## **April Meeting**

Topic: "Research and Presidential Aircraft -The new gallery of the National Museum of the USAF"
Speaker: Martin Keenan
Reporter: Gord McNulty

It was a pleasure to introduce a familiar figure to the Toronto Chapter in historian Martin Keenan, a longtime member and former Chapter treasurer. He previously made four presentations to the Chapter, with the most recent being "The X-15" in April, 2016. Martin obtained his BSc. from the University of Guelph in 1989. After working in the industrial treatment and motion picture film processing industries, he joined Petro-Canada in 1996. Since 2000, he has been a Product Specialist for Lubricants Research and



Speaker Martin Keenan Photo Credit - Neil McGavock

Development, dealing with aluminum complex and food grade greases. He is a member of the Society of Tribological and Lubrication Engineers (STLE). Currently he is dealing with Lithium and Calcium Sulphonate complex greases. Martin also worked previously in Industrial Water Treatment. He became an aviation enthusiast as a result of a family trip to the first Hamilton Air Show in 1975, where he encountered Voodoos, Harvards, Mustangs, Corsairs and other famous aircraft for the first time. He has been a member of the Toronto Chapter since 2003.



The Presidential and Research Aircraft Gallery beyond Air Force One SAM 26000 – *Photo Credit - National Museum of the USAF* 

The National Museum of the USAF is located at Wright-Patterson Air Force Base, six miles northeast of Dayton, Ohio. The airfield is the former Wright Field and is normally closed to flying, but one runway is still used to fly exhibits to the museum and occasionally for aviation events hosted by the museum. The extensive collection is housed in four large hangars. The first was built in 1971, the second in 1988, and the third in 2003. The fourth, finished in 2016, houses the collection of presidential and research aircraft, space-related exhibits and some transport aircraft. Despite the vast amount of floor space, the museum still has aircraft

parked outside. Martin suggested they could probably build a fifth gallery of the same size to house the entire collection.

The presidential and research aircraft were formerly housed in what's known as the museum's annex --two historical hangars on the old Wright Field flightline. The housing of the collection in these crowded old facilities was less than ideal. The setup was rather spartan and photography was difficult. The location of the hangars in the active area of the base was the greatest problem. Before the 9/11 terrorist attacks, that wasn't a huge problem. Security became a priority after 9/11. The annex was totally inaccessible for several months and after that, a bus was required for only a limited number of relatively brief trips per day. A new gallery was required to allow the presidential and research aircraft to be more accessible to the public. The impressive new gallery opened in June 2016. Martin visited in September and took excellent photos for his presentation.

## Flypast V. 51 No. 7



The Douglas VC-54C Sacred Cow - Used by President Franklin D. Roosevelt Photo Credit - National Museum of the USAF

Beginning with the resplendent presidential aircraft, Martin noted Franklin D. Roosevelt was the first U.S. president to fly in office. FDR travelled to the Casablanca Conference in January 1943 on a Pan American Airways Boeing 314 Clipper. Because of security concerns about the president flying on a commercial airliner, the Army Air Force Air Transport Command was given the responsibility of flying the president. The Douglas VC-54C became the first presidential aircraft. It flew FDR only once, to the Yalta Conference in February 1945. The press nicknamed the aircraft as the *Sacred Cow* as a result of the stringent security and special status of the aircraft, officially known as *The Flying White House*. The VC-54C was a unique combination of a Douglas C-54A fuselage and C-54B wings for greater fuel capacity, with the V designation indicating it was a VIP transport. The aircraft was used in a non-VIP capacity for about 15 years. The *Sacred Cow* was restored at the museum's restoration facility over a 10-year period between the late 1980s and early 1990s. Its appearance and configuration is the same as it was as the time of the Yalta event. The cabin gallery reflected the nautical theme of FDR, with his naval background. The Sacred Cow had the unique feature of an electric elevator to lift Roosevelt, who was stricken with polio, into the aircraft. The interior was also wheelchair-friendly to enable FDR to talk to the pilots.

The *Sacred Cow* remained in service when Harry S. Truman took office. In fact, the National Security Act of 1947 that created the USAF was signed by Truman aboard the aircraft. Shortly thereafter, it was replaced by the Douglas VC-118 Independence, a military version of the DC-6 airliner. The Independence was named after Truman's hometown of Independence, Missouri. Truman was evidently a serious poker player and the interior was laid out to reflect that. In 1953, the Independence was replaced by Columbine II, a Lockheed VC-121A Constellation. This aircraft led to the creation of the Air Force One designation after a call sign mixup with a commercial airliner in 1954. It's not actually part of the museum collection. Privately owned, it recently made a ferry flight from long-term storage in Arizona to Virginia and is under restoration there. In November 1954, Columbine III, a Lockheed presidential aircraft was put in service. It was named by President Dwight Eisenhower after the state flower of Colorado, the adopted home state of Mrs. Eisenhower. Martin was impressed with the opportunity to view the classic cockpits of the piston-engined presidential aircraft, with the flight engineer's consoles and all of the dials. Toward the end of Eisenhower's presidency, Columbine III was supplemented in 1959 and then replaced by the jet technology of one of three Boeing VC-137Bs, offthe-shelf Boeing 707s, until 1962. They were known as SAM or Special Air Missions aircraft. One of the VC-137Bs is now in the collection of the Museum of Flight at Seattle.

## Flypast V. 51 No. 7



Air Force One SAM 26000 Photo Credit - National Museum of the USAF

In October 1962, Boeing delivered a VC-137C, a highly modified 707-320, known as SAM 26000, to the air force. The vibrant blue and white colour scheme was designed by Jacqueline Kennedy in consultation with famous industrial designer Raymond Loewy. Replacing what had been a red and gold colour scheme that President Kennedy felt was too regal, this scheme has continued to the present day. SAM 26000 is best known as the aircraft which flew Kennedy to Dallas, where he was assassinated in November 1963. Hours later, Vice President Lyndon Johnson was sworn in as the new president aboard SAM 26000 as it returned to Washington. The aircraft still shows

a partition at the rear that had to be cut away, with the removal of four rows of seats, so that Kennedy's casket could be loaded aboard. SAM 26000 became the president's backup aircraft with the acquisition in 1972 of a near identical VC-137C, SAM 27000. SAM 26000, however, remained in government service until its retirement in 1998. For its part, SAM 27000 was retired in 2001 and is now in the Ronald Reagan Presidential Library in California. The original intention was to restore the interior of SAM 26000 to its 1962 appearance, but this wasn't completely finished, so the aircraft still retains its communications outfit from the 1990s.

The presidential collection also includes smaller aircraft that served at various times as transports. They include an Aero Commander U-4B, used to fly President Eisenhower on short trips and often flown by Ike himself, before presidential helicopters came into service; a North American T-39 Sabreliner that flew Johnson to and from the LBJ Ranch in Texas: a Lockheed VC-140B JetStar which carried Johnson, Richard Nixon, Gerald Ford, Jimmy Carter and Ronald Reagan; and a Gulfstream III VC-120B, which replaced the JetStar and

presidents. A certain amount of floor

space in the fourth gallery is occupied



served Bill Clinton and several retired Lyndon B. Johnson being sworn in as US President aboard Air Force One Photo Credit - National Museum of the USAF

by several unrelated transport aircraft. Martin suggested they are place holders pending the ultimate arrival of one of the current Air Force One aircraft, a Boeing VC-25, a highly modified Boeing 747.

As for research aircraft, the museum has a superb collection covering the golden age of test flight in the 1940s through the 1960s. Martin began with the "parasite" fighters, based on the idea of long-range bombers that required a fighter escort carrying their own fighter. McDonnell's dimunitive, radical XF-85 Goblin was to be carried in the bomb bay, on a trapeze. The XF-85 could theoretically be lowered out of the bomb bay to perform its mission, and then reattach to the trapeze. The theory worked better than the practice for this unsuccessful oddity. The Republic YF-84J FICON (contraction of Fighter and ReCONnaissance), a modified RF-84F Thunderflash, was intended to be lowered from the bomb bay of a Convair B-36 on a boom, with attachments. This aircraft actually flew for a year or two. However, it became clear that air- to-air refuelling was the solution to flying small fighters long distances.



Convair XF-92 – Photo Credit - www.airwar.ru

In terms of aerodynamic innovation, the Convair XF-92 was the first powered aircraft to fly with a delta wing. It incorporated German aerodynamic research captured by the Americans after the Second World War. While it was only marginally supersonic in a dive, the XF-92 was the direct ancestor of the Convair F-102 Delta Dagger, F-106 Delta Dart and B-58 Hustler. The Northrop X-4 Bantam was built to test the flying characteristics of tailless configurations at transonic speeds. Its flight characteristics weren't particularly good and it was considered an accomplishment that there

weren't any major accidents during the test program. The Bell X-5 was the first high-performance aircraft with a variable geometry or swing wing. It was also derived from captured German research, specifically the very advanced Messerschmitt P.1101 prototype --- built but not flown by the Germans at the end of the war. The X-5, based on the Messerschmitt design, proved the concept was practical. It led to successful production swing-wing aircraft beginning in the 1960s through the 1980s. The Grumman X-29 was intended to test the practicality of a forward swept wing, another innovation from the Germans. It was the first supersonic aircraft with a forward swept wing. Two X-29s flew from the early 1980s to the early 1990s. So far, the technology hasn't appeared on any production American aircraft, though it has been used in a Russian technology demonstrator, the larger, twin-engined Sukhoi Su-47.





The Bell X-5 in flight – Photo Credit - National Museum of the USAF Flypast V. 51 No. 7

Bell X-5 photo showing the variable geometry swing wing – Photo Credit -National Museum of the USAF



The X-29 Research aircraft over the Mojave Desert *Photo Credit - NASA* 

Regarding innovation in propulsion, the museum has a Republic XF-84H "Thunderscreech", an F-84F Thunderstreak fitted with a large Allison turboprop engine to test supersonic propellers. It was extremely loud, even reportedly as far as 25 miles away! It made communication with groundcrew impossible. The vibration was so bad that some groundcrew became physically sick. As flawed as the aircraft was, it was at one point the world's fastest propeller-powered aircraft. The Republic XF-91 Thunderceptor combined a turbojet engine, a General Electric J79, with a rocket engine, an XRL11 as used in the Bell X-1. Designed as a point interceptor,

the XF-91 had a variable incidence wing and an inverse tapered wing design in which the wings were wider at the tips rather than the roots. Two XF-91s were built.

As for flight control systems, the Lockheed NT-33A had an inflight simulator to test the flying qualities, cockpit displays, control sticks and flight control systems of smaller aircraft. It was used to develop systems for the X-15, A-10, F-15, F-16, F-18, F-117 and F-22. Hundreds of air force and navy test pilots trained on this aircraft. The unusual nose section actually came from an F-94 Starfire. When retired in 1997, the NT-33A was the oldest flying aircraft in the USAF. The one-of-a-kind Convair NC-131H, sometimes seen in western New York, was another flying simulator to test the aerodynamic performance of larger aircraft before they were built. It was used for the B-1, Space Shuttle, B-2, YF-23 and C-17. The Lockheed P-80R, a modified Shooting Star, had a smaller cockpit canopy, shorter wing, redesigned intakes and low drag finish. It set a world speed record of 624 miles per hour in June 1947. The Douglas X-3 Stiletto was designed for sustained flight at Mach 2.0, but problems with underpowered engines made it barely capable of supersonic flight, only in a dive. It did, however, influence design of the F-104 and pioneered the use of titanium in aircraft construction. The Bell X-1B was one of the second-generation X-1 aircraft intended to build on the performance of the original X-1, the first aircraft to exceed the speed of sound. The second generation X-1s were considerably faster than the original X-1, with the X-1A reaching Mach 2.44 in December 1953. The museum's X-1B is the only survivor of the second generation X-1s. The museum's Lockheed YF-12, a modified Lockheed A12, ancestor of the SR-71 Blackbird, was built as a high-speed, Mach 3.0 high altitude interceptor. It set several speed and altitude records in the mid-1960s, finishing

by investigating supersonic cruise technology. It's the only surviving YF-12. The museum's X-15 is the second X-15 built. It was modified as an X-15A, with a stretched fuselage and large propellant tanks. It made the fastest flight of the X-15 program on its final flight in October 1967, reaching Mach 6.7.

The Bell XV-3 convertiplane, a direct ancestor of today's V-22 Osprey, was designed to use horizontal rotors for vertical lift. The rotors could then be tilted forward to achieve the speed of a conventional aircraft. Its interior was configured



The Bell XV-3 Convertiplane Photo Credit - National Museum of the USAF

Flypast V. 51 No. 7

for medical evacuation. The Ryan X-13 Vertijet, designed to test the concept of a vertical takeoff and landing jet, flew successfully but development was cancelled in 1958. Canadian content at the museum includes an Avro Canada Avrocar, one of two surviving examples. The Hawker Siddeley XV-6 Kestrel, immediate ancestor of the Harrier V/STOL fighter, was one of six built in joint evaluation by Britain, Germany and the U.S. A Chance-Vought XC-142, a conceptual V/STOL transport, tilted the entire wings as well as the rotors. Reminiscent of a Canadair CL-84, but larger, it had power transmission issues but flew research for NASA. The Bell P-59 Airacomet, first jet-powered aircraft built in the U.S., was powered by a GE turbojet based on an early British Whittle engine. Slower than some contemporary piston-engined fighters, it was built in limited numbers. P-59s were used to train pilots to fly the early jets. The Fisher P-75 Eagle, intended to be a long-range fighter built from parts of other warbirds already in production, had a mid-mounted Allison engine driving co-axial contra-rotating propellers. It had no better performance than other fighters and was cancelled. The North American F-107, a development of the F-100 Super Sabre, lost the competition for a tactical fighter bomber to the Republic F-105 Thunderchief. One of the museum's best-known aircraft is the North American XB-70 Valkyrie prototype for a Mach 3 bomber that didn't proceed with the advent of ICBMs and SAMs. It flew in highspeed research, supporting the American SST program. The Northrop YF-23 lost the advanced fighter competition to the current F-22. It was more stealthy and faster but not as manoeuvrable.



Chapter 2<sup>nd</sup> V-P John Bertram thanking Speaker Martin Keenan – *Photo Credit - Neil McGavock* 

Three other galleries display aircraft from the Wright Brothers to the end of the Second World War; the Korean and Vietnam wars; and the Cold War. Tours of the museum's restoration facility are conducted every Friday. As Martin said, "This is one of the finest aviation museums in the world." Answering questions, he noted the museum has several British warbirds in U.S. markings and an Avro Canada CF-100. Chapter 2<sup>nd</sup> Vice-President John Bertram thanked Martin for a fine presentation on an exceptional museum.



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