locked. Forget or neglect the procedure to latch and lock the helmet can cause a hypoxia when climbing to high altitude. This thing happened to Terry Pappas, an SR-71 Blackbird pilot when flight training at Beale AFB in 1986, even though he had flown about 150 hours in the flight simulator and one subsonic flight in the aircraft. That was why the full-pressure suit was designed. In order to keep the mission continued the number of pilots and RSOs had to be sustained, so that they would always be available when needed for training or Operational sortie missions. Considering this condition, the US Air Force then purchased extremely costly SR-71B, an operational trainer type of SR-71A. At least two of this type the Air Force serial number 61-17956 and 61-17957 was slotted into the main batch at Beale AFB. The first flight of SR-71B was on 18 November 1965. This trainer-type aircraft has a raised instructor cockpit and dual pilot controls and also includes the reconnaissance systems for RSO training. Another trainer, SR-71C 61-17981 did the first flight on 14 March 1969.

## WORLD RECORDS

The Blackbird that was developed for the US Air Force as reconnaissance aircraft nearly 40 years ago is still remained the world's the most unique, fastest and highest-flying air-breathing production aircraft throughout their operational existence. The very last official flight of the SR-71 Blackbird was on 6 March 1990 from its home base at Beale AFB to Smithsonian Institute. Even in this flight, the 61-17972 crewed by Colonel Edward Yielding and RSO, Joseph T. Vida, also set four world records; one these records is world record for flying from Los Angeles to Washington D.C. in 64 minutes 2 seconds at 2,144.8 miles per hour. There are other world records as well that also have been booked. Some records also break the previous records. The World Absolute and Class Records for Speed record was taken by the SR-71 61-1758 over a 15/25 Kilometer Straight Course at 2,193.167 miles per hour or 3,529.56 km per hour on 28 July 1976. This record surpasses the record set by the Lockheed YF-12A Interceptor prototype in June 1951. This A-type Blackbird was piloted by Captain Eldon W. Joersz and Major George T. Morgan, Jr. About flying at sustained high-altitude, the A-type 61-17962 is the champion. The crews, Captain Robert C. Helt and RSO, Major Larry A. Elliot booked the World Absolute and World Class Records for Horizontal Flight on 28 July 1976. They were flying at sustained 85,069 feet (25.929 km) breaking the previous record of 80,258 feet (24.462 km) set by a Lockheed YF-12A on 1 May 1965.

One day before the 61-17972 broke the record, another SR-71A also broke the World Absolute Closed Circuit Speed Record over a 1,000 Kilometer Course at speed 2,092.29 miles per hour (3,367.22 km per hour). The SR-71A is a Class C-1 Group III Jet Engine aircraft, same as the Russian's Mig-25 Foxbat. The Absolute Speed Record of 1,853 miles per hour and the World Class Speed Record of 1,815 miles per hour that was set in October 1967 and attained by the Mig-25 Foxbat was taken over by the Blackbird 9 years later. These records booked by Major Adolphus H. Bledsoe, Jr. and RSO, Major John T. Fuller. Flying with the Blackbird had made the distance between two big cities in two continentals very close. This is another record of the SR-71A that flew from London in Europe to Los Angeles in America in only 3 hours 47 minutes and 35.8 seconds, less than 4 hours. The Blackbird, piloted by Captain Harold B. Adams and Major William C. Machorek was flying at speed of 1,480 miles per hour or 2,382.8 km per hour. The 1971 Mackay and 1972 Harmon Trophies were also proudly dedicated to the SR-71A 61-17968 for its non-stop flying for 15,000 miles (24,140 km) for 10 hours and 30 minutes including aerial refueling which booked by Major Thomas B. Estes and Major Dewain C. Vick on 26 April 1971. This non-stop flying three-quarter of the Earth proved the reliability of the Blackbird for Endurance Flight. Not a single world's record in speed and altitude that never noted the Blackbirds existence.

The achievements of SR-71 Blackbirds in air reconnaissance world were a very expensive cost of years of research, hard-work, time-consuming and exhaustive test flight that sacrificed the test pilots and the aircrafts starting from the "ANGEL" program for the U-2 aircraft, the

“ARCHANGEL” project for the A series aircraft, to the “SENIOR CROWN” program for the SR-71 Blackbird. At least five A-12s, two YF-12As and 12 SR-71s were lost during the tests or flight trainings for many reasons but none was ever shot down by the enemies’ batteries. This is another record that was never written in the book; their successfulness escaping from the unfriendly forces all over the hot zones they ever flew. Throughout their Operational missions, in some places, Surface to Air Missiles were fired at the Blackbirds in an attempt to bring down one of the reconnaissance planes. At times, SAMs were fired in salvos but as Clarence L. "Kelly" Johnson stated: *"Over 1,000 missiles have been fired at the Blackbird without a loss of Plane or Crew"*. The table below lists all the “black heroes” of Blackbirds.

<b>Aircraft</b>		
<b>Tail #</b>	<b>MODEL</b>	<b>Disposition</b>
60-6924	A-12	Blackbird Airpark, Palmdale, CA (AFFTC Museum)
60-6925	A-12	Intrepid Sea-Air-Space Museum, NY
60-6926	A-12	crashed 24 May 1963, CIA pilot ejected safely
60-6927	A-12	Museum of Science/Industry, LA (Stored at Skunk Works)
60-6928	A-12	crashed 05 January 1967, CIA pilot killed
60-6929	A-12	crashed 28 December 1967, pilot ejected safely
60-6930	A-12	Alabama Space and Rocket Center, Huntsville
60-6931	A-12	Minnesota ANG Museum, St Paul, MN
60-6932	A-12	crashed 5 June 1968, CIA pilot killed
60-6933	A-12	San Diego Aerospace Museum
60-6934	YF-12A	destroyed on landing 14 August 1966
60-6935	YF-12A	USAF Museum, Dayton, OH
60-6936	YF-12A	crashed 24 June 1971, crew ejected safely
60-6937	A-12	Storage, Plant 42 (Skunk Works)
60-6938	A-12	USS Alabama Battleship Memorial Park, Mobile, AL
60-6939	A-12	destroyed on landing 9 July 1964, crew ejected safely
60-6940	A-12	Museum of Flight, Seattle
60-6941	M-12	crashed 30 July 1966 , pilot survived, LCO killed

64-17950	SR-71A	destroyed on takeoff 11 April 1969, crew ejected safely
64-17951	SR-71A	Pima Air Museum, Tucson, AZ (NASA YF-12C 937)
64-17952	SR-71A	crashed 25 January 1966, pilot survived, RSO killed
64-17953	SR-71A	crashed 18 December 1969, crew ejected safely
64-17954	SR-71A	destroyed on takeoff 11 April 1969, crew ejected safely
64-17955	SR-71A	AFFTC Museum, Edwards AFB, CA
64-17956	SR-71B	Operational, NASA Dryden FRC, Edwards AFB, CA
64-17957	SR-71B	crashed 11 January 1968, crew ejected safely
64-17958	SR-71A	Robbins AFB Museum, GA
64-17959	SR-71A	Air Force Armament Museum, Eglin AFB, FL
64-17960	SR-71A	Castle Air Museum, Merced, CA
64-17961	SR-71A	Kansas Cosmosphere & Space Center, Hutchinson, KS
64-17962	SR-71A	Reserve Fleet, Plant 42, Palmdale, CA
64-17963	SR-71A	Beale AFB Museum, CA
64-17964	SR-71A	SAC Museum, Offutt AFB, NE
64-17965	SR-71A	crashed 25 October 1967, crew ejected safely
64-17966	SR-71A	crashed 13 April 1967, crew ejected safely
64-17967	SR-71A	Operational (USAF), Det 2, 9th SW, Edwards AFB, CA
64-17968	SR-71A	Virginia Aviation Museum
64-17969	SR-71A	crashed 10 May 1970, crew ejected safely
64-17970	SR-71A	crashed 17 June 1970, crew ejected safely
64-17971	SR-71A	Operational (USAF), Det 2, 9th SW, Edwards AFB, CA
64-17972	SR-71A	National Air and Space Museum, Washington D.C.
64-17973	SR-71A	Blackbird Airpark, Palmdale, CA (Det 1 ASC)
64-17974	SR-71A	crashed 21 April 1989, crew ejected safely
64-17975	SR-71A	March Field Museum, March AFB, CA
64-17976	SR-71A	USAF Museum, Dayton, OH
64-17977	SR-71A	destroyed in takeoff accident 10 October 1968

64-17978	SR-71A	destroyed in landing accident 20 July 1972
64-17979	SR-71A	History & Traditions Museum, Lackland AFB, TX
64-17980	SR-71A	Operational, NASA Dryden FRC, Edwards AFB, CA
<b>64-17981</b>	<b>SR-71C</b>	<b>Hill Aerospace Museum, Hill AFB, UT</b>

## THE DARK DAYS

These glory days turned to dawn when US government instructed the US Air Force terminating the all SR-71 Blackbirds operational on 22 November 1989 following the suspending of the SR-71 operations on 1 October 1989 except for proficiency flights. These were the dark days for Habus everywhere and emotions ran high as the program came to end. Finally, the SR-71s were decommissioned in ceremony at Beale AFB from their duty on 26 January 1990 after servicing the nation for almost 22 years – the first operational flight of the SR-71 by the US Air Force was on 21 March 1968. The political reasons caused the Blackbirds terminated operationally. The most common official reasons given were that getting too old to maintain and/or it was too expensive. Another reason was that satellites could do it all. A third reason that was never stated officially, but was widely believed, was that the Blackbird was being retired because a superior replacement was entering service – the secret aircraft code named “**AURORA**” that reportedly can fly at Mach 6, almost twice as fast as the Blackbird. From all of these reasons, the most obvious seen was the US Air Force did want them. Before retiring, the SR-71s were assigned to Strategic Air Command (SAC). SAC, though, did not really see the plane as contributing to SAC’s missions such as dropping bombs or image, and it had always been somewhat of an awkward fit. Unlike its various C-135 models and the U-2, the SR-71 could not loiter nor did anyone ever promise that it could. There numbers of documented cases that show, quite simply, SAC did not want the airplane. The US Air Force also did have one legitimate complaint against the aircraft. The biggest users of the Blackbird were the CIA, for obvious reason, State and the Navy. The Navy had for years operated what was essentially a Mach 2, shorter-legged SR-71 the RA-5C Vigilante. When the Vigilante was retired, the Navy suffered a severe loss of reconnaissance capability. Although the F-14 provides reconnaissance capability with its TARPS system; that system has been held back while there are repeated attempts to give the Navy’s Designated Wonderplane, the F/A-18 Hornet, to take over the reconnaissance mission.

The most damaging thing, though, that happened was a T-39 crash in April, 1985. General Jerry O’ Malley, former SR-71 pilot and Wing Commander, was aboard, on his way to an official speaking engagement. He understood the nature of the SR-71 and its unique requirements and benefits. He was likely to become the Air Force Chief of Staff in 1986 and possibly even Chairman of the Joint Chiefs after that. When he was killed, General Welch went on to become chairman, and he was known as being hostile to the SR-71. This was when the SR-71’s fate was sealed, although



it took three more years to die. The SR-71 had lost its constituency inside the Beltway and it was just a matter of time before it was killed. This is not unique to the Air Force. Finally, Secretary of Defense Dick Cheney, who did not like the airplane when he was a Congressman, was persuaded to kill the SR-71, despite Congress' willingness to continue funding the program. The actual retirement of the SR-71 demonstrated its unpopularity with some at the top. Usually, when a major aircraft goes out of service, there are very high ranking officials present and numerous tributes are offered to the aircraft. At the retirement of the SR-71, many observers noted the absence of the usual highest rank of military and government officials at the ceremony. It is well known that the SR-71 delivered to the Smithsonian established four new speed records on 6 March 1990, as the Smithsonian requested. What is not well known is that the US Air Force initially refused the request for a record flight and in fact kept trying to block it up until the last minute. It took the personal intervention of Senator John Glenn to permit the record flight to take place. Even then, the crew was instructed to fly a conservative by-the-book profile, which was unnecessary considering that this was to be the aircraft's last flight ever. After the arrival of the world-record 61-17972 at Dulles, US Air Force made no effort to help the Smithsonian in its preservation and it was left to deteriorate in the D.C. weather. The bird is now in a climate-controlled hangar, but that hangar was donated by the hangar manufacturer. What an ironic retirement for the seven world record holding in speed and altitude aircraft. One of the SR-71A 61-17972 maintenance crew, the SR-71 Crew Chief US Air Force Master Sergeant (ret) Leyland Haines said:

*"The sad thing is this country will never know what it lost. We know the SR-71 is needed--now more than ever. In the last year alone there have been several unresolved crises that could have been satisfied with the Blackbird. You are all aware of them. How many more will follow in this ever-increasingly volatile world? The criminal thing is how many wrong decisions will be made, unnecessary piles of money spent, or American lives lost without the best intelligence at hand?"*

In the beginning of the Gulf War and the Iraq invaded the Kuwait, the decision made to ground the SR-71 Blackbird became apparently wrong. When the Desert Storm operation began in 1994, Joint Chiefs of Staff General Norman Schwarzkopf was reported to have asked for the SR-71 very early on. On 28 September 1994, Congress voted to allocate \$100 million for reactivation of three SR-71s, two SR-71As and 1 SR-71B. Following this, Congress directed the US Air Force to bring the SR-71 out of retirement because of the need for highly survivable, manned, air-breathing reconnaissance platform to provide synoptic, multi-sensor and broad-area coverage. It was known that very soon after the Saddam Hussein's troops moved into Kuwait, the US Air Force approached Lockheed and asked how long it would take to restore SR-71 operations. Lockheed's response was that depending on the priority and if the US Air Force could supply the sensor packages, the first one could be operational in 14 days and the next one around thirty days after that because they had not been out of service that long at this point. The move to reactivate the Blackbird reconnaissance aircraft was not unopposed. Critics looked at the aircraft's limitations; it can effectively operate only in good weather and can not transmit the images it collects directly to those who need them that concluded that it should be retired. Factually, The SR-71 had a major

impact in the war. In addition to being able to fly anywhere over Iraq with relative impunity at any time of the day (not just at night like the F-117s Nighthawk) and providing both targeting data and post-strike intelligence, it could have monitored aircraft and ship movement and would have made the SCUD missile hunts much more successful. Airpower did not do very well against the SCUDs. This was primarily due to problems with targeting. Satellites were ineffective against the mobile SCUDs. USAF had no real tactical air reconnaissance per se and the Navy was effectively limited to TARPS equipped F-14s, which was restricted in capability. The SR-71s' great speed would permit it surprise SCUD batteries before they could cover up or move. It could then speed back to Saudi Arabia while a strike group was launched to head into the war zone. The SR-71 could be on the ground and a rough interpretation could be done and data transmitted to the strike group before it got to the target area. This had been very effective.



Figure 7. The writer is standing in front of the famous SR-71C Blackbird 62-17981 at Hill Aerospace Museum, Hill AFB, Utah (Private collection).

Accomplishing the missions completely and successfully did not endear a lot of people, especially some high-rank and decision-maker people at the top. Again, due to conflicting language in section 304 of the National Security Act of 1947, Deputy Defense Secretary John White directed the US Air Force to ground the SR-71s on 15 April 1996. According to Air Force News released on 30 January 1997, since 1 January 1997 the SR-71 Blackbird spy aircraft and its crews were ready for deployment and mission. The SR-71's home base was still in Beale AFB. Although assigned under the 9<sup>th</sup> SRW, they operated from Detachment 2 at Edwards AFB under Air Combat Command (ACC). Not more than a year, on 15 October 1997 US President Bill Clinton used his Line Item Veto power to kill off the last funding for the magnificent Blackbirds and relegating them largely to care of a number of museums around the country. Following the Veto, the US Air Force Headquarter directed termination of all SR-71s operation and subsequent disposal of the fleet a year later. Fortunately, four of them were maintained by NASA as high-

altitude high-speed research platforms in Linear Aerospike SR-71 Experiment (LASRE). LASRE was a small, half-span model of a lifting body with eight thrust cells of an aerospike engine mounted on the back of an SR-71 aircraft and operating like a "flying wind tunnel". On 18 November 1998 the SR-71 completed this program and also it was the end of SR-71s' service to the NASA. The reason was the NASA too had fallen short of operating funds that resulting in rested the Blackbirds on their tarmacs.

This is not a film but a real life and we all know "The End" not always happy ending. This "Not Happy Ending" film happened to the most advanced aircraft in its time the SR-71 Blackbird. Developed in a very black secret place ever in the Earth, in a "black" project that nobody ever knew that inside the area some expert people had been working very hard to produce the highest-speed highest-altitude cobra-hooded manned reconnaissance, almost stealth and seven-world-record holder aircraft in world that human has ever flown. It was realized that the cost of running the SR-71 fleet was \$260 million annually in the 1980s but their Operational results were invaluable to help deciding strategic decision for military purposes and foreign affairs. In some cases, the SR-71s could do better than spy satellites such as they could be sent as soon as possible to a trouble spot easier than a satellite. That what had happened to the SR-71 Blackbird which had to be grounded just for a much more mundane reason: It was not a very popular aircraft with the people in power. However, the Blackbird has shown the engineering wizards done by the Lockheed-Martin's Skunk Works people, those who flew in flight test and in operational, the Habus and those who maintained the Blackbird from beginning until it rests in peace. They deserve high respect in achieving the impossible as a normal course of business and did not believe in failure; the things that we, Indonesian people should learn to forward the aerospace technology for Indonesian people wealthy in the future. That was the end of the Blackbird's life, but I think they are now free. Free to stand still on where they stand, just like a line from the Beatles' song that says " ... *you are only waiting for these moments to be free .....*".

The title at the top of the page was taken from a very appropriate poem for such a high-flying aircraft. Here it is in its entirety with credit given to the author and Joseph Tomasone that put it into his web page (<http://www.ab2m.net>):

***"Oh, I have slipped the surly bonds of earth  
And danced the skies on laughter-silvered wings;  
Sunward I've climbed, and joined the tumbling mirth  
Of sun-split clouds -- and done a hundred things  
You have not dreamed of -- wheeled and soared and swung  
High in the sunlit silence. Hov'ring there,  
I've chased the shouting wind along, and flung  
My eager craft through footless halls of air.  
Up, up the long, delirious burning blue,  
I've topped the windswept heights with easy grace  
Where never lark, or even eagle flew.  
And, while with silent, lifting mind I've trod  
The high untresspassed sanctity of space,  
Put out my hand, and touched the face of God."***

**John Gillespie Magee Jr.**