FORGOTTEN HISTORY

FROM THE SHADOWS: THE LEGACY OF THE SR-71 *BLACKBIRD*

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AN ABRIDGED TIMELINE OF AERIAL RECONNAISSANCE

1930 < 1914

1941 < 1931

1951 < 1942

1961 < 1952

< 1962

THE DAWN OF MECHANIZED AERIAL RECONNAISSANCE

- Doves, pigeons, and balloons had been used with timed cameras (ca. 1794-1917)
- By 1912, Royal Air Force begins trials with hardpoint mounted cameras.
- Low-altitude observation aircraft began widespread use by World War I.

OBSERVATION GAINS ALTITUDE

- Initial issues with ice on lenses resolved in 1928 perfected in 1933.
- Dedicated observation flights begin shortly after World War II begins in 1940.

STRATEGIC RECONNAISSANCE BECOMES NECESSITY

- Smaller aircraft were unable to keep up the demands of a growing intel community.
- Bombers repurposed for long-range strategic recon missions into the Cold War.

PURPOSE-BUILT RECONNAISSANCE, THE BEGINNING OF THE LEGACY

- Design proposals fielded in 1953 for a purpose-built recon aircraft.
- U-2 *Dragon Lady* flies for the first time in 1955.
  - Gary Powers shot down in May of 1960 over Soviet air space.

The *Blackbird* and *Valkyrie* families are born to pave the way for the next generation in aviation: interception, deep-strike, and reconnaissance.

This is the peak of Cold War military technology in aviation...

THE FIRST PURPOSE-BUILT DESIGNS: THE RB-36 & RB-47

USAF AIR RECONNASIANCE WINGS, 1948-1951

A size comparison between the B-29 *Superfortress* and the B-36 *Peacemaker*.

- One of the most controversial bombers served as one of the first LRSR aircraft.
- Lots II thru VI included RB-36 variants of some form. Retroactive conversions.
- Replaced the smaller B-29/50 recon variants quickly after entering service.
- Was subsequently quickly replaced by the jet-powered B-47's.

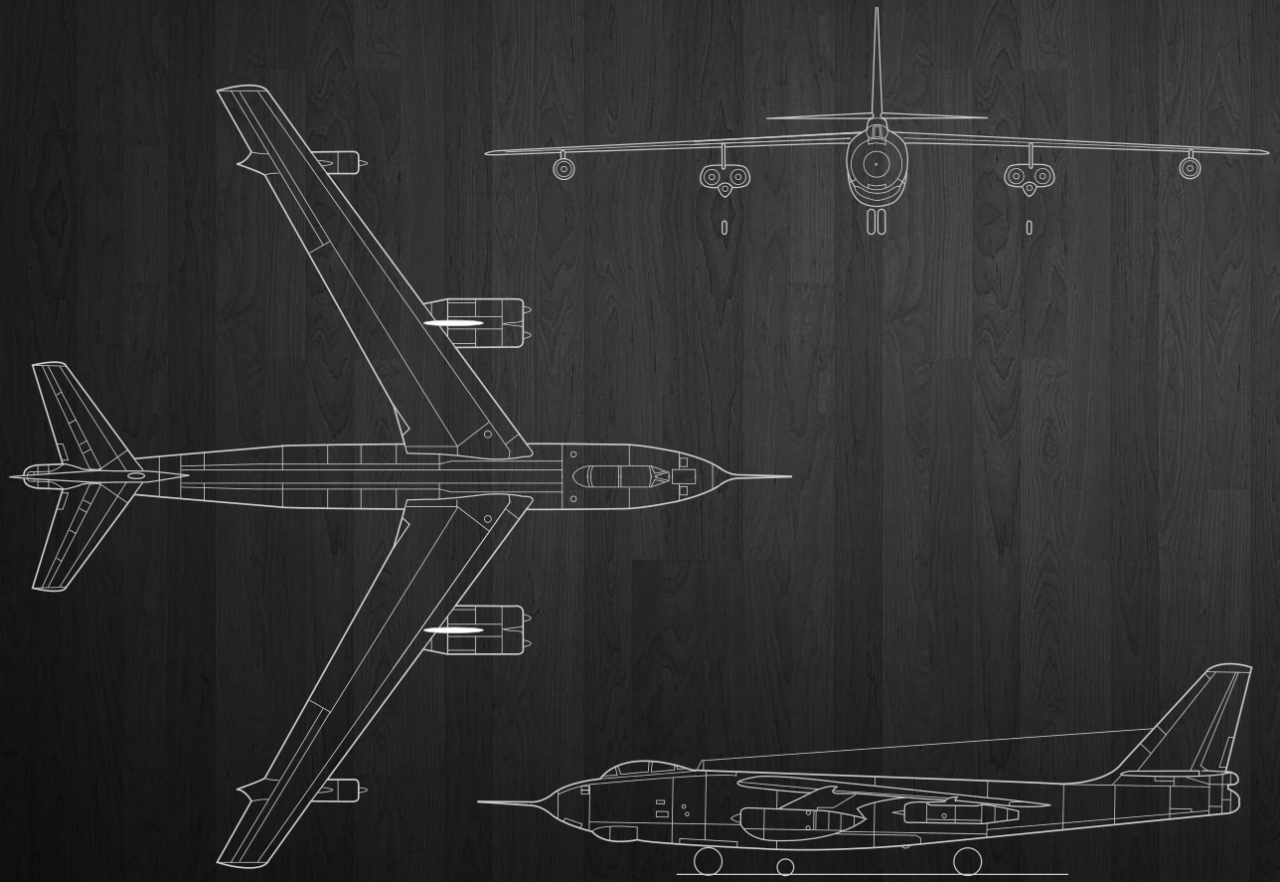
XB-47 prototype on TARMAC in 1947. Over 200 RB-47's would be produced by 1953.

Production B-47 in flight.

- The first design that, by design, had a recon variant planned pre-production.
- Over 270 production models with four separate variants.
- MiG-15's introduction made the B-36 obsolete, thus the need for a jet designed aircraft.
- RB-47's entered widespread service by 1952.
- RB-36's were fully retired by 1955.
- Longer range operations required B-52 support, mainly for deep-Soviet operations.
- RB-47's continued recon operations thru 1963.

THE FIRST PURPOSE-BUILT DESIGNS: THE RB-36 & RB-47

USAF AIR RECONNASIANCE WINGS, 1948-1951



Crew:	3
Dimensions:	107 feet 1 inch Long 116 feet Wide 28 feet High
Weight:	80,000 lbs Empty ~133,000 lbs Average 230,000 lbs Maximum
Speed:	~600 MPH Maximum ~560 MPH Cruise
Range:	~2,000 Miles
Ceiling:	~40,000 Feet
Variants:	28
Number Built:	Over 2,000
First Flight:	17 December 1947
Introduced:	1951
Retired:	1969-1977

THE BIRTH OF BLACK: THE U-2

A LEGACY THAT LIVES ON TODAY

A U-2 *Dragon Lady* in flight.

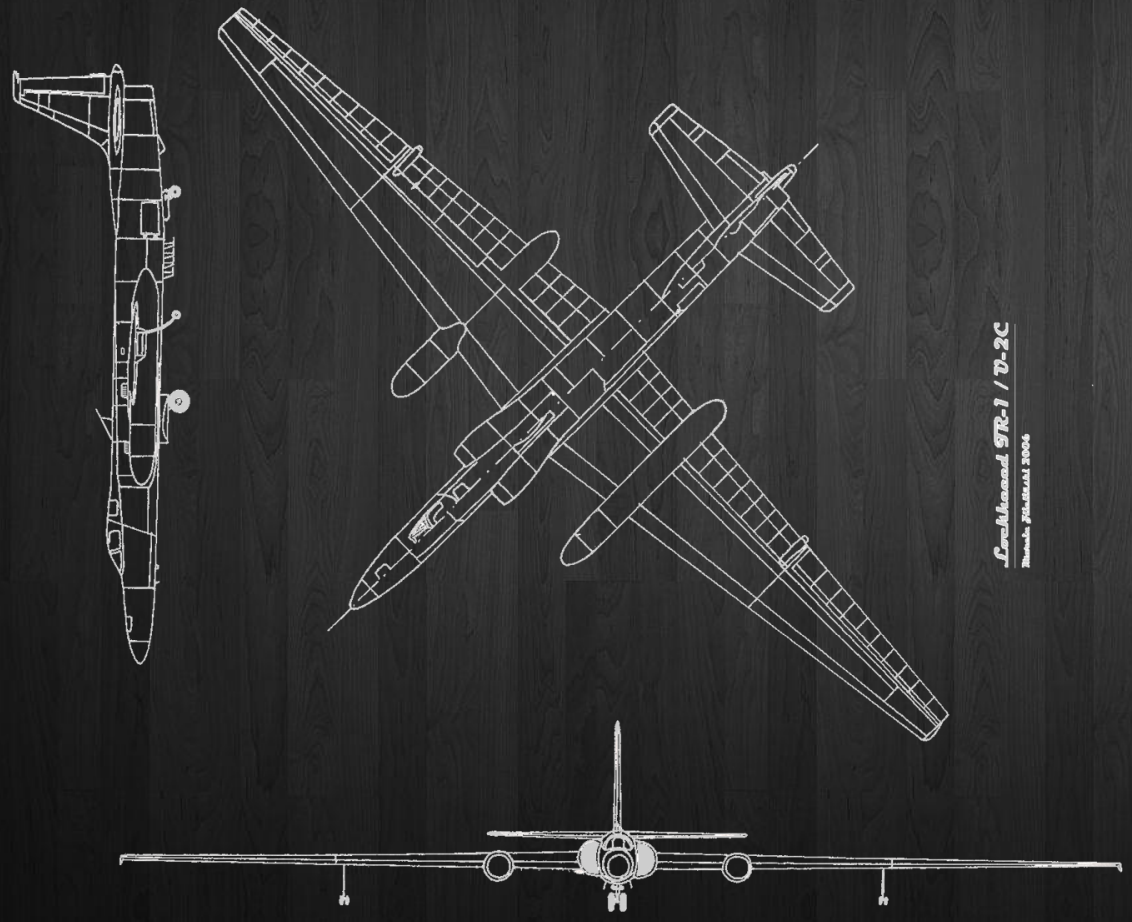
- Lockheed began drafting a concept for high-altitude recon craft in 1953.
- Lockheed was selected due to success with the P-38 and limited successful P-80.
- High priority on aircraft capable of deep pierce Soviet air space.
- Set the standard for future recon plane requirements in the U.S.

- U-2's were used for a long series of experiments.
- TR-1's were variants that continued operation well into the 21st century.
- Larger quantity of operators led to a larger quantity of production.
- DARPA, CIA, and USAF used or continue to use the aircraft.
- NASA utilize the TR-2 for atmospheric testing and ballistic research.
- The U-2 remains in service today for the USAF.

U-2's were also used to experiment on the idea of launching long-range recon aircraft from aircraft carriers.

THE BIRTH OF BLACK: THE U-2

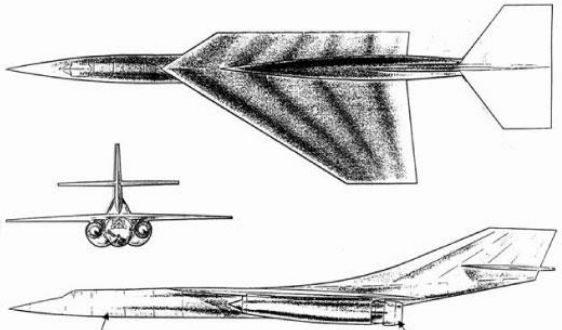
A LEGACY THAT LIVES ON TODAY



Crew:	1
Dimensions:	63 feet Long 105 feet Wide 16 feet High
Weight:	16,000 lbs Empty 40,000 lbs Average
Speed:	~410 MPH Min/Max At altitude
Range:	Over 6,000 Miles
Ceiling:	Over 80,000 Feet
Variants:	18
Number Built:	Around 100
First Flight:	1 August 1955
Introduced:	1957
Retired:	Service continues

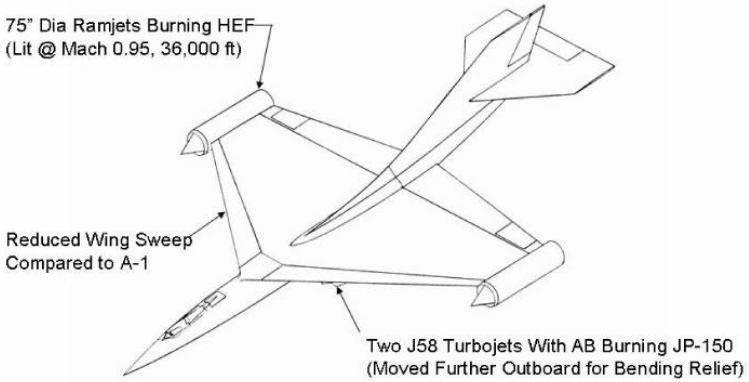
ARCHANGEL 1
JULY 1958

Length:	116.67 ft	Zero Fuel Weight:	41,000 lbs	Cruise Mach:	3.0
Span:	49.6 ft	Fuel Weight:	61,000 lbs	Cruise Alt:	83 - 93 kft
Height:	23.58 ft	Takeoff Gross:	102,000 lbs	Radius:	2,000 NM



ARCHANGEL 2
SEPTEMBER 1958

Length:	129.17 ft	Zero Fuel Weight:	54,000 lbs	Cruise Mach:	3.2
Span:	76.68 ft	Fuel Weight:	81,000 lbs	Cruise Alt:	94 -105 kft
Height:	27.92 ft	Takeoff Gross:	135,000 lbs	Radius:	2,000 NM

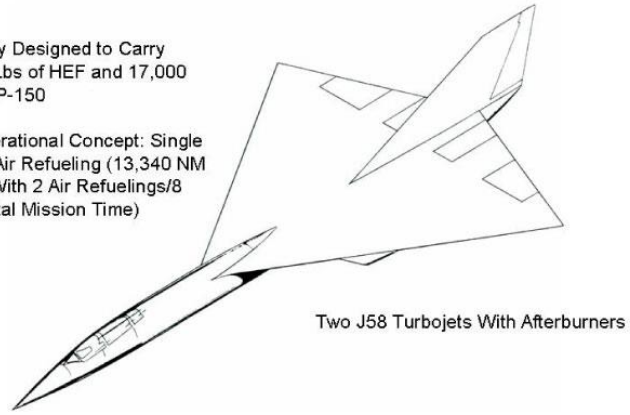


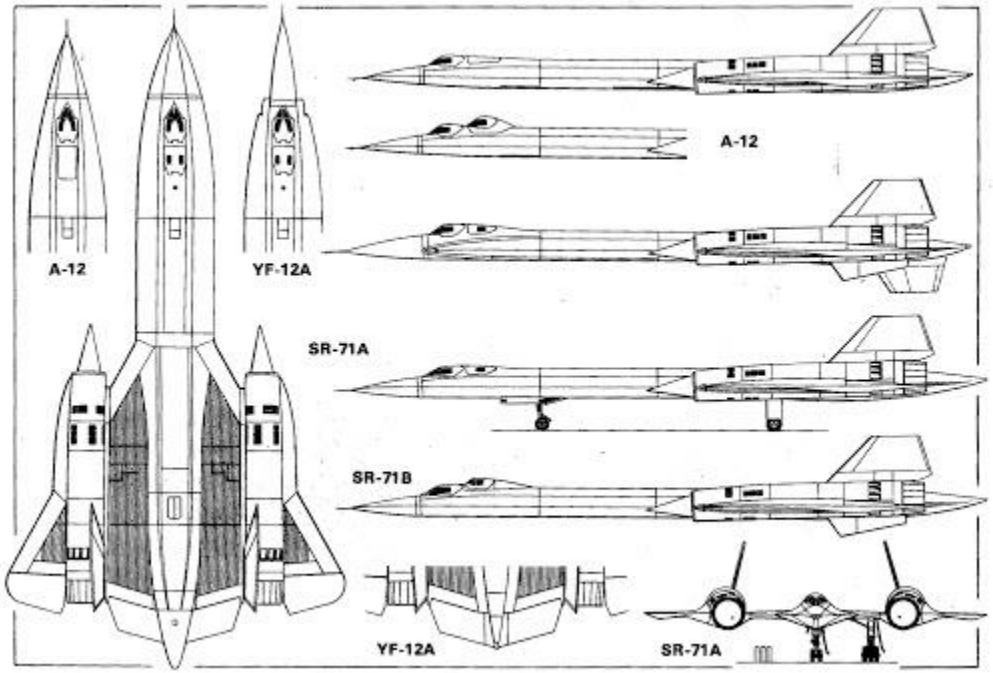
A-11
MARCH 1959

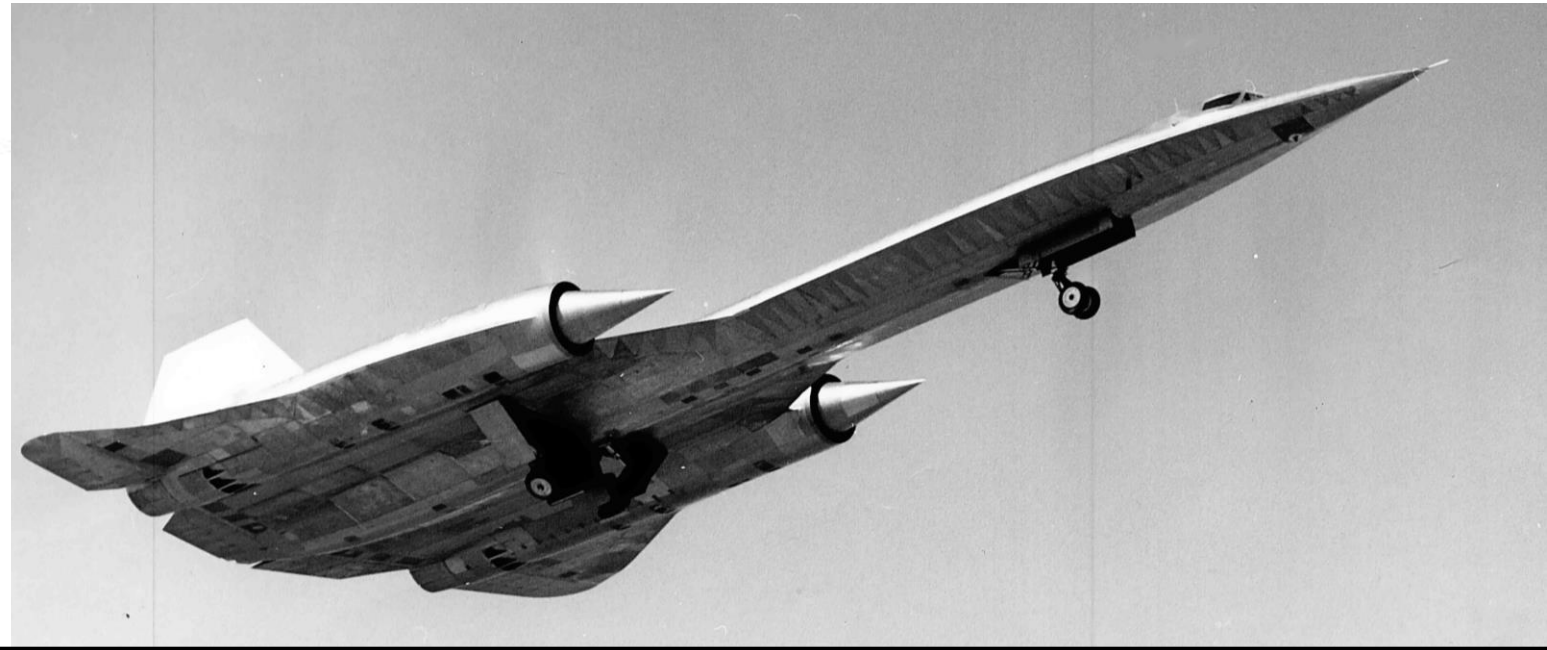
Length:	116.67 ft	Zero Fuel Weight:	36,800 lbs	Cruise Mach:	3.2
Span:	56.67 ft	Fuel Weight:	55,330 lbs	Cruise Alt:	93.5 kft
Height:	21.03 ft	Takeoff Gross:	92,130 lbs	Radius:	2,000 NM

Originally Designed to Carry 31,000 Lbs of HEF and 17,000 Lbs of JP-150

Key Operational Concept: Single Base + Air Refueling (13,340 NM Range With 2 Air Refuelings/8 Hour Total Mission Time)







THE HARBINGERS OF A LEGEND

A PROJECT SO DARK THAT IT ONLY JUST BECAME DECLASSIFIED

Assembly plant for the A-12 *Oxcart*.

- Advances in Soviet technology led to increased worry about vulnerabilities.
  - Unilateral missions launched by North American Aviation (see *Valkyrie program).*
- The loss of Gary Powers' U-2 in 1960 exacerbated the worry.
- Lockheed had already launched the *Archangel* program in 1956.
- "One-step-ahead" policy in the Skunk Works.
- The A-12 designation literally referred to the twelfth *Archangel* design (*Oxcart*) – a designation which stuck.

- The A-12 was smaller, faster, and had a higher ceiling than the *Blackbird.*
- Distinctive markings were used, such as the silverback schema.
- Flew numerous missions over Vietnam during the war.
- Formally declassified in a series from 1998 to 2007.
- The A-12's function was disinfo'd by the existence of the YF-12 interceptor concept, a program that led to the recreation of the A-12 as the SR-71.
  - GEN Curtis LeMay also was partially responsible for the SR-71's nerfing from the *Oxcart*.

10 A-12 *Oxcarts* parked on TARMAC in the Nevada Desert. A-12's and the M-21 had distinct paint schemes.

"YOU'LL NEVER SEE ME COMING"

STEALTH, SPEED, ALTITUDE, LETHALITY. WHAT MAKES A "DARK EMPRESS?"

M-21 with a D-21 drone. The mission of this combination was to expand the reach of the A-12.

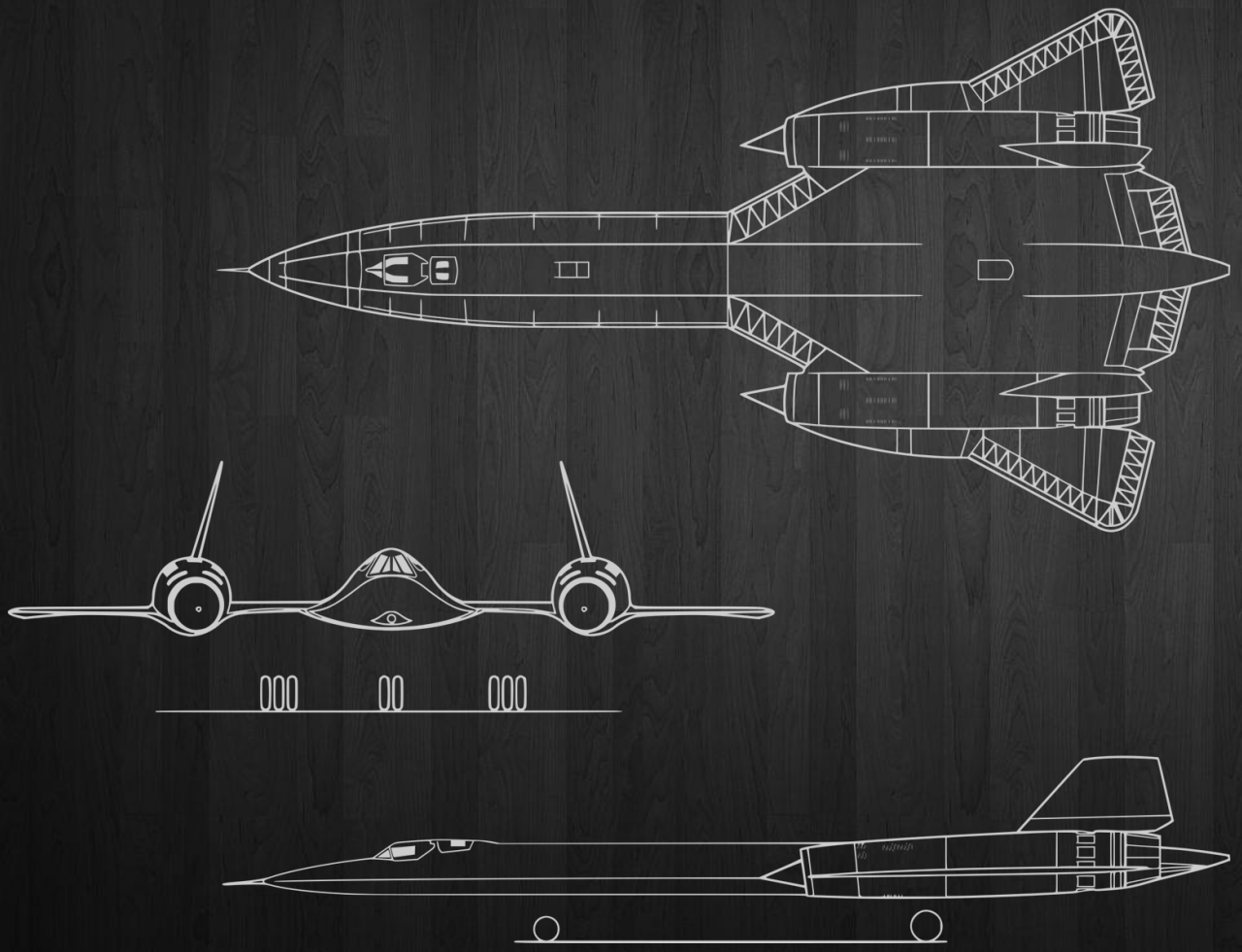
- Utilized stealth coatings on control surfaces to aid in cross-section reduction.
- Stealth technology was not as refined as the successor.
- Utilized a combination of altitude and speed to remain viable.
- Public knowledge of the A-12 and SR-71 was kept faded due to the YF-12.
- A-12's operated in tandem with replacement SR-71's thru 1968.

- 3 YF-12's were produced and flown from 1963 thru 1966.
- Designed to carry AIM-47 *Falcon* missiles for interception purposes.
- McDonnell Douglas' F-15 was a cheaper alternative (ca 1965-1972).
  - Secretary of Defense Robert McNamara effectively ended the YF-12 program in 1966.
- YF-12 & AIM-47's were both dumped in favor of the F-15 and AIM-54's.
- Subsequent SR-71 development regardless carried a potential interceptor mission set, but never executed.

YF-12 in flight over the Groom Lake site, the area more notoriously known as Area 51. Note the nosecone vs. the A-12.

THE BLACKBIRD FAMILY, AN ICON DEFINED

IT NEVER MET ITS MATCH



Crew:	2
Dimensions:	107 feet 5 inches Long 55 feet 7 inches Wide 18 feet 6 inches High
Weight:	67,500 lbs Empty 152,000 lbs Average 172,000 lbs Maximum
Speed:	2,500 MPH Maximum 2,200 MPH Cruising
Range:	~3,250 Miles
Ceiling:	~85,000 Feet
Variants:	3
Number Built:	32
First Flight:	22 December 1964
Introduced:	1966
Retired:	Final, 2006

THE BLACKBIRD FAMILY, AN ICON DEFINED

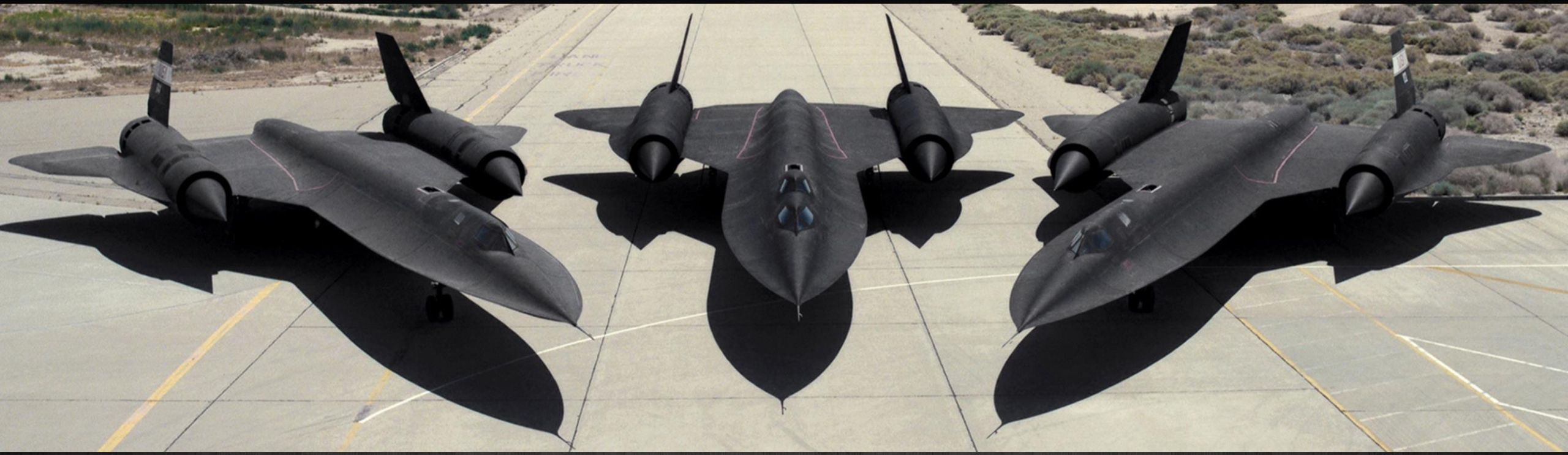
IT NEVER MET ITS MATCH

An SR-71 *Blackbird* refuelling by KC-10 on a standard flight over the Mediterranean Sea.

- GEN LeMay – for lack of better tact – “wanted bombs and missiles.”
- Emphasis was in turn placed on interceptors, fighters, and bombers.
- The SR-71 was subsequently restricted to a handful of production models.
- While A-12’s operated over Vietnam, SR-71’s operated over the USSR.
- More emphasis on stealth made its slightly nerfed specs negligible.

- By 1968, the SR-71 was the primary means of unplanned recon operations.
- U-2’s continued limited service in regions where airspace had limited contest.
- Spy satellites had also reeked havoc on the need for aircraft.
- Lockheed posited that another interim aircraft would be necessary still.
- The 1993 total collapse of the Soviet Union rendered the *Blackbird’s* mission “complete” in-so-far as it was designed for.

SR-71 on flight TARMAC in the Nevada Desert at sundown. Maintenance tools were made specifically for the aircraft.



BLACKBIRD'S AND VALKYRIE'S: THE GENESIS OF CROSS-MISSION COHESION

IT WAS NEVER JUST ABOUT THE RECONNAISSANCE

- The SR-71 featured several different incarnations:

A	=	Initial Production Variant
B	=	Trainer, 2-seat Variant
C	=	Hybridized with the YF-12
XB-71	=	Proposed Bomber Blackbird
XF-71	=	Proposed Fighter/Interceptor Variant
R-71	=	Proposed "mother" Variant (from M-21)
XST-71	=	Proposed Stratospheric Variant

- The earlier *Valkyrie* program had similar plans:

XB-70	=	Testbed for proposed bomber (2 produced)
RB-70	=	Proposed reconnaissance variant
XF-108	=	Proposed smaller fighter design
B-70R	=	Proposed regional interceptor
A-5	=	Produced attack variant

Shown, two SR-71A's (left and right), and SR-71B (center) at Edwards AFB.

"TO INFINITY, AND BEYOND"

THE *BLACKBIRD* ENTERS NASA SERVICE

One of the most widely distributed SR-71 photos is this one of a NASA banded SR-71C.

- NASA was the main operator of the *Blackbird* from 1994-1999.
- Following the deactivation of all but two, NASA held the only air-worthy craft.
- At least two additional flights took place between 1999 and 2006.
- NASA still has ownership of the two *Blackbirds*, however they are display craft.
- Several D-21 drones also remain in NASA possession.

- NASA used the SR-71 for a series of tests on frame stability, altitude, and speed.
- SR-71's were modified to carry instrumentation for these tests.
- Testing also included using the *Blackbird* as a pacer craft for others to follow.
- Fin-stabilization testing included removing portions of the vertical stabilizers.
- Parasite-craft pylon testing was also carried out, which was used in subsequent testing of the X-15, 43, and 45.

NASA banded SR-71A with F-18/X-51 HARV chase plane at Dryden Testing Facility, Edwards AFB, CA.

HER LAST FLIGHT...

She set five records, four of which she retains:

Flight from LA to DC (2,300 miles, AVG 2,145 mph) in 1:04:20.
Coast-to-Coast flight in 1:07:54.
Kansas City to DC (942 miles, AVG 2,176 mph) in 0:25:59.
STL to Cincinnati (311 miles, AVG 2,190 mph) in 0:08:32.
Maximum speed of 2,242.48 mph.

"Mr. President, the termination of the SR-71 was a grave mistake and could place our nation at a serious disadvantage in the event of a future crisis. Yesterday's historic transcontinental flight was a sad memorial to our short-sighted policy in strategic aerial reconnaissance."

- Senator John Glenn, 6 March 1990

HER LAST FLIGHT...

As the SR-71 taxied by, I knew I was witnessing the passing of an era. This era began with the fateful flight of Gary Powers in a U-2 and the resulting embarrassment to the Eisenhower administration. An order was issued to proceed with the development of a more advanced plane that couldn't be shot down. The SR-71 was the result. For three decades it performed its mission untouched by the other side. As it swung its long nose into the run-up area, the jet took on that proud look I had seen before.

HER LAST FLIGHT...

I watched the support people scurry beneath the jet, carrying out their normal procedures. The familiar scene felt different because I watched with a heavy heart. The distinguished roar of the engines assaulted my hearing one more time, and I felt the jet defiantly telling all who could hear that it did not want to go away; it could still do the job. The airplane was still the best. The sound thundered across the airfield with the cry of one still undefeated, issuing its final challenge. When the run was completed and all the maintenance people had moved away, the jet sat alone, waiting to take the runway.

HER LAST FLIGHT...

I saw her then as I had the very first time and tears welled in my eyes. I knew her better now and loved her more. How could I not love her, after all she had shown me? She had not changed, and she had not aged. She was a bit of the past and the future rolled into one, the hottest of hot rods, and a technological wonder built to last. As she sat there dripping fuel, leaning slightly forward on a sloped ramp, she embodied purpose and elegance. I knew I would always remember her that way, the elegant Lady in Black, superior in design and performance. Some people said that the continuous heating incurred at high speeds had caused the metals of the jet to weld tighter over the years, and she now flew faster than when she was new. I had flown her and I believed them.

HER LAST FLIGHT...

I watched the last SR-71 pull two fiery plumes down the runway and climb steeply away, her voice echoing proudly across the foothills. My eyes strained to follow her, hoping somehow to keep her alive, but soon she was swallowed by a bright blue sky. Though the jet was miles away and out of sight, I could still hear the faint rumble of the J-58s.

- MAJ Brian Shul, USAF Pilot, SR-71 Blackbird Program, 1990

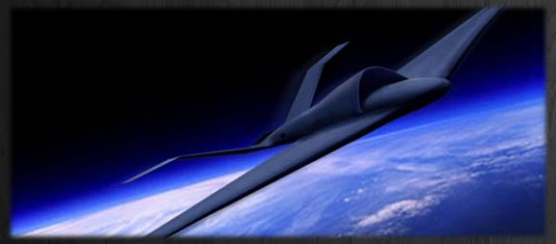
WHAT'S LEFT?

TO DATE, THE ONLY AIRCRAFT CAPABLE OF FUFILLING THE SR-71'S ROLE IS THE U-2, AND A HANDFUL OF DRONES.

THE SINGLE-ROLE MISSION OF THE SR-71 HAS NEVER BEEN REPLACED – THAT WE KNOW OF.

Lockheed SR-72

- Early 1990s aviation theorists coined the name "Aurora" – it was since given to the B-2.
- Lockheed has only briefly mentioned the potential of a successor (as early as 1965).
- No official information is known or is available, and its existence has likely evolved if true.



Lockheed TR-X

- The only confirmed project from the Skunk Works.
- Mission definition would replace the function of the U-2 spy plane and a handful of drones.
- Last meaningful update was in 2018, the artistic rendering shown to the left.

Northrop RQ-180

- A low flying competitor to the TR-X, it is unlikely that it would fit in the same role.
- Functions in much the same as the RQ-170 *Sentinel*.
- There is no official statement regarding the aircraft's existence.
- Numerous sources may be misidentifying the RQ-170 as a potential RQ-180.

THERE HAVE BEEN 9 AIRBORNE SR-71 SIGHTINGS SINCE 2016. 7 IN ALASKA, 2 IN NEVADA.