

March 7, 2020 CAHS Toronto Chapter Meeting

Topic: Cold War overflights of the Soviet Union and the Lockheed U-2

Speaker: Martin Keenan, Historian

Reporter: Gord McNulty

It was a pleasure to introduce Martin Keenan, a familiar presenter at CAHS Toronto Chapter meetings. Martin obtained his BSc. from the University of Guelph in 1989. After working in the industrial water treatment and motion picture film processing industries, he joined Petro-Canada in 1996. Since 2000, he has been a Product Specialist for Petro-Canada Lubricants, dealing with the design and manufacture of lubricating greases at their Mississauga lubricants plant. He is a member of the Society of Lubrication and Tribological Engineers.

Martin became an aviation enthusiast as a result of a family trip to the first Canadian Warplane Heritage Air Show in June, 1975 at Hamilton. He encountered Voodoos, Harvards, Mustangs, Corsairs and other warbirds for the first time. Martin is a published aviation author and photographer. His pictures and articles have been published in U.S. Aviator, Flypast, Airforce, Maritime Patrol Aviation, Classic Wings and Le Fana de l'Aviation. A resident of Burlington, Martin has been a member of the CAHS Toronto Chapter since 2003, and is a former Secretary-Treasurer of the Chapter.



Speaker - Martin Keenan

Martin began his well-illustrated presentation, No. 7, recalling how the post-war balance of power between the U.S. and the USSR was suddenly altered after the Soviets tested an atomic bomb on Aug. 29, 1949. The U.S. urgently required surveillance to find Soviet bomber and missile bases, industrial sites, transportation centres, and so on. Covert overflights over the USSR had started as early as 1946. Reconnaissance versions of the B-29 Superfortress, known as the F-13, flew over eastern Siberia to search for bomber and fighter airfields. Once, an F-13 ended up in the middle of a formation of Soviet Tupolev Tu-4s, the reverse engined copy of the B-29. No one among the Soviets seemed to have notice that one of the bombers had white stars instead of red! Fortunately, the 46th Squadron crew quietly slid out of the formation.



Convair RB-36D

F-86 Sabres were converted to RF-86As by removing the guns and installing a camera package under the pilot's seat where the guns normally were. The gun ports were painted on to make it look like the aircraft was still armed. Much larger Convair RB-36Ds, modified B-36 Peacemakers with large cameras and electronic intelligence equipment in some of the bomb bays, had the advantages of greater capacity and range. RB-36Ds flew around the periphery of the USSR and also over Poland. However, the B-36 was far from stealthy and could not fly high enough to completely avoid interception.

As Britain's Prime Minister Churchill was considered to be more willing to authorize overflights than President Truman, the USAF loaned North American RB-45 Tornado reconnaissance bombers to the Royal Air Force "Special Duty Flight." In April, 1952, three Special Duty Flight aircraft simultaneously radar mapped the western USSR and escaped unscathed. In August, 1953, an RAF Canberra is believed to have overflown a Soviet missile range at Kapustin Yar, near Stalingrad, and landed in Iran but there was never official acknowledgment of this daring mission. (Google "Canberra over Soviet Union" for details).



Martin RB-57D

B-47 Stratojets were also converted to reconnaissance RB-47s. In May, 1954, a Strategic Air Command RB-47E flew over the White Sea region. It took images of nine Soviet air bases. MiG-15s, supposed to provide air defence, weren't capable of reaching a B-47 at 40,000 feet. However, unknown to the mission planners, MiG-15s were replaced by MiG-17s. The RB-47 managed to escape after being chased by a MiG-17 into Finnish airspace and taking a couple of bullets. These missions were extraordinarily dangerous. Between 1950 and 1960, at least 133 American air force and naval personnel were killed in action --- frequently under circumstances where their activities couldn't be officially acknowledged.

High-altitude balloons were among the most exotic attempts to reconnoitre the USSR. In early 1956, Project Genetrix launched 516 balloons that were intended to drift across the Soviet land mass and randomly take pictures. Only 44 were recovered on the far side. Of the 44, only 32 had actually taken usable images, providing some targeting data --- but nowhere near enough. Many balloons either fell down or were shot down. The remains were prominently displayed in Moscow, embarrassing the Americans. However, a technique was developed to recover the balloon gondolas from which images were obtained. Released from the balloon, gondolas would descend under parachutes and a C-119 Flying Boxcar would pick them up in mid-air.



X-16

A photo reconnaissance satellite was really needed to gather knowledge about the deep interior of the USSR, but in the early 1950s it was barely outside the realm of science fiction. The USAF began investigating high-tech solutions. The idea of combining a turbojet engine with a very high aspect ratio wing design produced something like a jet-powered sailplane. The goal was to design a reconnaissance aircraft that could fly so high it could not be intercepted, and possibly not even detected. In early 1953, the USAF started Project Bald Eagle.

The Martin company was asked to design a version of the B-57 Canberra, with a high aspect ratio wing and a high altitude version of Pratt and Whitney J-57 engines. Twenty RB-57Ds were built as an interim step before a more advanced aircraft could be built. Fairchild and Bell submitted proposals. Bell was chosen to develop the Model 67 under high security. It featured a high aspect ratio, slightly swept wings, and was powered by two high-altitude J-57s. The aircraft was designed to fly at about 70,000 feet, with a range of 3,300 miles and a payload of cameras and sensors. Such performance could be achieved only if the structure was very light, so the g limits had to be narrower more than on a conventional military aircraft.

The USAF designated the espionage plane the X-16, an experimental aircraft, to cover its real purpose. Twenty-eight aircraft were ordered. The first flight was set for early 1956, but then Clarence "Kelly" Johnson, Lockheed's chief engineer and legendary designer, was brought into Project Bald Eagle. At the time, Johnson was involved in design of the



Clarence Kelly Johnson

F-104 Starfighter. Kelly thought of using a shortened Starfighter fuselage, with high aspect ratio wings. To keep it light, the jet would take off on a cart and land on a skid replacing the landing gear. He sent his design, the CL-282, to the Pentagon. They asked for a more detailed proposal. However, the Strategic Air Command, led by Gen. Curtis LeMay, wasn't really impressed.

Nonetheless, the Central Intelligence Agency was interested. CIA staff secretly arranged for the CL-282 to be developed in parallel with the X-16. President Eisenhower authorized an aggressive CIA program, with the aircraft to be operational in only 17 months. The landing gear issue was solved by equipping the aircraft with a single main gear, a tailwheel, and outrigger "pogo" wheels on the wings. The pogo wheels, which maintained balance for taxiing and takeoff, would drop away when the aircraft took off. The construction was fairly light. Like the X-16, the aircraft would not have the usual g limits for a military aircraft. Special fuel, low volatility JP-7, was developed, as regular JP-4 would boil in at extreme altitudes.



Lockheed F-104 Starfighter

The CIA called this aircraft the Angel, referring to where it would be flown. The pilot would have to wear a pressure suit. The cockpit was pressurized to 30,000 feet to compromise between pilot comfort and structural weight. The Angel had an equipment bay, that could house cameras or electronic intelligence equipment, behind the cockpit. High-altitude Hycon cameras were developed during the program. The Hycon "B" camera, featuring two counter-rotating spools of film, could produce 6,500 feet of nine-inch film without creating a weight-balance issue during a mission. The two rolls of film combined produced an 18 x 18-inch negative, capable of resolving lines on a parking lot from 6,500 feet away on a clear day. The camera lens could swivel to seven different positions, so photos could be taken directly below or to either side while the aircraft was flying.

By 1955, construction of the supersecret aircraft was under way. A remote location in a flat stretch of desert at Groom Lake, Nevada, conveniently next to the Atomic Energy Commission's nuclear test range, was chosen. The range was extended for secrecy. First called "Watertown Strip" or "Paradise Ranch," it is now known as Area 51. Most senior USAF commanders weren't aware of the Angel program until they were briefed by the CIA in June 1955. The Strategic Air Command was furious and a dispute rose to the USAF Chief of Staff. Ultimately, the USAF would have a say in selecting the pilots but the CIA would do the actual overflights. Lemay felt the USAF should have its own U-2s and the X-16 was cancelled in October 1955.

The first prototype Angel, completed at Burbank in July 1955, was shipped aboard a C-124 Globemaster II and flown to "Watertown Strip." Taxi trials of "Article 341" started in August, 1955. The aircraft showed tremendous lift. It took off unexpectedly, flying for a quarter mile before it was recovered. The first official flight was on Aug. 4, 1955. The "pogo" wheels were pinned in place so they wouldn't drop away they were normally supposed to. The Angel flew fine, but landing was problematic, even with the flaps out, speed brakes extended and the engine almost at idle. It didn't want to land. However, a thunderstorm threatened. The test pilot decided to stall the aircraft right above the runway and that worked.

Early flights were restricted to a 200-mile radius around Watertown Strip, so they could glide to the base if engine problems arose. Early generation engines were prone to flaming out at altitude. The Angel showed it had the altitude performance, but would be challenging to fly. At altitude, the minimum and maximum speeds were only about 10 knots apart. Pilots had to fly in a very narrow speed range, as shown in a CIA documentary about Angel pilot training. The best way to land the Angel was in "a full stall, just like the old-fashioned planes with tailwheels." The stall was adopted as standard procedure. When landing, the pogo wheels would drop away after the Angel touched the ground and the pilot would sometimes taxi right to the hangar doors.

USAF pilots were recruited in cloak-and-dagger style to fly what they anticipated to be a supersonic aircraft, but the Angel was decidedly subsonic. Angel pilots underwent extensive medical exams in New Mexico to prepare for long duration, high altitude flights. Training began at Groom Lake in January 1956. The pilots, officially working for Lockheed, were in fact working for the CIA.



Ground View of U-2 Showing Landing Gear

Navigation over the USSR was problematic. They did celestial navigation with a sextant, but the pilot couldn't do calculations wearing a pressure suit. Calculations were worked out beforehand. The pilot simply had to take the sextant measurements in flight. The aircraft originally carried NACA (precursor of NASA) markings but this was a cover. If they had to land somewhere other than they were supposed to, they would say they were engaged in high-altitude weather research. The aircraft was then given the innocuous designation U-2 in the utility aircraft series. U-2s were assigned to Weather Reconnaissance Squadron Provisional - 1.

The unit began with trial flights over East Germany, Czechoslovakia, Hungary, Romania and Bulgaria on June 20 and July 2, 1956. They obtained good results. The

White House wanted to cover major Soviet targets quickly and missions began on July 4 and July 5. During a flight on July 10, the Soviets protested to the U.S. embassy in Moscow. Despite assurances by U-2 designers, the aircraft was detectable by Soviet radar. MiGs began to follow U-2s at lower altitudes and a U-2 over Kiev was fired upon by anti-aircraft artillery. A furious Eisenhower halted the overflights immediately.

The overflights revealed a tremendous amount of information on locations of Soviet bomber airfields, nuclear test ranges and missile testing facilities. U-2 photos showed the Soviets had far fewer bombers, notably the M-4 Bison and the Tu-95 Bear, than expected. Despite the value of the intelligence, Eisenhower was reluctant to consider more overflights. The 1956 Hungarian Uprising changed that but he remained cautious, insisting on authorizing each flight. U-2s flew around the edges of the USSR, the Soviet satellite nations, and the Mideast, especially during the Suez Crisis.

Francis Gary Powers, on a flight over the USSR on Nov. 20, 1956, noticed MiGs trying to climb to his altitude. In a bid to "stealth" the U-2, long wires were added, as well as radar absorbing materials to the fuselage underside to reduce its radar signature. These measures lowered its altitude by 5,000 feet and the range by 20 per cent. The materials also insulated the engine bay and made the engine prone to overheating. These aircraft, nicknamed "Dirty Birds," were deployed in June 1957.

On Oct. 4, 1957, the launch of the Sputnik earth satellite produced public hysteria. U-2 operations focused on missile sites and "Dirty Bird" modifications were removed as they inhibited performance. Stealth had to be incorporated from the inception of design. Operation Soft Touch represented the peak of the overflights and they then declined. The CIA calculated the U-2 could overfly the USSR for two years before interception was possible, but that window was closing. Work on a higher-performance U-2 began. Only one overflight was made in 1958; only two in 1959.

The new version of the U-2 was powered by a J-75 engine to replace the J-57, providing more altitude, speed and payload but reduced range. The original U-2As were re-engined and became U-2Cs. The CIA also replaced the original metal finish with a blue black scheme to reduce visibility. In 1958, the CIA brought in the RAF. A British pilot flew the first overflight mission in a U-2C on Dec. 6, 1959. CIA flights to find potential Soviet targets continued, and two more missions were authorized in spring 1960. The second mission, to fly right across the USSR from Pakistan to Norway, was named Operation Grand Slam. It was stretching the U-2 range to the limit. Operation Square Deal, in April, 1960, discovered new launch sites. One site overflown was a test site for a new surface to air missile, the S-75 Dvina.

On May 1, 1960 "May Day" in the USSR, Powers took off on his second overflight of the USSR. It was supposed to be a nine-hour flight. At 6 a.m. on May 1, Khrushchev was alerted. He ordered it destroyed, regardless of cost. All non-military air traffic was grounded. Powers detected interceptors below him but they were unable to get to his altitude. Three hours into the mission, Powers' autopilot failed. He would have turned back had it happened an hour earlier, but

he carried on. Finally, an S-75 battery was able to fire on the aircraft.

As described in Powers' biography Operation Overflight, a harrowing ordeal began when he suddenly noticed "a dull thump. The aircraft jerked forward and a tremendous orange flash lit up the cockpit and sky." Powers checked the instruments, which were normal, but then the right wing started to droop and the U-2 headed down. The aircraft shook violently, Powers was flicked all over the cockpit and he assumed both wings had come off. What was left of the plane began spinning, upside down. Thrown forward, Powers couldn't use the ejection seat as "the metal rail overhead would cut off both my legs."



Black U-2

Powers was on the edge of panic. But he collected his nerves and realized he could climb out of the airplane. He unlocked and released the canopy and it sailed off into space. The plane was still spinning as "the altimeter passed 34,000 feet and was unwinding very fast." He released the seat belt first, but the centrifugal force took him half way out of the U-2, so quickly that he hit the rear view mirror and snapped it off. "I saw it fly away. That was the last thing I saw because almost immediately my faceplate frosted over."

Powers then discovered he'd forgotten to unfasten the oxygen hoses, which held him to the aircraft. He couldn't activate the destruction switches, as the g forces were too great. He was desperate. He recalled: "Kicking and squirming, I must have broken the oxygen hoses because suddenly I was free."

Initially, it was unclear as to whether the U-2 had been hit. As many as 14 S-75s may have been fired. One of them shot down a MiG-19 in the vicinity. Once it became clear Powers' U-2 was lost, a cover story was issued. On May 3, NASA stated one of their aircraft was missing over northern Turkey after the pilot reported oxygen difficulties and may have flown some distance unconscious. On May 4, Khrushchev announced the news but said nothing about the pilot. The U-2, hurriedly painted in a fake NASA paint scheme, was shown to reporters at Edwards AFB. The cover story relied on the assumption that no one would survive the disintegration of a U-2, but late on May 7, Khrushchev revealed that Powers had survived and was being interrogated. Ultimately, Ike took full responsibility for spy missions, saying they were distasteful but necessary.

The wreckage of the U-2 went on display in Moscow on May 11. Khrushchev unleashed an anti-American tirade, threatening to attack any Allied bases from which U-2 jets flew over Russia. The Four Powers Paris Summit meeting collapsed on May 16, 1960, when Eisenhower refused Khrushchev's demand for an apology. Eisenhower decided no further U-2 flights over the USSR would occur under his presidency. Powers' trial was held in Moscow on Aug. 17-19. The CIA had not expected any of their pilots would be recovered alive. If they were captured, they were told they might as well disclose their activities as the Soviets would learn anyway. Nonetheless, Powers concealed significant information about the U-2, its equipment and the entire program. He was sentenced to 10 years incarceration.

While the trial was in progress, on Aug. 18, 1960, the USAF launched Discoverer 14 into orbit. Officially a scientific research satellite, it was actually the first successful American spy satellite --- part of the top-secret Corona program. Later, the satellite's recovery vehicle or bucket was recovered over the Pacific Ocean using that same technique for recovering Genetrix balloon gondolas. The Corona program led to images of USSR missile bases being taken without putting anyone's life in danger. The U-2 was upgraded in the late 1970s and remarkably, they still remain in service.

Powers was later exchanged for Soviet spy Rudolf Abel in Berlin on Feb. 10, 1962. Despite the U-2 shootdown, and satellites, the CIA still saw a need for high-performance reconnaissance aircraft. "Kelly" Johnson of Lockheed would again lead the effort for a successor to the U-2, culminating in the SR-71. Martin answered numerous questions about his exceptional and fascinating presentation and received a gift from the Chapter in appreciation.
