

50 Years of the

U-2

The Complete Illustrated History
of the “Dragon Lady”

Chris Pocock

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Foreword

by Major General Pat Halloran, USAF (retd.)

Kelly called it the "Angel." The Agency referred to it as the "Article," and the Air Force named it the "Dragon Lady." However, for 50 years, the bad guys of the world simply called it the dreaded U-2 Spy Plane. It was a name that aptly described the design, the mission and the legend.

Of course, those of us who flew the U-2 for the Air Force called it many names, depending on how that Lady responded on the day that we were flying it! Each airframe seemed to have unique flying characteristics and a personality of its own. It was always an interesting experience to take this marvelous machine above 70,000 feet, and to enjoy the unparalleled view of our private world, while at the same time trying to ignore the drawbacks.

To start with, you had been stuffed into a horribly claustrophobic partial pressure suit. Then, you had spent two hours pre-breathing 100% oxygen, before being squeezed into a very tiny cockpit. Once airborne, you spent a great deal of time attempting to fine tune the autopilot; manage airspeed control inside the 10-knot window of the "coffin corner"; keep over 1,000 gallons of fuel balanced between those floppy wings; shoot and plot celestial navigation fixes; do map pilotage through a drift sight; and wonder how long your bladder would continue to hold on this 9-10 hour flight. That was before they added inflight refueling to extend the range! Oh and yes, you mustn't forget to operate your primary reconnaissance equipment on cue. That's why you're up there. Of course in the back of your mind you were always anticipating the exciting landing which lay in store for you in this strange, bicycle-gear machine.

It was a plane which had an insatiable appetite for eating the lunch of young aviators. Despite those few distractions, there were some extremely rewarding missions that were assigned to U-2 pilots who agreed to go along with this folly. My comments reflect my own experiences in the Air Force side of this program, but friends who flew the U-2 for the CIA, would probably agree with most of them.

I had the great fortune to spend almost 17 years flying Kelly Johnson's spectacular reconnaissance airplanes for the Air Force. First, it was the graceful U-2 for nine years, and then the powerful SR-71 for eight more years. I never dreamed of having such a wonderful opportunity to explore the high altitude flight regimes occupied by those two remarkable vehicles back when I was flying the F-84, my first operational airplane following graduation from pilot training in 1950. There is no question in my mind, that Kelly Johnson was the greatest aeronautical engineer of our time. The aircraft that he produced will always be recognized as some of the greatest designs in modern aeronautical history.

The U-2 was the most demanding, but rewarding airplane I have ever flown in my 34 years in the Air Force. It was single engine (I liked); we flew it solo (I liked); very high (I liked); out of radio contact for most of mission (I really liked); and it had extreme range (necessary, but not a "like" thing). The personal satisfaction in completing some very difficult and hazardous missions in this plane was beyond anything I had ever experienced.

I have had engine failures, dead stick landings, disconnected oxygen at 65,000 feet, and more flameouts than I can count. And talk about a home sick angel...near the end of a mission, with minimum fuel, it would still climb with the throttle in idle! That was a disconcerting experience the first time you encountered it.

All of this excitement came at a high cost. It is interesting to note that of the original 55 airframes that were built back in the '50's, only 10 survived to an honorable retirement in dusty museums. The loss of life, as well as airplanes, was probably the highest, percentage wise, of any operational squadron in the Air Force. Seventeen days after the delivery of our first airplanes, we already had two fatalities, and one of these was on his first flight. Initially, we didn't have an ejection seat, so that didn't help the statistics. Flying this airplane was not exactly fun, but it certainly did have exciting moments. However, every operational mission we flew gave some real professional pay back and every pilot was eager for his next sortie.

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It is truly awesome to think that this aircraft, which was originally conceived as a "throw away" machine after a few overflight missions, is still flying today. Several years ago I was tapped to head a study group, with the slightly derogatory name of the "Graybeard Panel," to review the U-2 operations by the Air Combat Command, which had taken over management of the system from the de-activated Strategic Air Command.

As we analyzed the current operations that these aircraft were involved in, I was again impressed with the durability and functional flexibility of the U-2. It has absorbed a long list of upgrades and modifications, such as a fan engine, GPS and a glass cockpit, to enhance its performance and keep it viable for many years to come. The aircraft still performs missions today that are as critical and demanding as any of the ones we flew in the old days. The young men and women (yes, women) who climb into that

cockpit today, and head for the fringes of outer space, are as dedicated as any pilots in the history of the aircraft. I am extremely proud to have been one of the original Air Force pilots selected for this program and I share that pride with the pioneers who flew with me, and with those who continue to follow.

We are indeed fortunate to have Chris Pocock as our primary research guru for this program. He has written a number of remarkable books and articles on the U-2. They are my primary source of historical detail on this aircraft and its mission. There is no doubt in my mind, that he knows more about the history of the U-2 than any other person in the world.

I think Kelly Johnson would be awed to read some of the details in this book, of how his Angel has been transformed from the tiny, black world in which it was conceived, to the world wide tactical operations in which it now shines.

1

Genesis

On 30 November 1953, in the development planning office of the Lockheed Corporation in Burbank, California, Jack Carter wrote a memo. The recently retired USAF Colonel titled it Strategic Reconnaissance, classified it “eyes only,” and addressed it to his boss, Gene Root. The history of the U-2 began with that memo, in which Carter outlined the urgent need for a new type of manned reconnaissance aircraft, and made some suggestions on how such a plane should be built.

The memo was unambiguous. The Soviet Union was the target, and the aircraft would have to overfly that country at extreme altitude with a payload of up to 500 pounds. Cameras would be one such payload, but Carter also mentioned “new types of sensing equipment,” by which he meant radar, infrared, or electronic intelligence. The aircraft should be flown by a single pilot at altitudes between 65,000 and 70,000 feet, at a speed of mach 0.8, and have a radius of action of 1,200 nautical miles. It should be capable of avoiding virtually all Soviet defenses until about 1960.

To build such an aircraft, Carter reckoned, most of the standard rules about structural design would have to be ignored. A maneuver load factor as low as 2.25g might be required—the military norm was more like 7g. Maximum indicated airspeed should be 225-250 knots. To save weight, landing gear should be eliminated. A turbojet, which sacrificed engine life for maximum performance and weight reduction, would be needed.¹

In addressing his memo to Gene Root, Carter was effectively preaching to the converted, for *both* of them had recently worked for a Pentagon office where U.S. strategic reconnaissance objectives were being redefined. This office, named USAF Development and Advanced Planning (AFDAP), set development planning objectives for various missions. It was headed by Colonel Bernard Schriever, a rising technocrat in the Air Force. Carter had been Schriever’s chief-of-staff, and Root was a consultant to AFDAP from the Rand Corporation.²

Richard Leghorn

Early in 1952, Bennie Schriever had been impressed by the ideas of Colonel Richard Leghorn, an expert and visionary in the reconnaissance field who had been recalled to military service from Kodak at the start of the Korean War. Leghorn had been drawing attention to the unique political and practical problems involved with peacetime overflights of “denied territory” since 1946. As the Iron Curtain descended on the postwar world,

the requirement outlined by Leghorn and his solution—higher and faster aircraft that would be invulnerable to detection and interception—made ever more sense. Schriever invited Leghorn to join his staff at AFDAP.

The young reconnaissance expert moved from Wright Field, where he had commissioned a proposal from the British manufacturer of the Canberra jet bomber for a radical adaptation of that aircraft to the reconnaissance role.³ At AFDAP other staffers, such as Gene Kiefer and Major



Colonel Richard Leghorn was a bright, former WWII recon pilot who developed the concept of overflight of “denied territory” behind the Iron Curtain. He also explored possible designs in the early 1950s. (via Cargill Hall)

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Bud Wienberg, agreed with Leghorn, that an aircraft designed for overflight could not be built to the usual military specifications, nor operated in the usual military fashion.

But Leghorn’s proposal to adapt the Canberra had no takers in the USAF hierarchy, apart from Schriever. This was despite the advice of a group of leading scientists in fields related to reconnaissance, which had confirmed the higher-and-faster requirement in their Beacon Hill Report to USAF in mid-1952. Leghorn was AFDAP’s liaison to this study, which was named after the suburb of Boston that was close to Harvard University, MIT, and the Boston University Optical Research Laboratory, where some of the scientists worked.

Meanwhile, wartime-vintage bombers and patrol planes converted for reconnaissance missions were lumbering along—and sometimes across—Soviet borders. They faced an increasing threat of interception from the new Soviet jet fighters, such as the MiG-15, directed by air defense radars. The RB-45C reconnaissance version of America’s first jet bomber, the Tornado, was not much of an improvement; its top speed was higher, but its max altitude was still only 40,000 feet. As the risk of detection and interception by the Soviets grew, U.S. military commanders found it increasingly difficult to gain the required political authority for deliberate overflights. A few top-priority missions over European Russia were effectively subcontracted to Britain’s Royal Air Force, since Prime Minister Churchill was more willing than President Truman to approve them.⁴

Bald Eagle

Prompted perhaps by these developments, and by the Beacon Hill study, the USAF formally requested design studies for a specialized reconnaissance aircraft on 1 July 1953. At the Wright Air Development Center (WADC) in Ohio, new developments chief Bill Lamar and engine specialist Major John Seaberg had laid the groundwork for this request in the preceding six months. They did not, apparently, refer back to the “unconventional aircraft” work that Leghorn had done there in 1951. But it was

BALD EAGLE

The purpose of this design study is to determine the characteristics of an aircraft weapon system having an operational radius of 1500 n mi and capable of conducting pre- and post-strike reconnaissance missions during daylight good visibility conditions.

Performance – Radius 1500 n mi

Speed – Optimum subsonic at altitude of 70,000 feet or higher

Payload – 100 to 700 lbs

Crew – one

Power Plant – current production engines with modifications, if necessary.

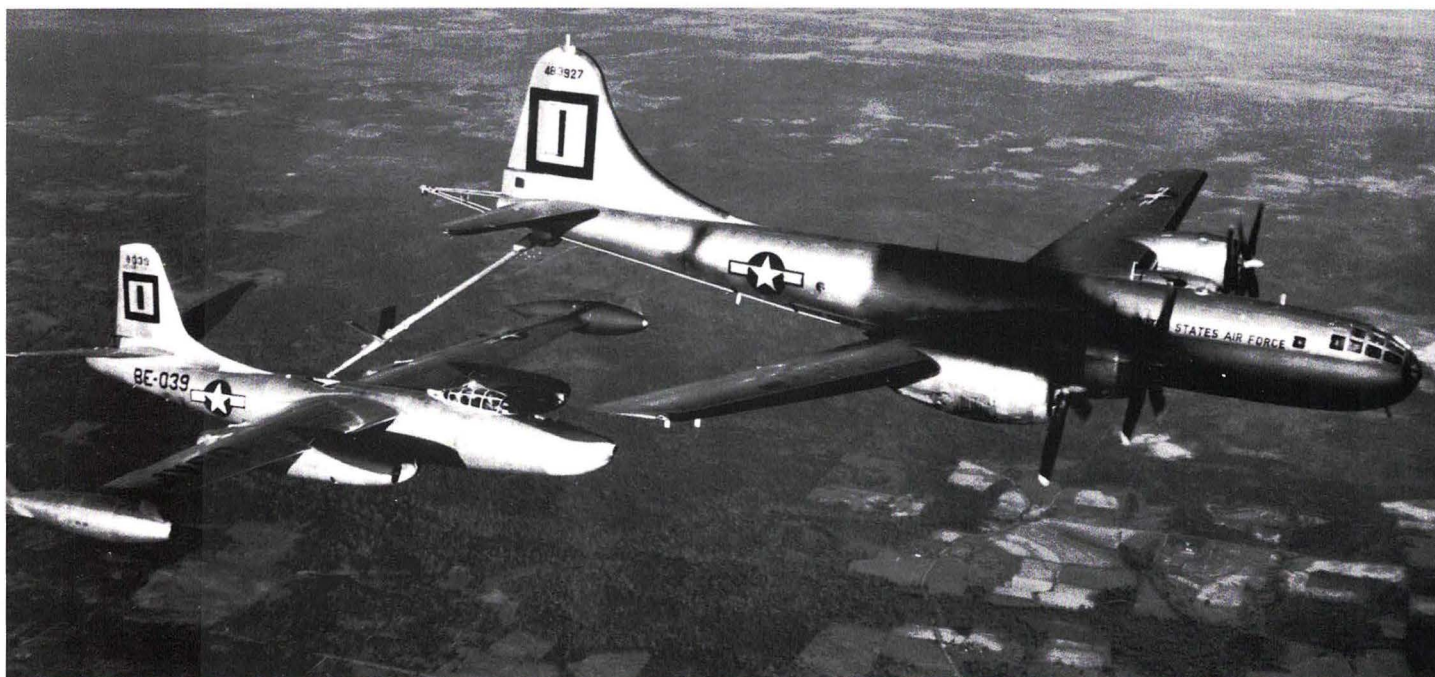
Gross Weight – as low as possible

Fuel Requirements – consideration will be given to the glide potential inherent in this type of aircraft. The MIL-C-5011A reserve fuel requirements will be waived. A 10% fuel reserve is considered adequate.

- Wright Field memo dated 27 March 1953

their idea to bypass the larger aerospace companies (including Lockheed). They thought that this relatively small requirement would get more attention from smaller companies, so they chose Bell and Fairchild. Their superiors at the Air Research and Development Command (ARDC) in Baltimore agreed. In addition, Martin was asked to study a modification of its B-57 light jet bomber, with a larger wing and new engines. The three companies were asked to submit their studies by the end of the year. The codename for the project was Bald Eagle.⁵

Lamar and Seaberg called for an aircraft that could reach 70,000 feet and have a radius of 1,500 nautical miles. They conceded that certain standard military equipment, such as defensive armament and an ejection seat, would have to be eliminated. They hoped that a combination of low wing



The RB-45C (seen here refueling from a KB-29) was the USAF’s first medium-range reconnaissance jet, but its maximum altitude was only 40,000 feet. (USAF).

"KELLY, WHAT COULD YOU DO...?"

When we (at CIA) first heard of the Russian missile center in 1952—or about then—at Kapustin Yar, on the Volga, we demanded that we get photographs of it. 'This is going to be a major new thing, and we've got to get on top of it.'

Then we went to (USAF Chief of Staff) Twining and said, 'You've just got to develop a plane that will do this, that will be high enough so it will go over their radar.' And the damned Air Force insisted that every plane be an all-purpose plane. In other words, it had to have some fighter ability, some maneuverability, and so on.

At that point, retired Marine Bg Gen Philip Strong went out on his own hook to Kelly Johnson at Lockheed and said, 'Kelly, what could you do to get as high as you could, get moderate speed, and just sit above their air defense?' And Kelly said, 'Jesus, I've got just the thing for you. I'd take the Lockheed (F-104), and I'd give it wings like a tent.'

- DDI Robert Amory, oral history interview, JFK Library, 1966



Clarence "Kelly" Johnson, Lockheed's brilliant aeronautical engineer, was 44 when he started design of a high-flying reconnaissance aircraft in early 1954 (Lockheed AG2149).

loading and fast-improving turbojet engine technology would meet the requirement, rather than an utterly unconventional airframe. To provide that turbojet, Seaberg favored Pratt & Whitney, where Perry Pratt had designed the highest pressure-ratio engine yet available. It was designated the J57, and it had already been adopted for the B-52 bomber and the F-100 fighter. The J57 was the first 10,000 lbs thrust jet engine, and every pound of that thrust would be needed at 70,000 feet, where only some seven percent of an engine's sea-level thrust could be reproduced.

The Skunk Works

Carter returned to Burbank and wrote his memo to Root. Both newcomers to Lockheed, they soon became aware that the ideal group to work on an unconventional reconnaissance plane was right on their doorstep in Building 82. So the initiative was passed to Kelly Johnson and his Skunk Works.

The Skunk Works had been created in 1943 when Lockheed got the contract to build the P-80, America's first jet fighter. Johnson was a brilliant aeronautical engineer, who had managed to cream off the pick of the Burbank factory's engineering talent into an experimental department where design engineers, mechanics, and assembly workers would work closely together in a streamlined fashion, free from the constraints imposed by the wider company bureaucracy. The department was completely independent from the rest of Lockheed for purchasing and all other support functions.

Walled off from the rest of the plant, and only accessible to the select few staff, it was also a very secure method of building secret prototypes—it built the XP-80 in just 143 days. What on earth were Kelly and Co up to in there? A popular wartime comic strip featured a hairy and eccentric Indian who regularly stirred up a big brew, throwing in skunks, old shoes, and other unlikely raw material. With Johnson's secret shop situated right next to the plastics area, the Skunk Works nickname caught on. The official name for Johnson's operation was Advanced Development Projects (ADP).

In early 1954, the Skunk Works had just completed designing the XF-104, soon to be named the Starfighter. Having heard from U.S. pilots in Korea that speed and altitude were the paramount requirements if you wanted to hassle with MiGs, Johnson had sat down to design a Mach 2 plus hotrod fighter capable of reaching over 60,000 feet. To achieve this with the jet engines then available meant aiming for a gross weight as low as 15,000 lb. Through ruthless pruning of systems and the design of a very short, thin wing this had been achieved.

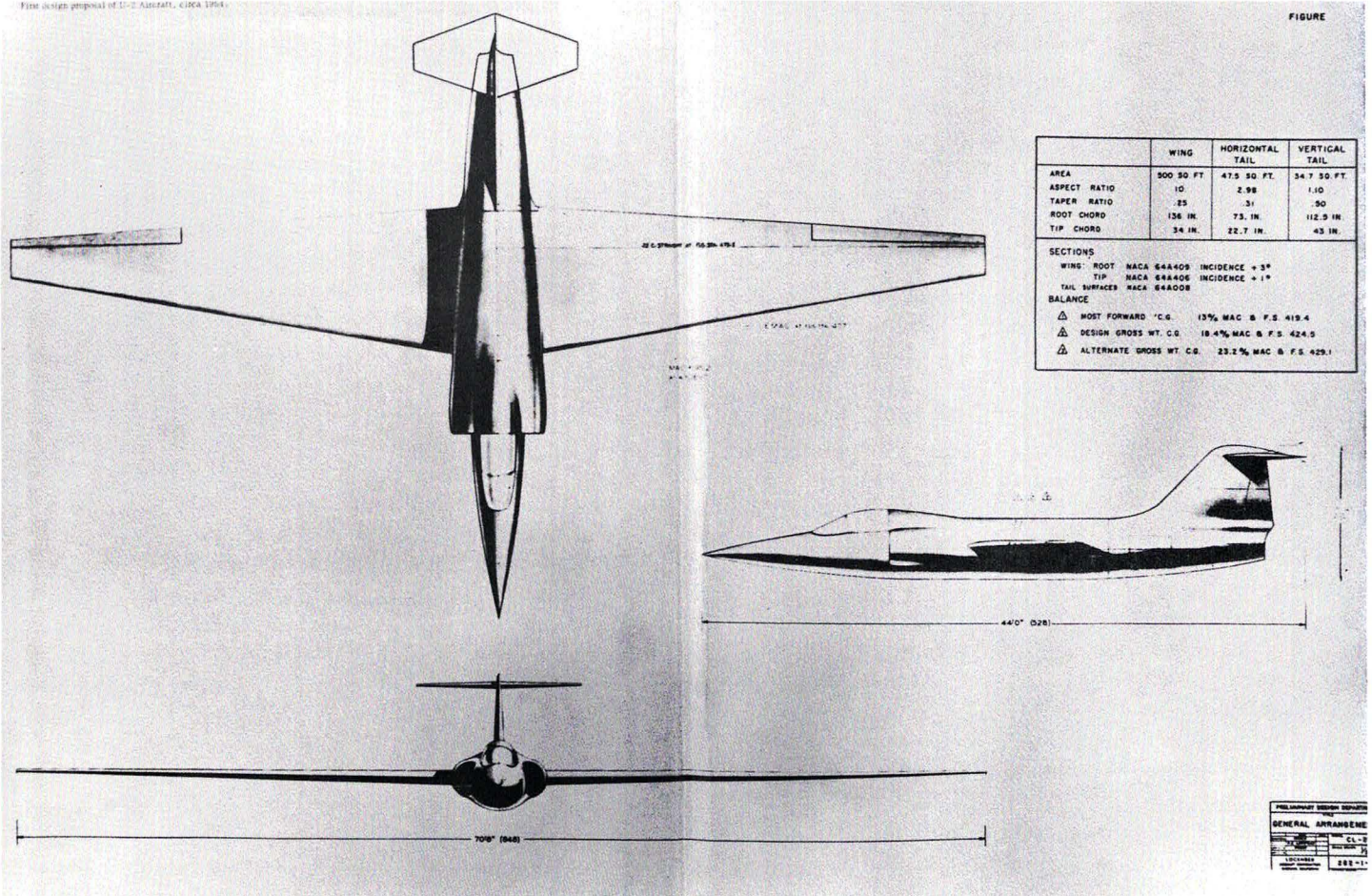
The CL-282

Johnson realized that the reconnaissance requirement outlined by Carter could be met by modifying the XF-104 fuselage and marrying it to a new high-aspect, low-thickness ratio wing. He set engineers Phil Coleman, Henry Combs, and Gene Frost to work.⁶ By 5 March 1954 Johnson and his small team had designed the CL-282 high altitude aircraft. It promised a maximum altitude of 73,000 feet, which would be reached at the end of a cruise-climb from 65,000 feet. The radius of action would be 1,400 nautical miles, measured from the start of cruise-climb. Endurance was therefore more than seven hours. And yet this machine took off at a gross weight of only 13,768 lbs, including a 600 lb allowance for payload.⁷

Some key ideas that Carter had relayed from AFDAP, such as no undercarriage and low maneuver load factor/IAS, were embraced and developed by Johnson and his small team. The CL-282 would take off from a ground cart, and land on a skid attached to the lower fuselage. Otherwise,

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Final design proposal of U-2 Aircraft, circa 1954.



The CL-282 was Kelly Johnson's attempt to adapt the XF-104 for the spyplane requirement. A new, 70-foot wing was the key feature, along with radical weight saving ideas. In early 1955, the 'Angel' evolved from this design (from Lockheed Report LR9732).



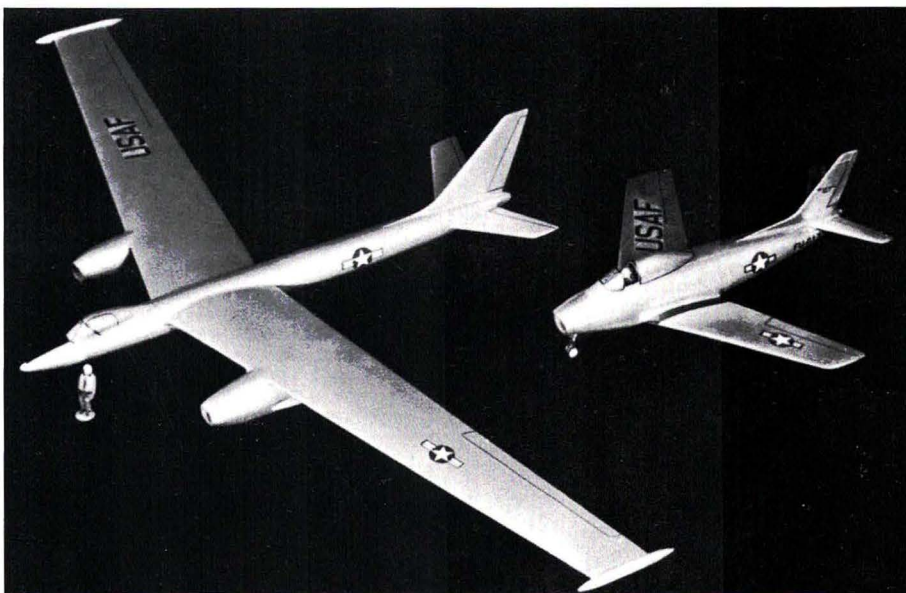
The Skunk Works' name derived from a famous wartime comic strip. This logo was later derived from it, and became a trademark.

the fuselage was that of the XF-104 (minus a 62-inch forebody section), and so was the tail. But the engine was changed, from the General Electric J79 turbojet, which Johnson had chosen for the F-104, to the same company's J73-X52.⁸ This was an interim engine derived from the first generation J47 that powered the B-47 and the F-86.⁹

The new wing was the key to the CL-282's promised performance. It bolted to the fuselage at ring-frames, with no carry-through structure, just like the XF-104. Wingspan was 70 feet, total area 500 sq feet, and aspect ratio was 10. Although a conventional two-cell construction, this wing boasted a Kelly Johnson innovation which he originally named Span Load Distribution Control. When flying at higher speeds, or in turbulent air, the wing control surfaces could be raised to the gust position (4-degrees for the flaps and 10-degrees for the ailerons). The effect was to reduce bending moments and tail loads by moving the wing center of pressure inboard. This allowed a much lighter wing structure, but one which could still cope with relatively turbulent air. This device—soon to be renamed Gust Control—would later be utilized extensively in transport aircraft.¹⁰

Rival Contenders

The CL-282 design study was sent to Bennie Schriever at the Pentagon in early March 1954. He was very interested, and requested a specific proposal from Johnson. A month later Johnson was in the Pentagon, promising to take complete responsibility for the program, including the produc-



The 115-ft wingspan of the Bell X-16 design is readily apparent on this model, placed next to an F-86 Sabre for comparison. Funded by the USAF, development of the X-16 was well underway when it was canceled in favor of the CIA's U-2. (via Jay Miller).

tion and field support of 30 airplanes. Two senior civilian officials at that meeting gave him a good reception, but the four USAF Generals present were not so enthusiastic.

They included Lt Gen Donald Putt, the outgoing commander of ARDC. By early April, Putt's staff at Wright Field had completed an evaluation of the industry studies that had been generated by the Bald Eagle request. Following John Seaberg's suggestion, all three contractors had adopted the Pratt & Whitney J57-P37 high altitude engine, and its development was already underway.

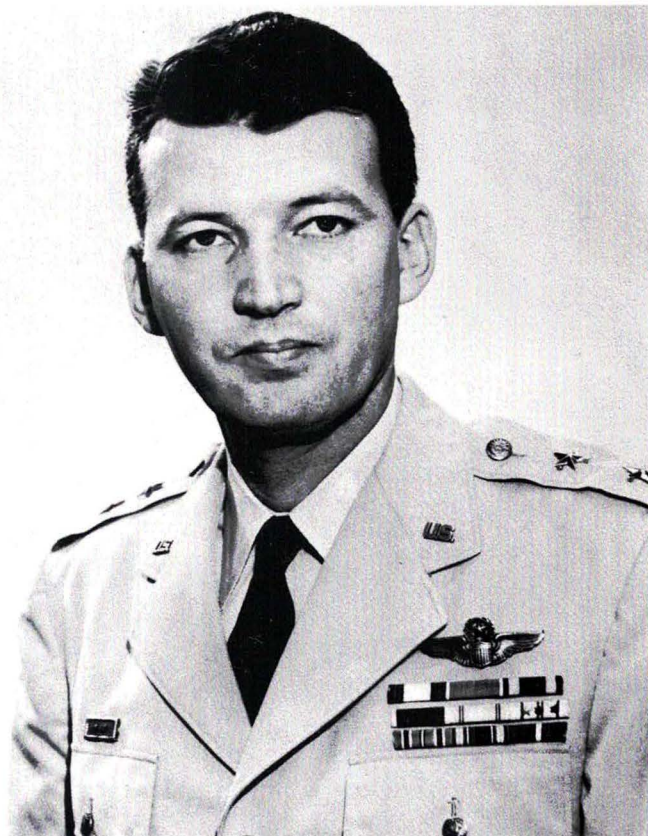
Martin had designed a larger wing for the B-57, and replaced its two Wright J65 turbojets with the J57s. Various weight-reducing measures were proposed, including honeycomb-backed skin panels on the wings, reduced spars and wing carry-through structure, and elimination of the flaps. Although this modified B-57 could not reach 70,000 ft, it would nevertheless be a quick and relatively cheap interim solution. Bell also built their Model 67 proposal round two wing-mounted J57s; theirs was a breathtakingly delicate and spindly machine with a super-slim fuselage for maximum drag reduction, and wings with an incredibly high aspect ratio of 12 for maximum lift. They were nearly 115 feet long—nine feet longer than the more conventional airfoil that Martin was proposing. Having decided that a single J57 could do the job, the Fairchild team opted for a much smaller wing, but their M-195 design featured a novel engine installation above and behind the cockpit. Weighing in at a little under 11,000 lbs empty, it was less than half the weight of the Bell.

But Seaberg and his colleagues at WADC could not bring themselves to approve a single-engine design. They picked Bell and Martin instead, and after briefing commanders at ARDC, SAC, and HQ USAF during April, they received immediate approval to proceed with the modified B-57.¹¹

Meanwhile, the AFDAP staffers in the Pentagon tried to raise wider interest in Kelly Johnson's unsolicited proposal. They sent it to ARDC for formal evaluation, and briefed SAC commander General Curtis LeMay on their reconnaissance concepts in general, and the CL-282 in particular. LeMay perceived the AFDAP concept (which included the idea of establishing overflight operations in special, dedicated units) as a threat to SAC's primary military mission. He stomped out of the briefing, declaring "This is a bunch of shit! I can do all of that stuff with my B-36!"¹²

CL-282 Rejected

In early June 1954, HQ USAF wrote to Kelly Johnson rejecting the CL-282 because it was too unusual, only single-engined, and they were already committed to the Martin program.¹³ This was apparently before ARDC had finished its formal evaluation of the CL-282. But Seaberg's group at Wright Field had reached a similar conclusion a few weeks later.



Colonel (later General) Bennie Schriever was receptive to the Lockheed proposal for a radical solution to the high-altitude reconnaissance requirement, but other USAF officers were not so keen (USAF).

And there the matter might have ended. The U-2 would never have been built, had it not been for a small group of original thinkers: a key civilian in the USAF's leadership; a leading CIA intelligence analyst; and that same group of scientists in the Boston area who had produced the Beacon Hill report. The key USAF civilian was Trevor Gardner, who had been personally appointed as Assistant Secretary of the Air Force for R&D by President Eisenhower. Gardner believed that the U.S. government should be far more concerned than it seemed to be over the threat of a surprise Soviet attack. He had been at the Pentagon meeting when Johnson presented the CL-282 and was impressed. Gardner also knew the business, since he was head of leading reconnaissance camera company Hycon in Pasadena, California, before coming to Washington.

The leading CIA analyst was Philip Strong, the operations chief within the Office of Scientific Intelligence (OSI). Working on the front line of the U.S. effort to gain knowledge of Soviet military developments, Strong was only too aware of how little was known. For instance, a top secret National Intelligence Estimate (NIE) on Soviet guided missile capabilities was full of uncertainties:

"...we have no evidence to confirm or deny current production...firm evidence on the present status of the Kapustin Yar test range is lacking...current intelligence on the particular missiles under development is almost non-existent..."¹⁴



Trevor Gardner (left, being sworn in as Assistant Secretary by Secretary of the Air Force Harold Talbott) was the key civilian official who pushed the Lockheed CL-282 design (USAF).

THE TAXICAB THEORY

You might say that Dr.Land was not exactly an advocate of big government. In fact, he often said that he only believed in groups whose entire membership could fit in the back of a taxicab.

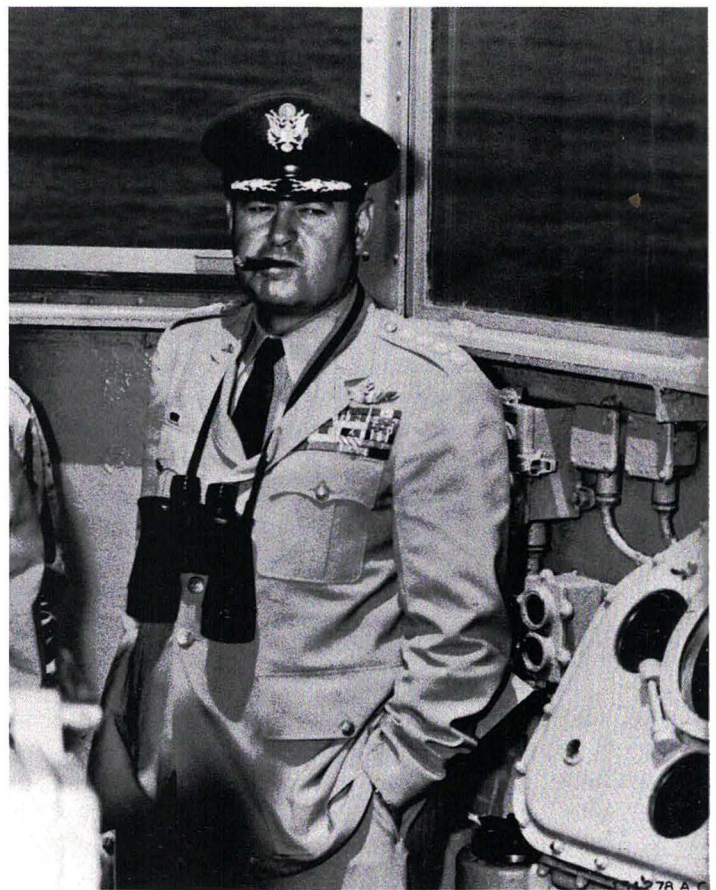
In 1954, Dr.Land put his taxicab theory to the test. Always security-conscious, he sought a secure environment in which to discuss which one of several aircraft prototypes could perform best at high altitude. So six gentlemen piled into a committee member's 1953 Ford. The group spent more than an hour driving through the city, listening to the great aircraft theorist Allen Donovan list the merits of Kelly Johnson's prototype.

- remarks by DCI William Webster at award ceremony for Dr Land, 1988

And missiles were not the only problem; reports of a Soviet long-range jet bomber had first landed on Strong's desk the previous year. On 1 May 1954 the new bomber flew over Moscow during the Mayday parade, prompting public concern in the U.S. about the growing strategic threat.

The Boston Scientists

The group of mainly Boston-based scientists included Edwin Land, the founder of the Polaroid company; Jim Baker from Harvard University Ob-



General Curtis LeMay was commander of SAC when the idea of devising a special reconnaissance aircraft and control system was first briefed to him in 1954. He said: "This is a bunch of shit! I can do all of that stuff with my B-36!" (USAF).

Chapter 1: Genesis

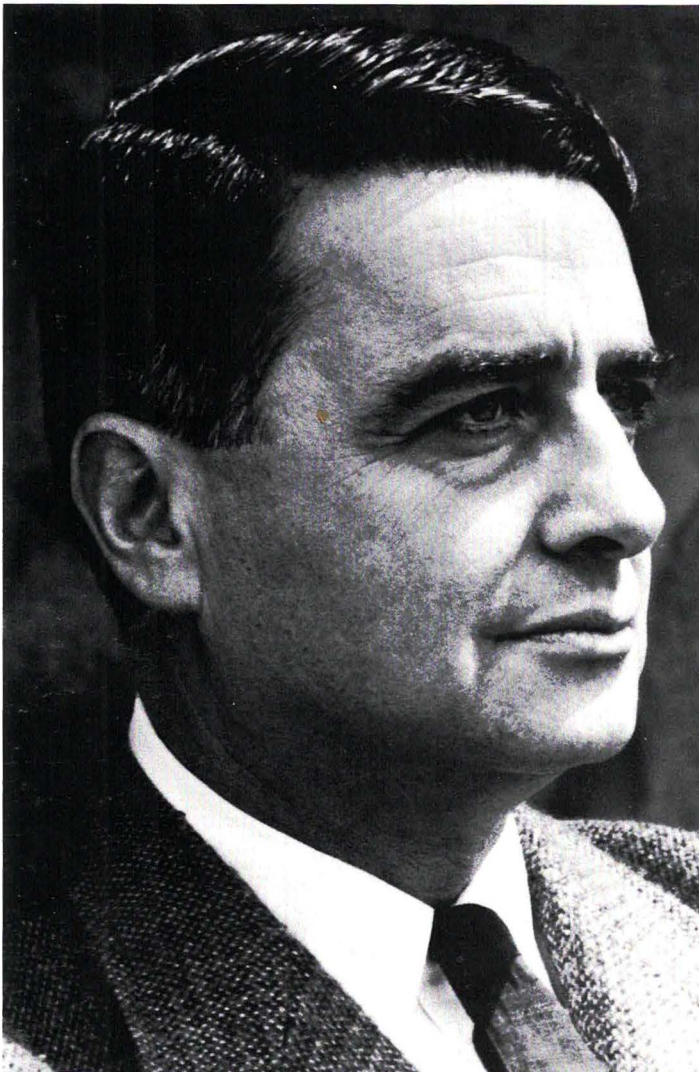
servatory; and Allen Donovan from Cornell Aeronautical Laboratory. Land was a widely respected and dynamic pioneer of many optical devices, as well as the inventor of the Polaroid instant camera. He had first been exposed to the airborne recon business as a member of the Beacon Hill study group. Baker was the nation's leading lens designer, and had played a key role in reconnaissance camera development going back to World War Two. Donovan was a bright aeronautical engineer who had refined Dick Leghorn's idea for a specialized aircraft during the Beacon Hill study.

In mid-1953 Baker, Donovan, Land, and a few others were invited to serve on an Intelligence Systems Panel (ISP), part of the USAF's Scientific Advisory Board. Phil Strong became associated, since he was brought in to advise the ISP of the yawning gaps in U.S. intelligence. Since Baker was chairman of the ISP, the USAF asked him to visit some aircraft companies and seek their views on high-altitude aircraft. Strangely, though, Baker was not asked to visit Bell, Fairchild, or Lockheed. Baker subsequently paid a long visit to Europe in early 1954, where he learned first hand of operational reconnaissance problems from USAF and RAF commanders.¹⁵

In mid-May 1954 Trevor Gardner and two colleagues invited Strong to the Pentagon, briefing him on the CL-282 and the Bald Eagle designs. They asked him if the CIA would throw its weight behind the project. Strong discussed the designs with the ISP. Donovan thought the B-57 would be far too heavy; he strongly believed that a single-engined design was vital. Baker suggested that Donovan visit Lockheed to learn more about the CL-282. Donovan was not able to make the trip until early August 1954, when he was briefed by Root and Johnson.¹⁶

The Land Panel

By that time, the impatient Gardner had managed to energize the Eisenhower administration into commissioning a top-level panel of experts to study the surprise attack issue. It became known as the Technological Capabilities Panel (TCP), and James Killian, the president of MIT, was chosen as its chairman. As an offshoot of the President's own Science Advisory Committee, the TCP members and staff worked in the Executive Office. The TCP reported directly to Eisenhower, and had great authority. Killian subdivided the task into three projects: offensive, defensive, and intelligence



Above: Jim Baker was the Harvard astronomer and expert in optics who served on the Land Panel and conceived the U-2's extraordinary B-camera (James Baker via Cargill Hall). Left: Edwin Land was a brilliant scientist whose drive and vision forged the Polaroid Company and made him a natural choice as a top-level advisor to the US government. More than anyone else, he ensured that the U-2 was actually built (Polaroid Corporate Archive).

50 Years of the U-2: The Complete Illustrated History of the "Dragon Lady"

capabilities. He invited fellow Bostonian Din Land onto his steering committee, and asked him to head up the intelligence project within the TCP. In turn, Land selected this project's membership, including Jim Baker and physics Nobel Laureate Ed Purcell from Harvard. They became known as the Land Panel.¹⁷

As soon as Land arrived in Washington on TCP duties Phil Strong approached him with drawings of the CL-282, and told the story of how it had been rejected by the USAF. Strong was lobbying for a flight over Kapustin Yar at this time, but the USAF said it couldn't be done. CIA director Allen Dulles was not very supportive, either. Land intuitively agreed with Strong's frustration. He believed in taking "a clean fresh look at the old, old knowledge." Land saw that Johnson had done just that with the CL-282. He also saw the merit of Leghorn's idea from way back, that such an unconventional plane should also be operated in an unconventional way. Land's innovative mind began to consider alternatives to the standard *modus operandi* of the military services.¹⁸

Two engines - or one?

In early September, Donovan and Baker paid a visit to Bell Aircraft's Niagara Falls facility to discuss the Model 67.¹⁹ That same month, ARDC designated this aircraft the X-16, and issued a contract for 28 aircraft. But Donovan was unimpressed. He discounted the safety factor that was implied by twin engines. If one engine failed at high altitude during the mission, he noted, the cruise could only be maintained at a lower altitude. There, Donovan argued, the aircraft would be easy prey for Soviet fighters. Donovan still preferred the CL-282, which promised the same or better performance at almost one-third the gross weight.²⁰

Land was now lobbying aggressively for the Lockheed plane, and also consulting widely to ensure that it carried the best possible sensor systems. He encouraged Jim Baker to pursue his innovative ideas for reducing camera size and weight, and brought in Richard Perkin of Perkin-Elmer for further advice. Land also persuaded Kodak to continue development of a new plastic film base named Mylar. Because it was so much thinner than existing film bases, a sufficient quantity for long-duration flights could be carried without too great a weight penalty. Land's panel also investigated electronic sensors, with a view to equipping a small high-flyer with a useful signals intelligence (SIGINT) payload.

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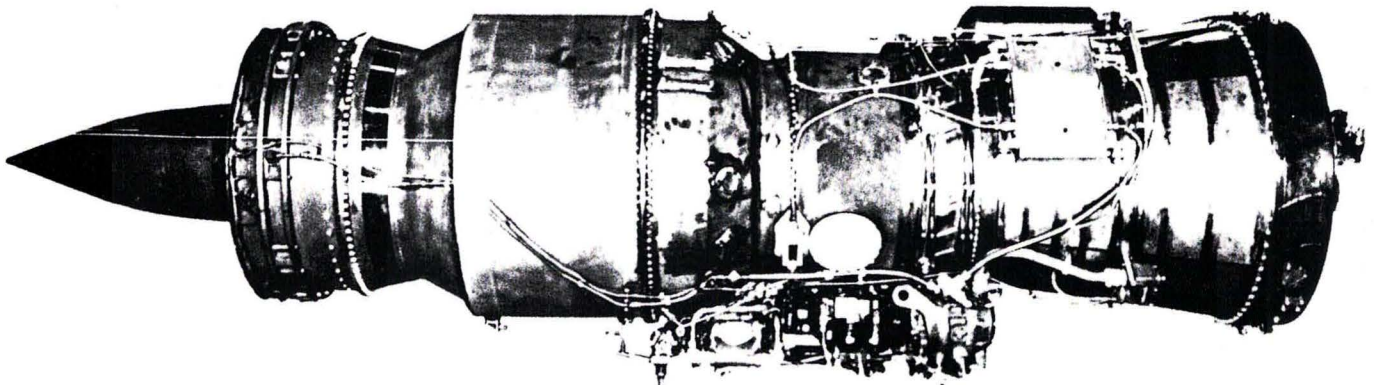
Secret task force under Central Intelligence Agency with strong Air Force staff assistance to equip and carry out entire mission.... Task Force to include top experts selected from Government agencies, armed services, universities, and industry to provide for most effective application of science and technology toward fulfillment of this objective....

Vehicle: Special "powered glider" CL-282 aircraft proposed by Lockheed. Altitude - 70,000 feet. Speed - 500 kt. Range - 3,000 n mi. Gross Weight - 15,000 lbs. Crew - lone pilot in heated, pressurized suit. Availability - four aircraft for field use in 17 months assured by Lockheed.

- extracts from Land Panel report, sent to DCI Allen Dulles on 5 November 1954

In October 1954 Baker was sent to Burbank for a detailed discussion on the camera payload weights and bulk. Kelly Johnson fought to keep down both. Every pound added meant two feet of altitude lost, he reminded Baker. The lensman had three different camera configurations in mind: a conventional trimetrogon mapping camera; multiple reconnaissance cameras with focal lengths from 12 to 48 inches in rocking mounts; and a 180-inch design with folded optics for the most detailed coverage of specific targets. The latter was particularly difficult to accommodate in the CL-282's small fuselage.²¹

Land knew that one particular USAF objection to Johnson's plane was the engine. He summoned Perry Pratt and asked him to describe P&W's high-altitude version of the J57. Pratt told how they were modifying the J57's alternator, oil cooler, hydraulic pump, and other key parts. But Johnson was most reluctant to give up the single-shaft GE powerplant, which was



Pratt & Whitney developed a high-altitude version of the J57, and Kelly Johnson was eventually persuaded that it should power the U-2 (via Jay Miller).

MEMO OF CONFERENCE WITH THE PRESIDENT

Authorisation was sought from the President to go ahead on a program to produce 30 special high performance aircraft at a cost of about \$35 million. The President approved this action. Mr Allen Dulles indicated that his organisation could not finance this whole sum without drawing attention to it, and it was agreed that defense would seek to carry a substantial part of the financing...

The Secretary of Defense sought the President's agreement to taking one last look at the type of operations planned, when the aircraft are available. The President indicated agreement.

To a question by the President, the Secretary of State indicated that difficulties might arise out of these operations, but that "we could live through them."

- 24 November 1954, (Colonel) A.J. Goodpaster

almost 1,000 lbs lighter. He knew that changing to the J57 would entail a complete redesign of the CL-282 fuselage, and abandoning the plan to quickly produce it on existing XF-104 jigs.

The CIA as sponsor

By late October 1954, Land's group had not only concluded that the radi-

cal CL-282 design must be built, they had also made the equally radical decision that its development and operation should *not* be entrusted to the USAF. Together with Trevor Gardner, they met Director of Central Intelligence (DCI) Allen Dulles and suggested that he should sponsor the aircraft. Dulles was dubious; he saw the CIA as an espionage and analysis agency that should not become involved with a major technical development effort such as this. On 5 November, Land wrote to Dulles on behalf of TCP project 3, insisting that "overflight is urgent and presently feasible." With typical *chutzpah*, Land urged Dulles to exercise the CIA's "right" to pioneer scientific techniques for collecting intelligence. The military should not "engage directly in extensive overflight," a task more suited to the CIA which, "as a civilian organization [could] undertake (with the Air Force's assistance) a covert program of selected flights."²²

Although the TCP was not due to report to the President for another three months, James Killian agreed with Din Land on the urgency of the overflight requirement. The pair went to see President Eisenhower, who asked many hard questions, but endorsed the Land group's approach.²³

Events now moved quickly. On 18 November General Donald Putt, who had moved up from ARDC to become Deputy Chief of Staff for Development, brought John Seaberg to the Pentagon from Wright Field to brief the TCP scientists on the USAF perspective. Seaberg grudgingly conceded that the Lockheed design was "aerodynamically close" to the Bell and Fairchild designs that he had sponsored. But he insisted that the J73 "would not be good enough to do the job in Kelly's airplane."²⁴

Summoned by Trevor Gardner, Kelly Johnson arrived the next day to meet General Putt in the presence of Land's group. Johnson dispelled any lingering doubts the scientists may have had. He reluctantly agreed to re-engine his CL-282 with the J57 engine, and to rethink the lack of a landing gear. At lunch the same day, with Secretary of the Air Force Harold Talbott, DCI Dulles, and his deputy, Lt Gen Pierre Cabell, Johnson was asked how his company could commit to such a tight timescale, when others dared not. "He's already proved it three times on previous projects," Putt intervened. The group told Johnson to go ahead, and emphasized the need for extreme secrecy.²⁵

Johnson flew back to California and gained the approval of Lockheed president Robert Gross. While Johnson worked on the redesign, Dulles called a meeting of the U.S. Intelligence Board to ratify the project.²⁶

At 8 am on 24 November 1954, Dulles, Cabell, Putt, and Talbott, together with the Secretaries of State and Defense, assembled before President Eisenhower to seek his formal authority to proceed. Ike gave the go-ahead, and told them to report back when the plane was ready for operations. Amazingly, that would be just 17 months later, exactly as Kelly Johnson had promised.



President Eisenhower gave the go-ahead for development of the secret high-altitude spyplane on 24 November 1954, and approved Din Land's suggestion that it be operated by the CIA, not the Air Force.