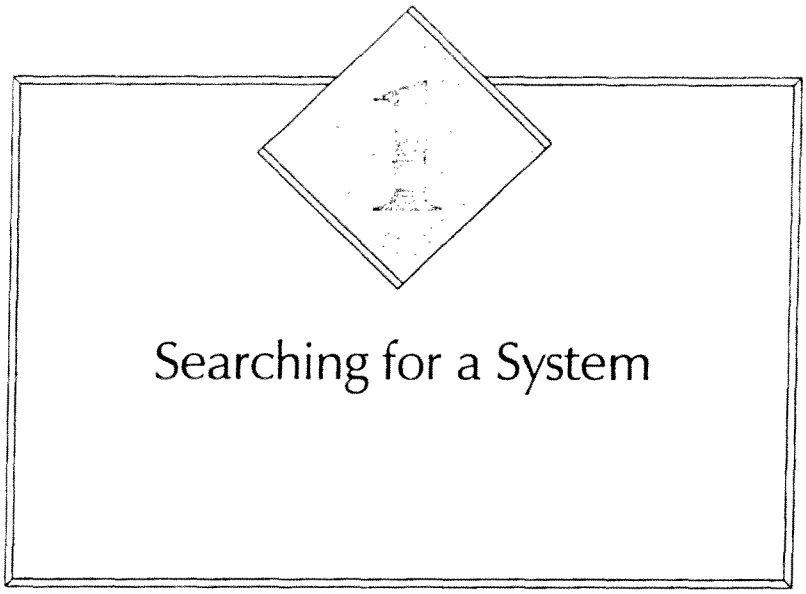


Searching for a System

THE NEED FOR HIGH-ALTITUDE RECONNAISSANCE

For centuries, soldiers in wartime have sought the highest ground or structure in order to get a better view of the enemy. At first it was tall trees, then church steeples and bell towers. By the time of the American Civil War and the Franco-Prussian War of 1870-71, observers were using hot-air balloons to get up in the sky for a better view of the "other side of the hill." With the advent of dry film, it became possible to carry cameras into the sky to record the disposition of enemy troops and emplacements. Indeed, photoreconnaissance proved so valuable during World War I that in 1938 Gen. Werner von Fritsch, Commander in Chief of the German Army, predicted: "The nation with the best aerial reconnaissance facilities will win the next war." [1]

By World War II, lenses, films, and cameras had undergone many improvements, as had the airplane, which could fly higher and faster than the primitive craft of World War I. Now it was possible to use photoreconnaissance to obtain information about potential targets before a bombing raid and to assess the effectiveness of the bombing afterward.

Peacetime applications of high-altitude photography at first included only photomapping and surveying for transcontinental highways and mineral and oil exploration. There was little thought given to using photography for peacetime espionage until after World War II, when the Iron Curtain rang down and cut off most forms of communication between the Soviet Bloc of nations and the rest of the world.

[1] Roy M. Stanley II, *World War II Photo Intelligence* (New York: Scribners, 1981), p. 16.

By 1949 the Soviet Union and the states of Eastern Europe had been effectively curtained off from the outside world, and the Soviet military carried out its planning, production, and deployment activities with the utmost secrecy. All Soviet strategic capabilities—bomber forces, ballistic missiles, submarine forces, and nuclear weapons plants—were concealed from outside observation. The Soviet air defense system, a prime consideration in determining US retaliatory policies, was also largely an unknown factor.

Tight security along the Soviet Bloc borders severely curtailed the movement of human intelligence sources. In addition, the Soviet Union made its conventional means of communication—telephone, telegraph, and radio-telephone—more secure, thereby greatly reducing the intelligence available from these sources. The stringent security measures imposed by the Communist Bloc nations effectively blunted traditional methods for gathering intelligence: secret agents using covert means to communicate intelligence, travelers to and from target areas who could be asked to keep their eyes open and report their observations later, wiretaps and other eavesdropping methods, and postal intercepts. Indeed, the entire panoply of intelligence tradecraft seemed ineffective against the Soviet Bloc, and no other methods were available.

Early Postwar Aerial Reconnaissance

Although at the end of World War II the United States had captured large quantities of German photos and documents on the Soviet Union, this material was rapidly becoming outdated. The main source of current intelligence on the Soviet Union's military installations was interrogation of prisoners of war returning from Soviet captivity. To obtain information about Soviet scientific progress, the intelligence community established several programs to debrief German scientists who had been taken to the Soviet Union after the end of the war but were now being allowed to leave.[2]

[2] At the end of World War II, the British had established Project DRAGON to gain information from German scientists who had worked on the Peenemunde rocket project, and the term DRAGON later was used to refer to individuals possessing scientific or technical information. In 1948 the US Air Force set up Project WRINGER in Germany to gather intelligence on the Soviet Union from defectors and refugees; this project was later absorbed into the combined armed forces/CIA Defector Reception Center (DRC), which began operations in February 1951. In October 1951, a separate organization to exploit individuals with scientific or technical backgrounds, especially German scientists who had worked inside the Soviet Union, came into existence. This organization was known as the Returnee Exploitation Group (REG) and was located in Frankfurt. By 1958 the flow of scientists was so small that the REG merged with the DRC. *The Defector Reception Center Germany, 1951 to 1967*, Clandestine Service Historical Series CSHP-41 (CIA: History Staff, 1972), pp. 5-6, 29-30 (S).

Interrogation of returning Germans offered only fragmentary information, and this source could not be expected to last much longer. As a result, in the late 1940s, the US Air Force and Navy began trying to obtain aerial photography of the Soviet Union. The main Air Force effort involved Boeing RB-47 aircraft (the reconnaissance version of the B-47 jet-propelled medium bomber) equipped with cameras and electronic "ferret" equipment that enabled aircrews to detect tracking by Soviet radars. At that time the Soviet Union had not yet completely ringed its borders with radars, and much of the interior also lacked radar coverage. Thus, when the RB-47s found a gap in the air-warning network, they would dart inland to take photographs of any accessible targets. These "penetration photography" flights (called SENSINT—sensitive intelligence—missions) occurred along the northern and Pacific coasts of Russia. One RB-47 aircraft even managed to fly 450 miles inland and photograph the city of Igarka in Siberia. Such intrusions brought protests from Moscow but no Soviet military response.[3]

In 1950 there was a major change in Soviet policy. Air defense units became very aggressive in defending their airspace, attacking all aircraft that came near the borders of the Soviet Union. On 8 April 1950, Soviet fighters shot down a US Navy Privateer patrol aircraft over the Baltic Sea. Following the outbreak of the Korean war in June 1950, the Soviet Union extended its "severe air defense policy" to the Far East. In the autumn of 1951, Soviet aircraft downed a twin-engine US Navy Neptune bomber near Vladivostok. An RB-29 lost in the Sea of Japan on 13 June 1952 was probably also a victim of Soviet fighters. The United States was not the only country affected by the new aggressive Soviet air defense policy; Britain and Turkey also reported attacks on their planes.[4]

[3] A. L. George, *Case Studies of Actual and Alleged Overflights, 1930-1953*, Rand Study RM-1349 (Santa Monica: Rand, 1955) (S). Arthur S. Lundahl and Dino Brugioni, interview by Donald E. Welzenbach, tape recording, Washington, DC, 14 December 1983 (TS Codeword). Recordings, transcripts, and notes for the interviews conducted for this study are on file at the DCI History Staff.

[4] Jeffrey Richelson states on page 121 of *American Espionage and the Soviet Target* (New York: Morrow, 1987) that "the first recorded attack by Soviet air defense forces, in this case fighters, occurred on October 22, 1949." In this incident, however, Soviet fighters did not attempt to hit the US aircraft; they merely fired warning shots. The real change in Soviet policy did not occur until the April 1950 downing of the US Navy Privateer. George, *Case Studies*, pp. 1-2, 6, 9-16 (S).

The Soviet Union's air defense policy became even more aggressive in August 1952, when its reconnaissance aircraft began violating Japanese airspace over Hokkaido, the northernmost Japanese home island. Two months later, on 7 October 1952, Soviet fighter aircraft stalked and shot down a US RB-29 flying over Hokkaido. Aerial reconnaissance of the Soviet Union and surrounding areas had become a very dangerous business.

Despite the growing risks associated with aerial reconnaissance of the Soviet Bloc, senior US officials strongly believed that such missions were necessary. The lack of information about the Soviet Union, coupled with the perception that it was an aggressive nation determined to expand its borders—a perception that had been greatly strengthened by the Soviet-backed North Korean invasion of South Korea in June 1950—increased US determination to obtain information about Soviet intentions and capabilities and thus reduce the danger of being surprised by a Soviet attack.

New Approaches to Photoreconnaissance

While existing Navy and Air Force aircraft were flying their risky reconnaissance missions over the Soviet Union, the United States began planning for a more systematic and less dangerous approach using new technology. One of the leading advocates of the need for new, high-altitude reconnaissance aircraft was Richard S. Leghorn, a Massachusetts Institute of Technology graduate and employee of Eastman Kodak who had commanded the Army Air Forces' 67th Reconnaissance Group in Europe during World War II. After the war he returned to Kodak but maintained his interest in photoreconnaissance. Leghorn strongly believed in the need for what he called pre-D-day reconnaissance, that is, reconnaissance of a potential enemy before the outbreak of actual hostilities, in contrast to combat reconnaissance in wartime. In papers presented in 1946 and 1948, Leghorn argued that the United States needed to develop such a capability, which would require high-altitude aircraft and high-resolution cameras. The outbreak of the Korean war gave Leghorn an opportunity to put his ideas into effect. Recalled to active duty by the Air Force, Lieutenant Colonel Leghorn became the head of the Reconnaissance Systems Branch of the Wright Air Development Command at Dayton, Ohio, in April 1951.[5]

[5] Richard S. Leghorn, interview by Donald E. Welzenbach, tape recording, Washington, DC, 19 August 1985 (S).

In Leghorn's view, altitude was the key to success for overhead reconnaissance. Since the best Soviet interceptor at that time, the MIG-17, had to struggle to reach 45,000 feet,[6] Leghorn reasoned that an aircraft that could exceed 60,000 feet would be safe from Soviet fighters. Recognizing that the fastest way to produce a high-altitude reconnaissance aircraft was to modify an existing aircraft, he began looking for the highest flying aircraft available in the Free World. This search soon led him to a British twin-engine medium bomber—the Canberra—built by the English Electric Company. The Canberra had made its first flight in May 1949. Its speed of 469 knots (870 kilometers per hour) and its service ceiling of 48,000 feet made the Canberra a natural choice for high-altitude reconnaissance work. The Royal Air Force quickly developed a reconnaissance version of the Canberra, the PR3 (the PR stood for photoreconnaissance), which began flying in March 1950.[7]

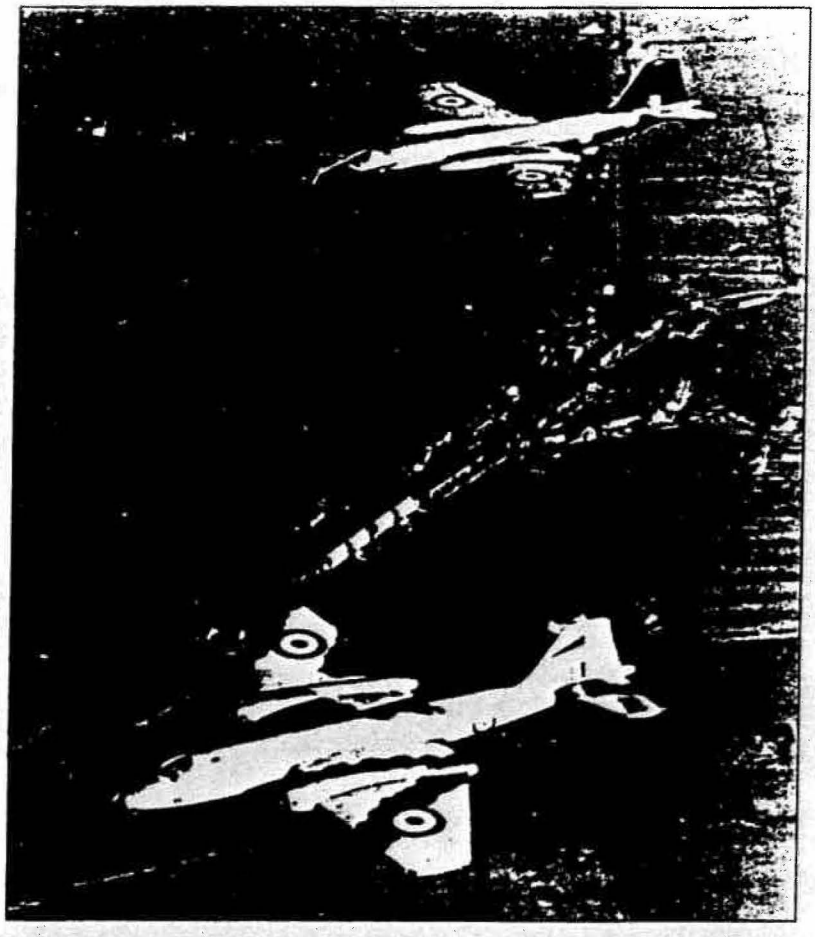
Richard S. Leghorn

At Leghorn's insistence, the Wright Air Development Command invited English Electric representatives to Dayton in the summer of 1951 to help find ways to make the Canberra fly even higher. By this time the Air Force had already adopted the bomber version of the Canberra, which the Glenn L. Martin Aircraft Company was to produce under license as the B-57 medium bomber. Leghorn and his English Electric colleagues designed a new Canberra configuration with very long high-lift wings, new Rolls-Royce Avon-109 engines, a solitary pilot, and an airframe that was stressed to less than the standard military specifications. Leghorn calculated that a Canberra so equipped might reach 63,000 feet early in a long mission and as high as 67,000 feet as the declining fuel supply lightened the aircraft. He believed that such a modified Canberra could penetrate the Soviet Union and China for a radius of 800 miles from bases around their periphery and photograph up to 85 percent of the intelligence targets in those countries.

Leghorn persuaded his superiors to submit his suggestion to the Pentagon for funding. He had not, however, cleared his idea with the Air Research and Development Command, whose reconnaissance

[6] 13,716 meters. To avoid giving a false impression of extremely precise measurements, original English measuring system figures in round numbers have not been converted to the metric system. To convert feet to meters, multiply by 0.3048. To convert airspeeds in knots (nautical miles per hour) to kilometers per hour, multiply by 1.85.

[7] Dick van der Aart, *Aerial Espionage, Secret Intelligence Flights by East and West* (Shrewsbury, England: Airlife Publishing, 1985), p. 18.



RAF Canberra Mark-PR3

division in Baltimore, headed by Lt. Col. Joseph J. Pellegrini, had to approve all new reconnaissance aircraft designs. Pellegrini's unit reviewed Leghorn's design and ordered extensive modifications. According to Leghorn, Pellegrini was not interested in a special-purpose aircraft that was only suitable for covert peacetime reconnaissance missions, for he believed that all Air Force reconnaissance aircraft should be capable of operating under wartime conditions. Pellegrini therefore insisted that Leghorn's design meet the specifications for combat aircraft, which required heavily stressed airframes, armor plate, and other apparatus that made an aircraft too heavy to reach the higher altitudes necessary for safe overflights of the Soviet Bloc. The final result of Leghorn's concept after its alteration by Pellegrini's staff was the RB-57D in 1955, whose maximum altitude

was only 64,000 feet. Meanwhile Leghorn, frustrated by the rejection of his original concept, had transferred to the Pentagon in early 1952 to work for Col. Bernard A. Schriever, Assistant for Development Planning to the Air Force's Deputy Chief of Staff for Development.[8]

In his new position Leghorn became responsible for planning the Air Force's reconnaissance needs for the next decade. He worked closely with Charles F. (Bud) Wienberg—a colleague who had followed him from Wright Field—and Eugene P. Kiefer, a Notre Dame–educated aeronautical engineer who had designed reconnaissance aircraft at the Wright Air Development Center during World War II. All three of these reconnaissance experts believed that the Air Force should emphasize high-altitude photoreconnaissance.

Underlying their advocacy of high-altitude photoreconnaissance was the belief that Soviet radars would not be able to track aircraft flying above 65,000 feet. This assumption was based on the fact that the Soviet Union used American-built radar sets that had been supplied under Lend-Lease during World War II. Although the SCR-584 (Signal Corps Radio) target-tracking radar could track targets up to 90,000 feet, its high power consumption burned out a key component quickly, so this radar was normally not turned on until an early warning radar had detected a target. The SCR-270 early warning radar could be left on for much longer periods and had a greater horizontal range (approximately 120 miles) but was limited by the curvature of the earth to a maximum altitude of 40,000 feet. As a result, Leghorn, Kiefer, and Wienberg believed that an aircraft that could ascend to 65,000 feet before entering an area being swept by the early warning radar would go undetected, because the target-tracking radars would not be activated.[9]

The problem with this assumption was that the Soviet Union, unlike Britain and the United States, had continued to improve radar technology after the end of World War II. Even after evidence of improved Soviet radar capabilities became available, however, many advocates of high-altitude overflight continued to believe that aircraft flying above 65,000 feet were safe from detection by Soviet radars.

[8] Leghorn interview (S).

[9] Ivan A. Getting, interview by Donald E. Welzenbach, Los Angeles, 28 August 1988 (U).

The Air Force Search for a New Reconnaissance Aircraft

With interest in high-altitude reconnaissance growing, several Air Force agencies began to develop an aircraft to conduct such missions. In September 1952, the Air Research and Development Command gave the Martin Aircraft Company a contract to examine the high-altitude potential of the B-57 by modifying a single aircraft to give it long, high-lift wings and the American version of the new Rolls-Royce Avon-109 engine. These were the modifications that Richard Leghorn had suggested during the previous year.[10]

At about the same time, another Air Force office, the Wright Air Development Command (WADC) in Dayton, Ohio, was also examining ways to achieve sustained flight at high altitudes. Working with two German aeronautical experts—Woldemar Voigt and Richard Vogt—who had come to the United States after World War II, Air Force Maj. John Seaberg advocated the development of a new aircraft that would combine the high-altitude performance of the latest turbojet engines with high-efficiency wings in order to reach ultrahigh altitudes. Seaberg, an aeronautical engineer for the Chance Vought Corporation until his recall to active duty during the Korean war, was serving as assistant chief of the New Developments Office of WADC's Bombardment Branch.

By March 1953, Seaberg had expanded his ideas for a high-altitude aircraft into a complete request for proposal for "an aircraft weapon system having an operational radius of 1,500 nm [nautical miles] and capable of conducting pre- and post-strike reconnaissance missions during daylight, good visibility conditions." The requirement stated that such an aircraft must have an optimum subsonic cruise speed at altitudes of 70,000 feet or higher over the target, carry a payload of 100 to 700 pounds of reconnaissance equipment, and have a crew of one.[11]

The Wright Air Development Command decided not to seek proposals from major airframe manufacturers on the grounds that a smaller company would give the new project a higher priority and

[10] Philip G. Strong, Chief, Operations Staff, OSI, Memorandum for the Record, "Reconnaissance Capabilities," 21 August 1953, OSI records (S).

[11] Jay Miller, *Lockheed U-2*, Aerograph 3 (Austin, Texas: Aerofax, 1983), p. 10.

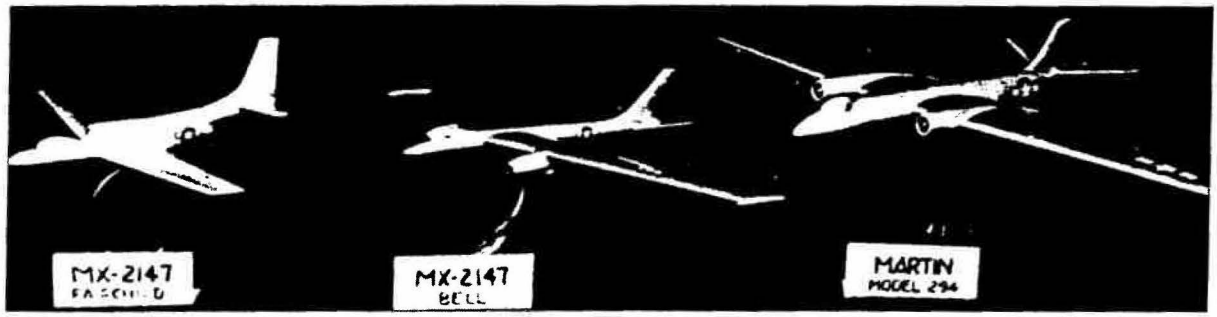
produce a better aircraft more quickly. In July 1953, the Bell Aircraft Corporation of Buffalo, New York, and the Fairchild Engine and Airplane Corporation of Hagerstown, Maryland, received study contracts to develop an entirely new high-altitude reconnaissance aircraft. In addition, the Glenn L. Martin Company of Baltimore was asked to examine the possibility of improving the already exceptional high-altitude performance of the B-57 Canberra. By January 1954 all three firms had submitted their proposals. Fairchild's entry was a single-engine plane known as M-195, which had a maximum altitude potential of 67,200 feet; Bell's was a twin-engine craft called the Model 67 (later the X-16), which had a maximum altitude of 69,500 feet; and Martin's design was a big-wing version of the B-57 called the Model 294, which was to cruise at 64,000 feet. In March 1954, Seaberg and other engineers at Wright Field, having evaluated the three contending designs, recommended the adoption of both the Martin and Bell proposals. They considered Martin's version of the B-57 an interim project that could be completed and deployed rapidly while the more advanced concept from Bell was still being developed.[12]

Air Force headquarters soon approved Martin's proposal to modify the B-57 and was very much interested in the Bell design. But word of the competition for a new reconnaissance airplane had reached another aircraft manufacturer, the Lockheed Aircraft Corporation, which submitted an unsolicited design.

Lockheed had first become aware of the reconnaissance aircraft competition in the fall of 1953. John H. (Jack) Carter, who had recently retired from the Air Force to become the assistant director of Lockheed's Advanced Development Program, was in the Pentagon on business and dropped in to see Eugene P. Kiefer, an old friend and colleague from the Air Force's Office of Development Planning (more commonly known as AFDAP from its Air Force office symbol). Kiefer told Carter about the competition for a high-flying aircraft and expressed the opinion that the Air Force was going about the search in the wrong way by requiring the new aircraft to be suitable for both strategic and tactical reconnaissance.

Immediately after returning to California, Carter proposed to Lockheed Vice President L. Eugene Root (previously the top civilian official in the Air Force's Office of Development Planning) that

[12] The request for proposal, known as "Design Study Requirements, Identification No. 53WC-16507," has been reprinted in Miller, *Lockheed U-2*, pp. 10-11.



Designs for the Air Force competition for a high-altitude reconnaissance aircraft

Lockheed also submit a design. Carter noted that the proposed aircraft would have to reach altitudes of between 65, 000 and 70,000 feet and correctly forecast, "If extreme altitude performance can be realized in a practical aircraft at speeds in the vicinity of Mach 0.8, it should be capable of avoiding virtually all Russian defenses until about 1960." Carter added, "To achieve these characteristics in an aircraft which will have a reasonably useful operational life during the period before 1960 will, of course, require very strenuous efforts and extraordinary procedures, as well as nonstandard design philosophy." Some of the "nonstandard" design characteristics suggested by Carter were the elimination of landing gear, the disregard of military specifications, and the use of very low load factors. Carter's memorandum closed with a warning that time was of the essence: "In order that this special aircraft can have a reasonably long and useful life, it is obvious that its development must be greatly accelerated beyond that considered normal." [13]

Lockheed's senior officials approved Carter's proposal, and early in 1954 the corporation's best aircraft designer—Clarence L. (Kelly) Johnson—began working on the project, then known as the CL-282 but later to become famous under its Air Force designator—the U-2. Already one of the world's leading aeronautical engineers, Kelly Johnson had many successful military and civilian designs to his credit, including the P-38, P-80, F-104, and Constellation. Johnson quickly came up with a radical design based upon the fuselage of the F-104 jet fighter but incorporating a high-aspect-ratio sailplane wing. To save weight and thereby increase the aircraft's altitude, Johnson decided to stress the airframe to only 2.5 units of

[13] Miller, *Lockheed U-2*, p. 12.

gravity (g's) instead of the military specification strength of 5.33 g's. For the power plant he selected the General Electric J73/GE-3 nonafterburning turbojet engine with 9,300 pounds of thrust (this was the same engine he had chosen for the F-104, which had been the basis for the U-2 design).[14] Many of the CL-282's design features were adapted from gliders. Thus, the wings and tail were detachable. Instead of a conventional landing gear, Johnson proposed using two skis and a reinforced belly rib for landing—a common sailplane technique—and a jettisonable wheeled dolly for takeoff. Other features included an unpressurized cockpit and a 15-cubic-foot payload area that could accommodate 600 pounds of sensors. The CL-282's maximum altitude would be just over 70,000 feet with a 2, 000-mile range. Essentially, Kelly Johnson had designed a jet-propelled glider.[15]

Kelly Johnson

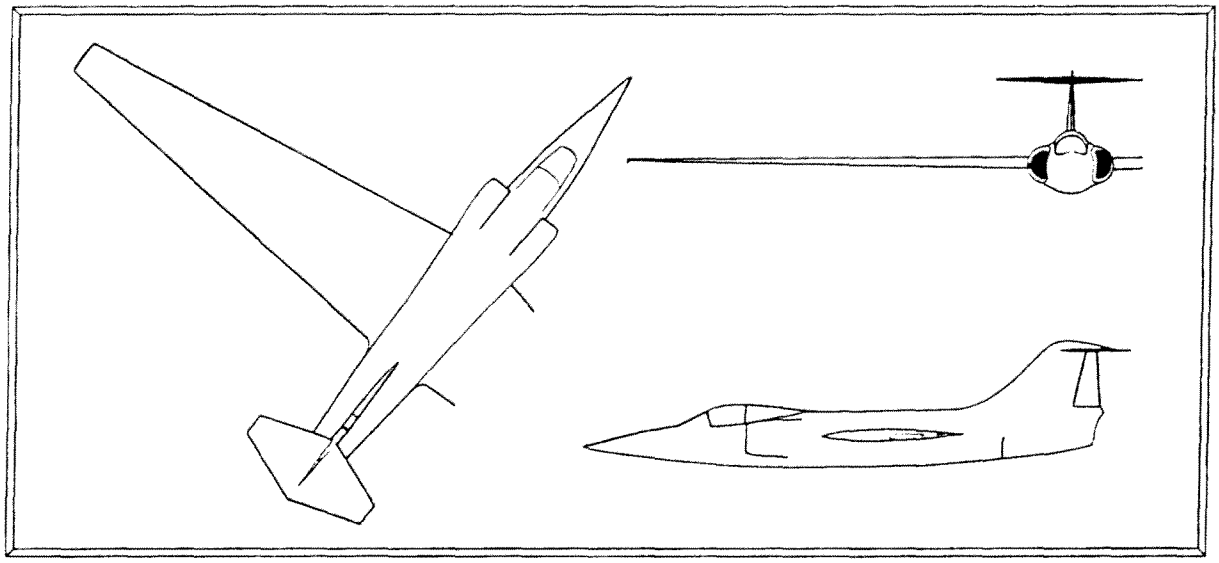
Early in March 1954, Kelly Johnson submitted the CL-282 design to Brig. Gen. Bernard A. Schriever's Office of Development Planning. Eugene Kiefer and Bud Wienberg studied the design and recommended it to General Schriever, who then asked Lockheed to submit a specific proposal. In early April, Kelly Johnson presented a full description of the CL-282 and a proposal for the construction and maintenance of 30 aircraft to a group of senior Pentagon officials that included Schriever's superior, Lt. Gen. Donald L. Putt, Deputy Chief of Staff for Development, and Trevor N. Gardner, Special Assistant for Research and Development to the Secretary of the Air Force. Afterward Kelly Johnson noted that the civilian officials were very much interested in his design but the generals were not.[16]

The CL-282 design was also presented to the commander of the Strategic Air Command (SAC), Gen. Curtis E. LeMay, in early April by Eugene Kiefer, Bud Wienberg, and Burton Klein from the Office of

[14] Lockheed Corporation, "Strategic Reconnaissance and Intelligence," Development Planning Note #1, 30 November 1953 (U).

[15] Miller, *Lockheed U-2*, p. 12. For more details on Kelly Johnson's original proposal, see "Profile of CL-282 High Altitude Aircraft prepared by Lockheed Aircraft Corporation, 5 March 1954" in Helen H. Kleyla and Robert D. O'Hern, *History of the Office of Special Activities*, DS&T, Directorate of Science and Technology Historical Series OSA-1, 16 vols. (CIA: DS&T, 1969), chap. 1, annex 2 (TS Codeword). The 16 volumes of this history contain 20 chapters, each paginated separately. Future references will be shortened to *OSA History*, followed by the relevant chapter and page numbers.

[16] Kelly Johnson Papers, "Log for Project X," April 1954, Lockheed Corporation, Advanced Development Projects Division, Burbank, California.



The Lockheed CL-282

Development Planning. According to Wienberg, General LeMay stood up halfway through the briefing, took his cigar out of his mouth, and told the briefers that, if he wanted high-altitude photographs, he would put cameras in his B-36 bombers and added that he was not interested in a plane that had no wheels or guns. The general then left the room, remarking that the whole business was a waste of his time.[17]

Meanwhile, the CL-282 design proceeded through the Air Force development channels and reached Major Seaberg at the Wright Air Development Command in mid-May. Seaberg and his colleagues carefully evaluated the Lockheed submission and finally rejected it in early June. One of their main reasons for doing so was Kelly Johnson's choice of the unproven General Electric J73 engine. The engineers at Wright Field considered the Pratt and Whitney J57 to be the most powerful engine available, and the designs from Fairchild, Martin, and Bell all incorporated this engine. The absence of conventional landing gear was also a perceived shortcoming of the Lockheed design.[18]

Another factor in the rejection of Kelly Johnson's submission was the Air Force preference for multiengine aircraft. Air Force reconnaissance experts had gained their practical experience during

[17] C. F. Wienberg, telephone conversation with Donald E. Welzenbach, 23 July 1988 (U).

[18] Miller, *Lockheed U-2*, p. 12.

World War II in multiengine bombers. In addition, aerial photography experts in the late 1940s and early 1950s emphasized focal length as the primary factor in reconnaissance photography and, therefore, preferred large aircraft capable of accommodating long focal-length cameras. This preference reached an extreme in the early 1950s with the development of the cumbersome 240-inch Boston camera, a device so large that the YC-97 Boeing Stratocruiser that carried it had to be partially disassembled before the camera could be installed. Finally, there was the feeling shared by many Air Force officers that two engines are always better than one because, if one fails, there is a spare to get the aircraft back to base. In reality, however, aviation records show that single-engine aircraft have always been more reliable than multiengine planes. Furthermore, a high-altitude reconnaissance aircraft deep in enemy territory would have little chance of returning if one of the engines failed, forcing the aircraft to descend.[19]

On 7 June 1954, Kelly Johnson received a letter from the Air Force rejecting the CL-282 proposal because it had only one engine and was too unusual and because the Air Force was already committed to the modification of the Martin B-57.[20] By this time, the Air Force had also selected the Bell X-16; the formal contract calling for 28 aircraft was signed in September. Despite the Air Force's selection of the X-16, Lockheed continued to work on the CL-282 and began seeking new sources of support for the aircraft.

Lockheed CL-282 Supporters and the CIA

Although the Air Force's uniformed hierarchy had decided in favor of the Bell and Martin aircraft, some high-level civilian officials continued to favor the Lockheed design. The most prominent proponent of the Lockheed proposal was Trevor Gardner, Special Assistant for Research and Development to Air Force Secretary Harold E. Talbott. Gardner had many contacts in west coast aeronautical circles because before coming to Washington he had headed the Hycon Manufacturing Company, which made aerial cameras in Pasadena, California. He had been present at Kelly Johnson's presentation on the CL-282 at the Pentagon in early April 1954 and believed that this

[19] Allen F. Donovan, interview by Donald E. Welzenbach, Corona del Mar, California, 20 May 1985 (S).

[20] Johnson, "Log for Project X," 7 June 1954.

Trevor Gardner

design showed the most promise for reconnaissance of the Soviet Union. This belief was shared by Gardner's special assistant, Frederick Ayer, Jr., and Garrison Norton, an adviser to Secretary Talbott.[21]

According to Norton, Gardner tried to interest SAC commander LeMay in the Lockheed aircraft because Gardner envisioned it primarily as a collector of strategic, rather than tactical, intelligence. But General LeMay had already shown that he was not interested in an unarmed aircraft. Gardner, Ayer, and Norton then decided to seek CIA support for the high-flying aircraft. At that time the Agency's official involvement in overhead reconnaissance was limited to advising the Air Force on the problems of launching large camera-carrying balloons for reconnaissance flights over hostile territory (for the details of this program, see chapter 2). The Chief of the Operations Staff in the Office of Scientific Intelligence, Philip G. Strong, however, served on several Air Force advisory boards and kept himself well informed on developments in reconnaissance aircraft.[22]

Gardner, Norton, and Ayer met with Strong in the Pentagon on 12 May 1954, six days before the Wright Air Development Command began to evaluate the Lockheed proposal. Gardner described Kelly Johnson's proposal and showed the drawings to Strong. After this meeting, Strong summarized his impressions of the Air Force's search for a high-altitude reconnaissance aircraft:

> *Proposals for special reconnaissance aircraft have been received in the Air Staff from Lockheed, Fairchild, and Bell. . . . The Lockheed proposal is considered to be the best. It has been given the type designation of CL-282 and in many respects is a jet-powered glider based essentially on the Lockheed Day Fighter XF-104. It is primarily subsonic but can attain transonic speeds over the target with a consequent loss of range. With an altitude of 73,000 feet over the target it has a combat radius of 1,400 nautical miles. . . . The CL-282 can be manufactured*

[21] Garrison Norton, interview by Donald E. Welzenbach, tape recording, Washington, DC, 23 May 1983 (S); Michael R. Beschloss, *Mayday: Eisenhower, Khrushchev and the U-2 Affair* (New York: Harper & Row, 1986), p. 79.

[22] Strong was a colonel in the Marine Corps Reserve and often used that title even though he was not on active duty. He later advanced to the rank of brigadier general in the reserve. For Strong's contacts with senior Air Force officials concerning the CL-282, see the Norton interview (S).

mainly with XF-104 jigs and designs. . . . The prototype of this plane can be produced within a year from the date of order. Five planes could be delivered for operations within two years.

The Bell proposal is a more conventional aircraft having normal landing gear. As a result, its maximum altitude over target is 69,500 feet and the speed and range are not as good as the Lockheed CL-282.[23]

Gardner's enthusiasm for the CL-282 had given Strong the false impression that most Air Force officials supported the Lockheed design. In reality, the Air Force's uniformed hierarchy was in the process of choosing the modified version of the Martin B-57 and the new Bell X-16 to meet future reconnaissance needs.

During their meeting with Strong, Trevor Gardner, Frederick Ayer, and Garrison Norton explained that they favored the CL-282 because it gave promise of flying higher than the other designs and because at maximum altitude its smaller radar cross section might make it invisible to existing Soviet radars. The three officials asked Strong if the CIA would be interested in such an aircraft. Strong promised to talk to the Director of Central Intelligence's newly hired Special Assistant for Planning and Coordination, Richard M. Bissell, Jr., about possible Agency interest in the CL-282.[24]

Philip Strong

Richard Bissell had already had an active and varied career before he joined the CIA. A graduate of Groton and Yale, Bissell studied at the London School of Economics for a year and then completed a doctorate at Yale in 1939. He taught economics, first at Yale and then from 1942 at the Massachusetts Institute of Technology (MIT), where he became a full professor in 1948. During World War II, Bissell had managed American shipping as executive officer of the Combined Shipping Adjustment Board. After the war, he served as deputy director of the Marshall Plan from 1948 until the end of 1951, when he became a staff member of the Ford Foundation. His first association with the Agency came in late 1953, when he undertook a contract study of possible responses the United

[23] Philip G. Strong, Memorandum for the Record, "Special Aircraft for Penetration Photo Reconnaissance," 12 May 1954, OSI records (now in OSWR), job 80R-01424, box 1 (S).

[24] Karl H. Weber, *The Office of Scientific Intelligence, 1949-68*, Directorate of Science and Technology Historical Series OSI-1 (CIA: DS&T, 1972), vol. 1, tab A, pp. 16-17 (TS Codeword).

Richard M. Bissell, Jr.

States might use against the Soviet Bloc in the event of another uprising such as the East Berlin riots of June 1953. Bissell quickly concluded that there was not much hope for clandestine operations against Bloc nations. As he remarked later: "I know I emerged from that exercise feeling that very little could be done." This belief would later make Bissell a leading advocate of technical rather than human means of intelligence collection.[25]

Bissell joined the Agency in late January 1954 and soon became involved in coordination for the operation aimed at overthrowing Guatemalan President Jacobo Arbenz. He was, therefore very preoccupied when Philip Strong approached him in mid-May 1954 with the concept of the proposed spyplane from Lockheed. Bissell said that the idea had merit and told Strong to get some topflight scientists to advise on the matter. Afterward he returned to the final planning for the Guatemalan operation and promptly forgot about the CL-282.[26]

Meanwhile, Strong went about drumming up support for high-altitude overflight. In May 1954 he persuaded DCI Allen W. Dulles to ask the Air Force to take the initiative in gaining approval for an overflight of the Soviet guided-missile test range at Kapustin Yar. Dulles's memorandum did not mention the CL-282 or any of the other proposed high-altitude aircraft. CIA and Air Force officials met on several occasions to explore the overflight proposal, which the Air Force finally turned down in October 1954.[27]

Although Allen Dulles was willing to support an Air Force overflight of the Soviet Union, he was not enthusiastic about the CIA undertaking such a project. Few details about Dulles's precise attitude toward the proposed Lockheed reconnaissance aircraft are available, but many who knew him believe that he did not want the CIA to become involved in projects that belonged to the military, and the Lockheed CL-282 had been designed for an Air Force requirement.

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[25] Thomas Powers, *The Man Who Kept the Secrets: Richard Helms and the CIA* (New York: Alfred A. Knopf, 1979), p. 79; Beschloss, *Mayday*, pp. 86-89.

[26] Memorandum for H. Marshall Chadwell, Assistant Director/Scientific Intelligence, from Chief, Support Staff, OSI, "Review of OSA Activities Concerned with Scientific and Technical Collection Techniques," 13 May 1955, p. 6, OSI (OSWR) records, job 80R-01424, box 1 (S); Richard M. Bissell, Jr., interview by Donald E. Welzenbach, tape recording, Farmington, Connecticut, 8 November 1984 (S).

[27] Memorandum for Richard M. Bissell, Special Assistant to the Director for Planning and Coordination, from Philip G. Strong, Chief, Operations Staff, OSI, "Overflight of Kapustin Yar," 15 October 1954, OSI (OSWR) records, job 80R-01424, box 1 (TS, downgraded to S).

Moreover, high-altitude reconnaissance of the Soviet Union did not fit well into Allen Dulles's perception of the proper role of an intelligence agency. He tended to favor the classical form of espionage, which relied on agents rather than technology.[28]

At this point, the summer of 1954, Lockheed's CL-282 proposal still lacked official support. Although the design had strong backers among some Air Force civilians and CIA officials, the key decisionmakers at both Air Force and CIA remained unconvinced. To make Kelly Johnson's revolutionary design a reality, one additional source of support was necessary: prominent scientists serving on government advisory boards.

DCI Allen W. Dulles

SCIENTISTS AND OVERHEAD RECONNAISSANCE

Scientists and engineers from universities and private industry had played a major role in advising the government on technical matters during World War II. At the end of the war, most of the scientific advisory boards were disbanded, but within a few years the growing tensions of the Cold War again led government agencies to seek scientific advice and assistance. In 1947 the Air Force established a Scientific Advisory Board, which met periodically to discuss topics of current interest and advise the Air Force on the potential usefulness of new technologies. The following year the Office of Defense Mobilization established the Scientific Advisory Committee, but the Truman administration made little use of this new advisory body.[29]

The BEACON HILL Report

In 1951 the Air Force sought even more assistance from scientists because the Strategic Air Command's requests for information about targets behind the Iron Curtain could not be filled. To look for new ways of conducting reconnaissance against the Soviet Bloc, the Air Force's Deputy Chief of Staff for Development, Maj. Gen. Gordon P. Saville, added 15 reconnaissance experts to an existing project on air

[28] Powers, *Man Who Kept the Secrets*, pp. 103-104; Edwin H. Land, interview by Donald E. Welzenbach, tape recording, Cambridge, Massachusetts, 17 and 20 September 1984 (TS Codeword); Robert Amory, Jr., interview by Donald E. Welzenbach and Gregory W. Pedlow, Washington, DC, 22 April 1987 (S).

[29] For more information on the Air Force's use of scientists see Thomas A. Sturm, *The USAF Scientific Advisory Board: Its First Twenty Years, 1944-1964* (Washington, DC: USAF Historical Office, 1967) (U).

defense known as Project LINCOLN, then under way at the Massachusetts Institute of Technology. By the end of the year, these experts had assembled in Boston to begin their research. Their headquarters was located over a secretarial school on Beacon Hill, which soon became the codename for the reconnaissance project. The consultants were called the BEACON HILL Study Group.

The study group's chairman was Kodak physicist Carl F. P. Overhage, and its members included James G. Baker and Edward M. Purcell from Harvard; Saville Davis from the *Christian Science Monitor*; Allen F. Donovan from the Cornell Aeronautical Laboratory; Peter C. Goldmark from Columbia Broadcasting System Laboratories; Edwin H. Land, founder of the Polaroid Corporation; Stewart E. Miller of Bell Laboratories; Richard S. Perkin of the Perkin-Elmer Company; and Louis N. Ridenour of Ridenour Associates, Inc. The Wright Air Development Command sent Lt. Col. Richard Leghorn to serve as its liaison officer.[30]

During January and February 1952, the BEACON HILL Study Group traveled every weekend to various airbases, laboratories, and firms for briefings on the latest technology and projects. The panel members were particularly interested in new approaches to aerial reconnaissance, such as photography from high-flying aircraft and camera-carrying balloons. One of the more unusual (albeit unsuccessful) proposals examined by the panel was an "invisible" dirigible. This was to be a giant, almost flat-shaped airship with a blue-tinted, nonreflective coating; it would cruise at an altitude of 90,000 feet along the borders of the Soviet Union at very slow speeds while using a large lens to photograph targets of interest.[31]

After completing these briefings at the end of February 1952, the BEACON HILL Study Group returned to MIT, where the panel members spent the next three months writing a report detailing their recommendations for ways to improve the amount and quality of intelligence being gathered on the Soviet Bloc. Published as a classified

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[30] USAF, Project LINCOLN, *BEACON HILL Report: Problems of Air Force Intelligence and Reconnaissance*, Massachusetts Institute of Technology, 15 June 1952, pp. v, xi; app. A (S, downgraded to C).

[31] Allen F. Donovan, telephone conversation with Donald E. Welzenbach, 21 June 1985 (U); James G. Baker, interview by Donald E. Welzenbach, tape recording, Washington, DC, 24 April 1985 (S).

document on 15 June 1952, the *BEACON HILL Report* advocated radical approaches to obtain the information needed for national intelligence estimates. Its 14 chapters covered radar, radio, and photographic surveillance; examined the use of passive infrared and microwave reconnaissance; and discussed the development of advanced reconnaissance vehicles. One of the report's key recommendations called for the development of high-altitude reconnaissance aircraft:

> *We have reached a period in history when our peacetime knowledge of the capabilities, activities and dispositions of a potentially hostile nation is such as to demand that we supplement it with the maximum amount of information obtainable through aerial reconnaissance. To avoid political involvements, such aerial reconnaissance must be conducted either from vehicles flying in friendly airspace, or—a decision on this point permitting—from vehicles whose performance is such that they can operate in Soviet airspace with greatly reduced chances of detection or interception.*[12]

Concern About the Danger of a Soviet Surprise Attack

The Air Force did not begin to implement the ideas of the *BEACON HILL Report* until the summer of 1953. By this time interest in reconnaissance had increased after Dwight D. Eisenhower became President in January 1953 and soon expressed his dissatisfaction with the quality of the intelligence estimates of Soviet strategic capabilities and the paucity of reconnaissance on the Soviet Bloc.[13]

To President Eisenhower and many other US political and military leaders, the Soviet Union was a dangerous opponent that appeared to be moving inexorably toward a position of military parity with the United States. Particularly alarming was Soviet progress in the area of nuclear weapons. In the late summer of 1949, the Soviet Union had detonated an atomic bomb nearly three years sooner than US experts had predicted. Then in August 1953—a scant nine months after the first US test of a hydrogen bomb—the Soviet Union detonated a hydrogen bomb manufactured from lithium deuteride, a technology more advanced than the heavy water method used by US

[12] *BEACON HILL Report*, pp. 164, 167-168 (C). This section of the report was written by Allen Donovan and Louis Ridenour.

[13] Lundahl and Brugioni interview (TS Codeword).

scientists. Thus, new and extremely powerful weapons were coming into the hands of a government whose actions greatly disturbed the leaders of the West. Only two months before the successful hydrogen bomb test, Soviet troops had crushed an uprising in East Berlin. And, at the United Nations, the Soviet Bloc seemed bent on causing dissension between Western Europe and the United States and between the developed and undeveloped nations. This aggressive Soviet foreign policy, combined with advances in nuclear weapons, led officials such as Secretary of State John Foster Dulles to see the Soviet Union as a menace to peace and world order.

The Soviet Union's growing military strength soon became a threat not just to US forces overseas but to the continental United States itself. In the spring of 1953, a top secret RAND study pointed out the vulnerability of the SAC's US bases to a surprise attack by Soviet long-range bombers.[14]

Concern about the danger of a Soviet attack on the continental United States grew after an American military attache sighted a new Soviet intercontinental bomber at Ramenskoye airfield, south of Moscow, in 1953. The new bomber was the Myasishchev-4, later designated Bison by NATO. Powered by jet engines rather than the turboprops of Russia's other long-range bombers, the Bison appeared to be the Soviet equivalent of the US B-52, which was only then going into production. Pictures of the Bison taken at the Moscow May Day air show in 1954 had an enormous impact on the US intelligence community. Unlike several other Soviet postwar aircraft, the Bison was not a derivative of US or British designs but represented a native Soviet design capability that surprised US intelligence experts. This new long-range jet bomber, along with the Soviet Union's large numbers of older propeller and turboprop bombers, seemed to pose a significant threat to the United States, and, in the summer of 1954, newspapers and magazines began publishing articles highlighting the growing airpower of the Soviet Union. Pictures of the Bison bomber featured prominently in such stories.[15]

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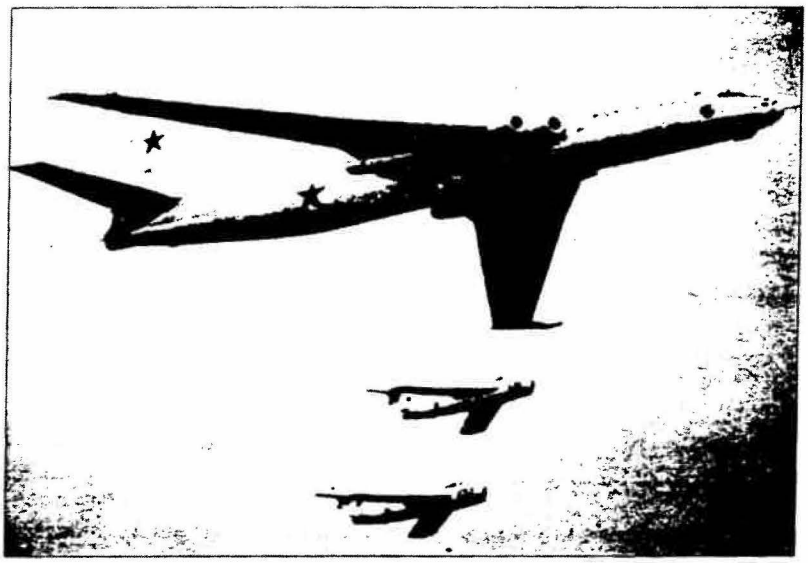
[14] RAND Corporation, Plans Analysis Section, "*Vulnerability of U.S. Strategic Power to a Surprise Attack in 1956,*" RAND Special Memorandum No. 15, Santa Monica, California: the RAND Corporation, April 15, 1953 (TS, declassified May 1967).

[15] "AF Cites Red Bomber Progress," *Aviation Week*, May 24, 1954, p. 14; "Is Russia Winning the Arms Race?," *US News and World Report*, June 18, 1954, pp. 28-29; "Russia Parades Airpower as '*Big Stick*'," *Aviation Week*, June 28, 1954, p. 15; "Red Air Force: The World's Biggest," *Newsweek*, August 23, 1954, pp. 28-33.



Soviet Myasishchev-4 bomber (the Bison)

The Air Force Intelligence Systems Panel

Even before the publication of photographs of the Bison raised fears that the Soviet bomber force might eventually surpass that of the United States, the Air Force had already established a new advisory body to look for ways to implement the main recommendation of the BEACON HILL Report—the construction of high-flying aircraft and high-acuity cameras. Created in July 1953, the Intelligence Systems Panel (ISP) included several experts from the BEACON HILL Study Group: Land, Overhage, Donovan, and Miller. At the request of the Air Force, the CIA also participated in the panel, represented by Edward L. Allen of the Office of Research and Reports (ORR) and Philip Strong of the Office of Scientific Intelligence (OSI).[36]

The chairman of the new panel was Dr. James G. Baker, a research associate at the Harvard College Observatory. Baker had been involved in aerial reconnaissance since 1940, when he first advised the Army Air Corps on ways to improve its lenses. He then established a full-scale optical laboratory at Harvard—the Harvard University Optical Research Laboratory—to produce high-quality

[36] Memorandum for Robert Amory, Jr., Deputy Director, Intelligence from Edward L. Allen, Chief, Economic Research, ORR and Philip G. Strong, Chief, Operations Staff, OSI, "Meeting of the Intelligence Systems Panel of the Scientific Advisory Board, USAF," 26 August 1953, OSI (OSWR) records, job 80R-01424, box 1 (S).

lenses. Since the university did not wish to continue manufacturing cameras and lenses after the end of the war, the optical laboratory moved to Boston University, which agreed to sponsor the effort as long as the Air Force would fund it. Baker decided to remain at Harvard, so his assistant, Dr. Duncan E. Macdonald, became the new head of what was now called the Boston University Optical Research Laboratory (BUORL). Baker's association with the Air Force did not end with the transfer of the optical laboratory to Boston University, because he continued to design lenses to be used in photoreconnaissance.[37]

The ISP first met at Boston University on 3 August 1953. To provide background on the poor state of US knowledge of the Soviet Union, Philip Strong informed the other panel members that the best intelligence then available on the Soviet Union's interior was photography taken by the German Luftwaffe during World War II. Since the German photography covered only the Soviet Union west of the Urals, primarily west of the Volga River, many vital regions were not included. The ISP would, therefore, have to look for ways to provide up-to-date photography of all of the Soviet Union. Several Air Force agencies then briefed the panel members on the latest developments and proposed future projects in the area of aerial reconnaissance, including new cameras, reconnaissance balloons, and even satellites. Among the Air Force reconnaissance projects discussed were multiple sensors for use in existing aircraft such as the RB-47, RB-52, and RB-58; Project FICON—an acronym for "fighter conversion"—for adapting a giant, 10-engine B-36 bomber to enable it to launch and retrieve a Republic RF-84F Thunderflash reconnaissance aircraft; reconnaissance versions of the Navajo and Snark missiles; the high-altitude balloon program, which would be ready to go into operation by the summer of 1955; and the search for a new high-altitude reconnaissance aircraft.[38]

[37] Baker interview (S). In 1957, after the Air Force decided to cut back its funding of BUORL, Duncan Macdonald and Richard Leghorn (by then retired from the Air Force) formed their own corporation—Itek—and purchased the laboratory from Boston University (Leghorn interview [S]).

[38] Memorandum for Robert Amory, Jr., Deputy Director, Intelligence, from Edward L. Allen, Chief, Economic Research, ORR, and Philip G. Strong, Chief, Operations Staff, OSI, "Meeting of the Intelligence Systems Panel of the Scientific Advisory Board, USAF," 26 August 1953; Memorandum for H. Marshall Chadwell, Assistant Director/Scientific Intelligence, from Chief, Support Staff, OSI, "Review of OSA Activities Concerned with Scientific and Technical Collection Techniques," 13 May 1955, p. 6, OSI (OSWR) records, job 80R-01424, box 1 (S); Donovan interview, 22 May 1985 (S).

The wide variety of programs discussed at the conference were all products of the Air Force's all-out effort to find a way to collect intelligence on the Communist Bloc. Some of the schemes went beyond the existing level of technology; others, like the camera-carrying balloons, were technically feasible but involved dangerous political consequences.

British Overflight of Kapustin Yar

The British were also working on high-altitude reconnaissance aircraft. In 1952 the Royal Air Force (RAF) began Project ROBIN, which was designed to modify the Canberra bomber for high-altitude reconnaissance. This project was probably inspired by Richard Leghorn's collaboration with English Electric Company designers in 1951, when they calculated ways to increase the altitude of the Canberra. The RAF equipped the new Canberra PR7 with Rolls-Royce Avon-109 engines and gave it long, fuel-filled wings. The range of this variant of the Canberra was now 4,300 miles, and, on 29 August 1955, it achieved an altitude of 65,880 feet.[39]

Sometime during the first half of 1953, the RAF employed a high-altitude Canberra on a daring overflight of the Soviet Union to photograph the missile test range at Kapustin Yar. Because of advanced warning from either radar or agents inside British intelligence, the overflight did not catch the Soviet Union by surprise. Soviet fighters damaged and nearly shot down the Canberra.[40] Rumors about this flight reached Washington during the summer of 1953, but official confirmation by the United Kingdom did not come until February 1954. While on a six-week tour of Europe to study aerial reconnaissance problems for the US Air Force's Scientific Advisory Board, James Baker was briefed by RAF intelligence officials on the Canberra overflight of the Soviet Union. On 22 and 23 March 1954, he reported on it to the full Scientific Advisory Board at Langley AFB, Virginia.

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[39] Van der Aart, *Aerial Espionage*, p. 18; Philip G. Strong, Chief, Operations Staff, OSI, Memorandum for the Record, "Meeting of Air Force Scientific Advisory Board, 18-21 October 1953," 26 October 1953, OSI (OSWR) records, job 80R-01424, box 1 (TS, downgraded to S).

[40] Stewart Alsop, *The Center*, (New York: Popular Library, 1968), p. 194; Beschloss, *Mayday*, pp. 78-79. Both of these books state that the project included the CIA, but there is no evidence to support this assertion.

Allen F. Donovan

Baker also chaired the next meeting of the Air Force's Intelligence Systems Panel in late April 1954 but could not tell its members about the British overflight of Kapustin Yar because they were not cleared for this information. The panel did, however, discuss the modifications for high-altitude flight being made to the US Canberra, the B-57.[41]

The Intelligence Systems Panel and the CL-282

The next Intelligence Systems Panel meeting took place on 24 and 25 May at Boston University and the Polaroid Corporation. Panel member Allen F. Donovan from the Cornell Aeronautical Laboratory evaluated the changes being made to the B-57 by the Martin Aircraft Company. Even without Martin's specifications or drawings, Donovan had been able to estimate what could be done to the B-57 by lengthening the wings and lightening the fuselage. He had determined that alterations to the B-57 airframe would not solve the reconnaissance needs expressed in the *BEACON HILL Report*. Theoretically, he explained to the panel, any multiengine aircraft built according to military specifications, including the B-57, would be too heavy to fly above 65,000 feet and hence would be vulnerable to Soviet interception. To be safe, Donovan explained, penetrating aircraft would need to fly above 70,000 feet for the entire mission.[42]

Development of such an aircraft was already under way, Donovan continued, for Philip Strong of the CIA had told him that the Lockheed Aircraft Corporation had designed a lightweight, high-flying aircraft. ISP chairman Baker then urged Donovan to travel to southern California to evaluate the Lockheed design and gather ideas on high-altitude aircraft from other aircraft manufacturers.

When he was finally able to make this trip in late summer, Donovan found the plane that he and the other ISP members had been seeking. On the afternoon of 2 August 1954, Donovan met with L. Eugene Root, an old Air Force acquaintance who was now a Lockheed vice-president, and learned about the Air Force's competition for a high-altitude reconnaissance aircraft. Kelly Johnson then showed Donovan the plans for Lockheed's unsuccessful entry. A lifelong sailplane enthusiast, Donovan immediately recognized that the

[41] Baker interview (S).

[42] Donovan interview (S); Baker interview (S).

CL-282 design was essentially a jet-propelled glider capable of attaining the altitudes that he felt were necessary to carry out reconnaissance of the Soviet Union successfully.[43]

Upon his return east on 8 August, Donovan got in touch with James Baker and suggested an urgent meeting of the Intelligence Systems Panel. Because of other commitments by the members, however, the panel did not meet to hear Donovan's report until 24 September 1954 at the Cornell Aeronautical Laboratory. Several members, including Land and Strong, were absent. Those who did attend were upset to learn that the Air Force had funded a closed competition for a tactical reconnaissance plane without informing them. But once Donovan began describing Kelly Johnson's rejected design for a jet-powered glider, they quickly forgot their annoyance and listened intently.

Donovan began by stressing that high-altitude reconnaissance aircraft had to fly above 70,000 feet to be safe from interception. Next, he set out what he considered to be the three essential requirements for a high-altitude spyplane: a single engine, a sailplane wing, and low structural load factors. Donovan strongly favored single-engine aircraft because they are both lighter and more reliable than multiengine aircraft. Although a twin-engine aircraft could theoretically return to base on only one engine, Donovan explained, it could only do so at a much lower altitude, about 34,000 feet, where it was sure to be shot down.

The second of Donovan's essential factors, a sailplane wing (in technical terms a high-aspect-ratio, low-induced-drag wing), was needed to take maximum advantage of the reduced thrust of a jet engine operating in the rarefied atmosphere of extreme altitude. Because of the thinness of the atmosphere above 70,000 feet, engineers estimated that the power curve of a jet engine would fall off to about 6 percent of its sea-level thrust.

Finally, low structural load factors, like those used by transport aircraft, were necessary to reduce weight and thereby achieve maximum altitude. Donovan explained that strengthening wings and

[43] Donovan interview (S)

wingroot areas to withstand the high speeds and sharp turns mandated by the standard military airworthiness rules added too much weight to the airframe, thereby negating the efficiency of the sailplane wing.

In short, it was possible to achieve altitudes in excess of 70, 000 feet, but only by making certain that all parts of the aeronautical equation were in balance: thrust, lift, and weight. The only plane meeting these requirements, Donovan insisted, was Kelly Johnson's CL-282 because it was essentially a sailplane. In Donovan's view, the CL-282 did not have to meet the specifications of a combat aircraft because it could fly safely above Soviet fighters.[44]

Donovan's arguments convinced the Intelligence Systems Panel of the merits of the CL-282 proposal, but this panel reported to the Air Force, which had already rejected the CL-282. Thus, even though the Lockheed CL-282 had several important sources of support by September 1954—the members of the Intelligence Systems Panel and high-ranking Air Force civilians such as Trevor Gardner—these backers were all connected with the Air Force. They could not offer funds to Lockheed to pursue the CL-282 concept because the Air Force was already committed to the Martin RB-57 and the Bell X-16. Additional support from outside the Air Force was needed to bring the CL-282 project to life, and this support would come from scientists serving on high-level advisory committees.

The Technological Capabilities Panel

The Eisenhower administration was growing increasingly concerned over the capability of the Soviet Union to launch a surprise attack on the United States. Early in 1954, Trevor Gardner had become alarmed by a RAND Corporation study warning that a Soviet surprise attack might destroy 85 percent of the SAC bomber force. Gardner then met with Dr. Lee DuBridge, President of the California Institute of Technology and Chairman of the Office of Defense Mobilization's Science Advisory Committee, and criticized the committee for not dealing with such essential problems as the possibility of a surprise attack. This criticism led DuBridge to invite Gardner to speak at the Science Advisory Committee's next meeting. After listening to

[44] Donovan interview (S); Baker interview (S).

Gardner, the committee members decided to approach President Eisenhower on the matter. On 27 March 1954, the President told them about the discovery of the Soviet Bison bombers and his concern that these new aircraft might be used in a surprise attack on the United States. Stressing the high priority he gave to reducing the risk of military surprise, the President asked the committee to advise him on this problem.[45]

James R. Killian, Jr.

The President's request led Chairman DuBridge to ask one of the most prominent members, MIT President James R. Killian, Jr., to meet with other Science Advisory Committee members in the Boston area to discuss the feasibility of a comprehensive scientific assessment of the nation's defenses. At their meeting at MIT on 15 April 1954, the group called for the recruitment of such a task force if the President endorsed the concept.

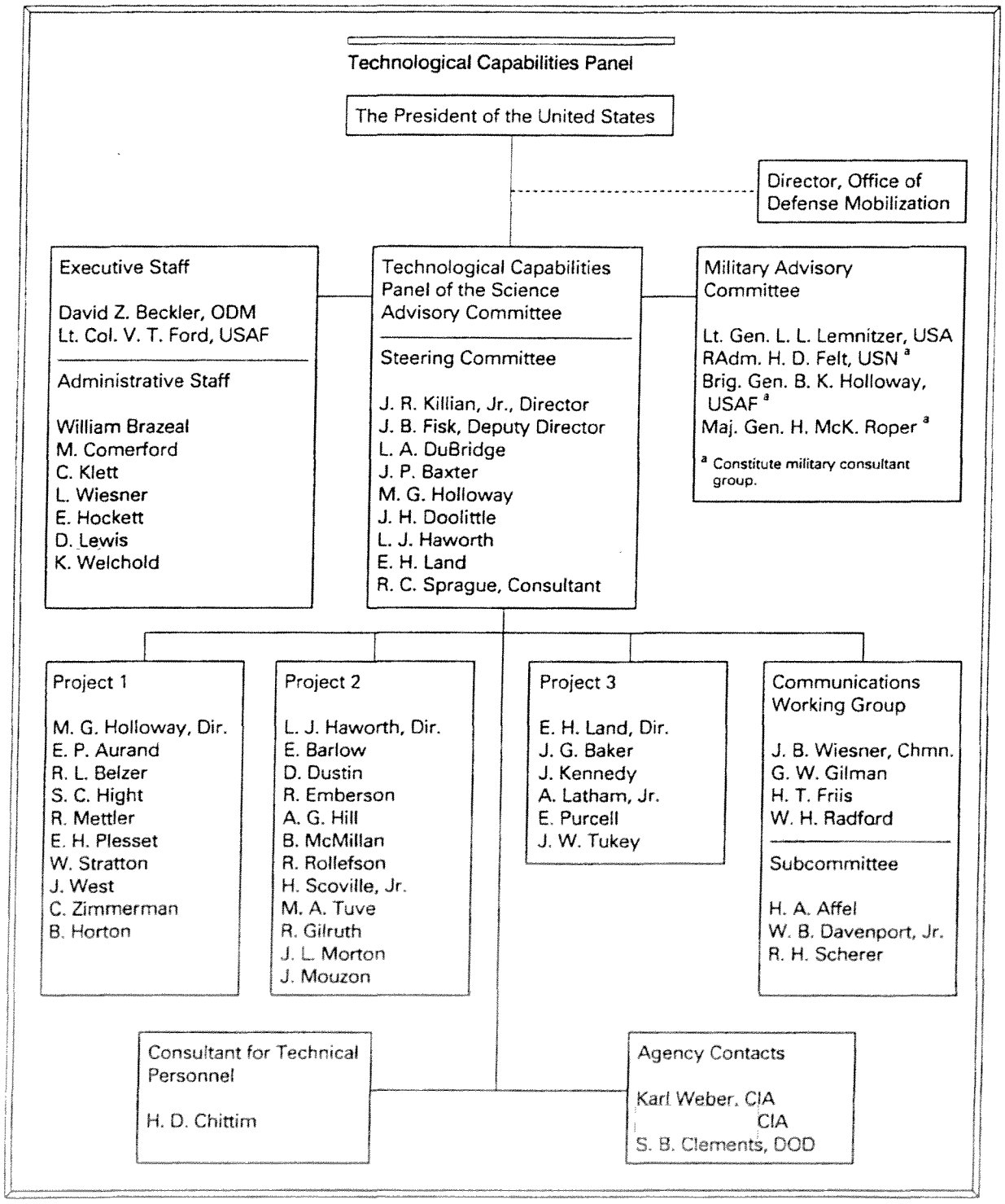
On 26 July 1954, President Eisenhower authorized Killian to recruit and lead a panel of experts to study "the country's technological capabilities to meet some of its current problems." Killian quickly set up shop in offices located in the Old Executive Office Building and organized 42 of the nation's leading scientists into three special project groups investigating US offensive, defensive, and intelligence capabilites, with an additional communications working group (see chart, page 28). The Technological Capabilities Panel (TCP) groups began meeting on 13 September 1954. For the next 20 weeks, the members of the various panels met on 307 separate occasions for briefings, field trips, conferences, and meetings with every major unit of the US defense and intelligence establishments. After receiving the most up-to-date information available on the nation's defense and intelligence programs, the panel members began drafting their report to the National Security Council.[46]

Project Three Support for the Lockheed CL-282

Even before the final Technological Capabilities Panel report was ready, one of the three working groups took actions that would have a major impact on the US reconnaissance program. Project Three had

[45] Beschloss, *Mayday*, pp. 73-74; Technological Capabilities Panel of the Science Advisory Committee, *Meeting the Threat of Surprise Attack*, 14 February 1955, p. 185 (hereafter cited as *TCP Report*) (TS/Restricted Data, downgraded to S).

[46] James R. Killian, Jr., *Sputnik, Scientists, and Eisenhower: A Memoir of the First Special Assistant to the President for Science and Technology* (Cambridge: MIT Press, 1977), p. 68; Beschloss, *Mayday*, p. 74; *TCP Report*, pp. 185-186 (S).



the task of investigating the nation's intelligence capabilities. Its chairman was Edwin H. (Din) Land, the inventor of the polarizing filter and the instant camera. When James Killian asked Land to head Project Three, Land had to make a major decision about his career. At the time, the 45-year-old millionaire was on a leave of absence from Polaroid and was living in Hollywood, advising Alfred Hitchcock on the technological aspects of making three-dimensional movies. Land decided to give up his interest in cinema's third dimension and return east to Polaroid and the panel appointment.[47]

Edwin H. Land

Land's Project Three was the smallest of the three Technological Capabilities Panel projects, for he preferred what he called "taxicab committees"—committees small enough to fit into a single taxicab. The Project Three committee consisted of Land; James Baker and Edward Purcell of Harvard; chemist Joseph W. Kennedy of Washington University, St. Louis; mathematician John W. Tukey of Princeton University and Bell Telephone Laboratories; and Allen Latham, Jr., of Arthur D. Little, Inc., an engineer and former treasurer of the Polaroid Corporation.[48]

In mid-August 1954, Land and Baker went to Washington to arrange for the various intelligence organizations to brief the Project Three study group. As the briefings progressed, the panel members became more and more distressed at the poor state of the nation's intelligence resources. Land later noted, "We would go in and interview generals and admirals in charge of intelligence and come away worried. Here we were, five or six young men, asking questions that these high-ranking officers couldn't answer." Land added that the Project Three members were also not overly impressed with the Central Intelligence Agency.[49]

Land learned the details of Lockheed's proposed CL-282 aircraft soon after he arrived in Washington. Philip Strong showed him Kelly Johnson's conceptual drawing of the plane and told him that the Air Force had rejected it. Although Land had heard Allen Donovan

[47] James R. Killian, Jr., interview by Donald E. Welzenbach, tape recording, Cambridge, Massachusetts, 2 November 1984 (S); Land interview (TS Codeword).

[48] *TCP Report*, p. 188 (S).

[49] Land interview (TS Codeword).

briefly mention a Lockheed design for a high-flying aircraft at the 24-25 May meeting of Baker's Intelligence Systems Panel, he did not realize that that plane and the one in Strong's drawing were the same. As soon as Land saw Strong's copy of the CL-282 drawing, however, he telephoned Baker to say, "Jim, I think I have the plane you are after."[50]

A few days later, when Land showed Kelly Johnson's conceptual drawing to Baker and the other Project Three members, they all became enthusiastic about the aircraft's possibilities. Although Baker had heard Allen Donovan's brief mention of the Lockheed design in May, he had not yet seen a drawing of the aircraft because Donovan did not report to the ISP on his early-August trip to Lockheed until 24 September. After seeing the CL-282 drawing, Baker began designing a camera and lens system that would fit in the Lockheed craft.[51]

At the end of August, Land discussed the CL-282 with Allen Dulles's Special Assistant for Planning and Coordination, Richard Bissell, who came away from the meeting without any definite ideas as to what Land wanted to do with the aircraft. Overhead reconnaissance was not uppermost in Bissell's mind at the time, and it was unclear to him why he had even been contacted.[52] Bissell's outstanding academic credentials, his acquaintanceship with James Killian through his previous teaching experience at MIT, and his direct access to DCI Dulles may have led the Technological Capabilities Panel members to consider him the best CIA point of contact.

Although surprised that he had become involved in the CL-282 project, Bissell's interest was piqued, and he set out to learn what he could about reconnaissance systems. In early September 1954, Bissell had Douglas E. Ashford, a young Air Force officer on his staff, put together a general status report on air reconnaissance programs. Bissell forwarded the 16-page study to the Deputy Director of Central Intelligence (DDCI), Lt. Gen. Charles Pearre Cabell, USAF, on 24 September. In a covering memorandum, Bissell called Cabell's

[50] Baker interview (S).

[51] Ibid.

[52] Bissell interview (S).

attention to a section of the report about a "stripped or specialized aircraft" called the Lockheed CL-282.[53]

By September 1954, Land's Project Three study group had become very much interested in the Lockheed CL-282 design. Their interest grew even stronger when James Baker told them of Allen Donovan's strong case for the CL-282 at the 24-25 September meeting of the ISP. It is not possible to determine exactly when the Land committee decided to back the CL-282; in fact, there may never have been a formal decision as such. In view of Land's impulsive nature, he probably seized upon the CL-282 design as being a workable concept and immediately began developing it into a complete reconnaissance system.

During September and October the Project Three study group met frequently to discuss the Lockheed design and the reconnaissance equipment it would carry. Meetings were small, generally with fewer than 10 participants; Garrison Norton was often the only government official in attendance. At times outside experts joined in the proceedings. When the discussion turned to cameras and film, Land invited Dr. Henry Yutzy, Eastman Kodak's film expert, and Richard S. Perkin, President of the Perkin-Elmer Company, to participate. For discussions on the J57 engine, the panel members asked Perry W. Pratt, Pratt and Whitney's chief engineer, to attend. Kelly Johnson also met with the panel to review plans for the CL-282 system.[54]

By the end of October, the Project Three meetings had covered every aspect of the Lockheed design. The CL-282 was to be more than an airplane with a camera, it was to be an integrated intelligence-collection system that the Project Three members were confident could find and photograph the Soviet Union's Bison bomber fleet and, thus, resolve the growing "bomber gap" controversy. It was not just the Lockheed aircraft that had captured the Land group's fancy; the plane was seen as the platform for a whole new generation of aerial cameras that several committee members had been discussing since the BEACON HILL and Intelligence Systems Panel meetings. James Baker was in the process of developing a revolutionary new

[53] Memorandum for DDCI Charles Pearre Cabell from R. M. Bissell, Special Assistant to the Director for Planning and Coordination, "Aerial Reconnaissance," 24 September 1954, DCI Records, job 80-B-1676R, box 25 (TS, downgraded to S).

[54] Killian, *Sputnik, Scientists, and Eisenhower*, p. 82.

camera with tremendously improved resolution and film capacity, and the Eastman Kodak company was working on new thin, lightweight film.[55]

By October 1954, the Project Three study group had drafted a complete program for an overhead reconnaissance effort based on the CL-282 aircraft. The one remaining question was who would conduct the overflights. The committee's members, particularly Land, were not in favor of the Air Force conducting such missions in peacetime. Firmly believing that military overflights in armed aircraft could provoke a war, they argued for civilian overflights in unarmed, unmarked aircraft. In their view, the organization most suited for this mission was the Central Intelligence Agency.[56]

In late October 1954, the Project Three panel discussed the CL-282 system concept with DCI Allen Dulles and the Secretary of the Air Force's Special Assistant for Research and Development, Trevor Gardner. Dulles was reluctant to have the CIA undertake the project. He did not like to involve the CIA with military projects, even ones that the military had rejected, like the CL-282. Furthermore, the DCI strongly believed that the Agency's mission lay in the use of human operatives and secret communications, the classic forms of intelligence gathering. Land came away from this meeting with the impression that Dulles somehow thought overflights were not fair play. Project Three committee members were nevertheless convinced that technology, particularly in the form of the CL-282 and the new camera designs, would solve the nation's intelligence problems.[57]

A Meeting With the President

Allen Dulles's reluctance to involve the CIA in the CL-282 project did not stop the Project Three committee from pursuing its aims because it was able to go over Dulles's head and appeal directly to the President. Having participated in the BEACON HILL Study and the Intelligence Systems Panel, several Project Three members had definite ideas on how to improve intelligence collection, ideas that they were determined to present to the highest levels of government. They were able

[55] Land interview (TS Codeword).

[56] Land interview (TS Codeword); Baker interview (S).

[57] Land interview (TS Codeword).

to do so because the Land committee was part of a panel commissioned by President Eisenhower to examine the nation's intelligence community and recommend changes. The committee thus had a direct line to the White House through James Killian's contacts there.

Early in November 1954, Land and Killian met with President Eisenhower to discuss high-altitude reconnaissance. Killian's memoirs contain an account of this crucial meeting:

> *Land described the [CL-282] system using an unarmed plane and recommended that its development be undertaken. After listening to our proposal and asking many hard questions, Eisenhower approved the development of the system, but he stipulated that it should be handled in an unconventional way so that it would not become entangled in the bureaucracy of the Defense Department or troubled by rivalries among the services.*[58]

The scientists from the advisory committees and the President were thus in agreement that the new reconnaissance program should be controlled by the CIA, not the military.

CIA and Air Force Agreement on the CL-282

Meanwhile Edwin Land and his Project Three colleagues were working to convince Allen Dulles that the CIA should run the proposed overflight program. On 5 November Land wrote to the DCI strongly urging that the CIA undertake the CL-282 project:

> *Here is the brief report from our panel telling why we think overflight is urgent and presently feasible. I [Land] am not sure that we have made it clear that we feel there are many reasons why this activity is appropriate for CIA, always with Air Force assistance. We told you that this seems to us the kind of action and technique that is right for the contemporary version of CIA: a modern and scientific way for an Agency that is always supposed to be looking, to do its looking. Quite strongly, we feel that you must always assert your first right to pioneer in scientific techniques for collecting intelligence—and choosing such partners to assist you as may be needed. This present opportunity for aerial photography seems to us a fine place to start.*[59]

[58] Killian, *Sputnik, Scientists, and Eisenhower*, p. 82. The exact date of the meeting cannot be determined, but it occurred during the first half of November 1954.

[59] Letter, Project Three Panel to DCI Allen F. Dulles, 5 November 1954, in *OSA History*, chap. 1, annex 1 (TS Codeword).

The letter had two attachments: a two-page summary of a complete operational plan for organizing, building, and deploying the CL-282 within a period of 20 months at a cost of $22 million and a three-page memorandum, entitled "A Unique Opportunity for Comprehensive Intelligence."

Aware of Dulles's preference for classical intelligence work, the Project Three memorandum stressed the superiority of the CL-282 program over traditional espionage methods:

> *We believe that these planes can go where we need to have them go efficiently and safely, and that no amount of fragmentary and indirect intelligence can be pieced together to be equivalent to such positive information as can thus be provided.*[60]

The Land committee memorandum also stressed the need for the CIA to undertake such reconnaissance missions rather than the Air Force, noting that "For the present it seems rather dangerous for one of our military arms to engage directly in extensive overflight." The committee members also listed the advantages of using the CL-282 rather than an Air Force aircraft:

> *The Lockheed super glider will fly at 70,000 feet, well out of the reach of present Russian interceptors and high enough to have a good chance of avoiding detection. The plane itself is so light (15,000 pounds), so obviously unarmed and devoid of military usefulness, that it would minimize affront to the Russians even if through some remote mischance it were detected and identified.*[61]

One additional advantage of the Lockheed design over the Air Force's proposed high-altitude reconnaissance aircraft was a faster completion time. Kelly Johnson had promised the Land committee that his aircraft would be flying by August 1955, just eight months after he proposed to start construction. The Bell X-16 prototype was not scheduled for completion before the spring of 1956.

The strong advocacy of Killian and the other scientists on the various advisory committees concerned with overhead reconnaissance, combined with President Eisenhower's support, finally won

[60] Memorandum for DCI Allen F. Dulles from Project Three Panel, "A Unique Opportunity for Comprehensive Intelligence," 5 November 1954, p. 3 (TS, downgraded to S) in *OSA History*, chap. 1, annex 1 (TS Codeword).

[61] Ibid.

over DCI Dulles, but a project of this magnitude also required the support of the Air Force. Some Air Force officials, however, feared that a decision to build the CL-282 might jeopardize the Air Force's own RB-57 and X-16 projects. Just one month earlier, in October 1954, the Wright Air Development Command had appealed to the Air Force Deputy Chief of Staff for Development, Lt. Gen. Donald L. Putt, to oppose the adoption of the Lockheed design. The officials argued that the Bell X-16 was a better design because it was more airworthy than the CL-282 and could be used throughout the Air Force in different types of missions because it had two engines, wheels, and an armor-plated, pressurized pilot's compartment. If J57 engines were diverted to the CL-282, the appeal to General Putt warned, there would not be enough of these popular powerplants to meet the needs of the X-16 program.[62]

Having heard of the Wright Air Development Command attack on the CL-282, Allen Donovan of the Intelligence Systems Panel met with General Putt on 19 October to argue in favor of the Lockheed design. This discussion led General Putt to meet with 15 scientists from the Technological Capabilities Panel on 18 November 1954 to discuss the merits of the four proposed reconnaissance aircraft. Also present as a briefer was Maj. John Seaberg from the Wright Air Development Command, who later recalled:

> *What I did was present the results of my comparative analysis of all four designs. I showed the relative high altitude performance capabilities of all four. I pointed out that aerodynamically the Bell, Fairchild, and Lockheed designs were close. Martin's B-57, being a modification, was not quite as capable. I stated that, in my opinion, the J73 [General Electric engine] would not be good enough to do the job in Johnson's airplane. And further, I overlaid a curve showing that with the J57 [Pratt & Whitney engine] installed, it would then be competitive with the Bell and Fairchild designs.*[63]

This meeting—along with the knowledge that President Eisenhower also supported the CL-282—helped win over the Air Force. To be on the safe side, however, the Air Force did not abandon the X-16 program until the Lockheed aircraft had begun flying.

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[62] Donovan interview (S).

[63] Quoted in Miller, *Lockheed U-2*, p. 13.

On 19 November, the day after Seaberg's briefing, the final decision on the CL-282 came at a luncheon hosted by Air Force Secretary Talbott. The participants—Dulles and Cabell from the CIA; Gardner, Ayer, and General Putt from the Air Force; Kelly Johnson; and Edwin Land—all agreed "that the special item of material described by Lockheed was practical and desirable and would be sought. . . . It was agreed that the Project should be a joint Air Force–CIA one but that, regardless of the source of the funds, whether AF or CIA, CIA unvouchered channels would be needed to pass the funds."[64]

It is interesting to note that Lockheed, which had originally developed the CL-282 on its own and had devoted considerable effort to promoting it, had to be persuaded to undertake the project in November 1954 because the company had become heavily committed to several other civilian and military projects. When Kelly Johnson received a call from Trevor Gardner on 17 November asking him to come to Washington for conversations on the project, his instructions from Lockheed's senior management were "to not commit to any program during the visit, but to get the information and return." When he returned to California, Johnson noted in his project log that "I was impressed with the secrecy aspect and was told by Gardner that I was essentially being drafted for the project. It seemed, in fact, that if I did not talk quietly, I might have to take a leave of absence from my job at Lockheed to do this special project."[65] Of course, Kelly Johnson did not need to be drafted or persuaded into undertaking such a bold step forward in aircraft design. He used Gardner's statement to convince Lockheed's senior management to approve the project, which they did after meeting with Johnson when he returned to California on the evening of 19 November.

Four days later, on 23 November, the Intelligence Advisory Committee (IAC) approved DCI Dulles's request to undertake the CL-282 project. The following day Dulles signed a three-page memorandum, drafted by DDCI Cabell, asking President Eisenhower to approve the overhead reconnaissance project. That same afternoon, at a meeting attended by the Secretaries of State and Defense and senior Air Force officials, Dulles and Cabell presented the document to the

[64] Charles Pearre Cabell, Memorandum for the Record, "Luncheon Meeting with the Secretary of the Air Force," 19 November 1954, in *OSA History*, chap. 2, annex 4 (TS Codeword).

[65] Johnson, "Log for Project X," 17 and 19 November 1954.

President and received verbal authorization to proceed. Eisenhower told Dulles that the project was to be managed by the Agency and that the Air Force was to provide any assistance needed to get it operational.[66]

Thus, it was that the CIA entered into the world of high technology primarily because of decisions and actions taken outside the Agency: the Air Force's refusal to build the CL-282 aircraft, President Eisenhower's desire to have a sensitive overflight project conducted by a civilian agency rather than the military, and, above all, the determination by a small group of prominent scientists that the Lockheed design represented the best possible overhead reconnaissance system.[67]

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[66] Charles Pearre Cabell, Memorandum for the Record, "Meeting at the White House," 24 November 1954, in *OSA History*, chap. 2, annex 8 (TS Codeword) ; Beschloss, *Mayday*, pp. 82-83; Andrew J. Goodpaster, Memorandum of Conference with the President, 24 November 1954," White House Office of the Staff Secretary, Alpha Series, Dwight D. Eisenhower Library (hereafter cited as WHOSS, Alpha, DDEL) (TS, declassified).

[67] Scientists remained active in advising the government on overhead reconnaissance. In February 1955, the Technological Capabilities Panel issued its final report, which strongly urged the use of technology to gather intelligence. President Eisenhower strongly backed the panel's findings and directed government agencies to respond to the recommendations by June. The CIA's most important reaction to the Technological Capabilities Panel report was to create its own Scientific Advisory Board composed of the members of the Project Three Study Group with the addition of James Killian and Jerome B. Wiesner, professor of electrical engineering at MIT. Edwin Land served as chairman of the CIA Scientific Advisory Board for the next 10 years, and it soon became known unofficially as the Land Panel. This panel provided important advice to the Agency, particularly in the field of overhead reconnaissance.

President Eisenhower also acted to increase the amount and quality of scientific advice he was receiving. In January 1956 he established the President's Board of Consultants on Foreign Intelligence Activities (renamed the President's Foreign Intelligence Advisory Board in 1961) to oversee the intelligence community and advise him on intelligence matters. The board's first chairman was James Killian. In 1957 the President reorganized and upgraded the Office of Defense Mobilization's Science Advisory Committee, which became the President's Science Advisory Committee. He also named James Killian to be the first Special Assistant to the President for Science and Technology. In this new position Killian served as the President's scientific advisor and the chairman of the President's Scientific Advisory Committee (Killian stepped down as chairman of the President's Board of Consultants on Foreign Intelligence Activities but remained a member). These actions by the President brought scientists into the White House and gave them considerable influence.

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