Introduction

The jet age arrived for the Royal Canadian Air Force (RCAF), after the Second World War, with the advent of the diminutive de Havilland Vampire fighter. At the time, no jet training was deemed necessary to provide the transition from existing, relatively slow, propeller driven aircraft to fly this simple fighter.

Then, in the early 1950s, the new Avro Canada CF-100 Canuck twin-jet, all-weather interceptor and Canadair’s CL-13 Sabre series of fighters were well along in their respective production runs and beginning to enter squadron service. These advanced aircraft were capable of achieving much higher speeds and greater altitudes than the Vampire, even though it was still to be employed to provide some jet experience prior to RCAF personnel moving onto the more capable aircraft.

At the same time, the North Atlantic Treaty Organization (NATO) experienced a significant buildup and Canada undertook to provide training for thousands of Allied aircrew in addition to its own programme to train RCAF and Royal Canadian Navy (RCN) personnel.

The stalwart and venerable Harvard trainer was not sufficient to keep up training efforts for the new and more sophisticated jets. The urgent need arose for a jet lead-in trainer, to transition fledgling pilots from the Harvard to the operational jets for the RCAF and to meet Canada’s NATO training commitments.

Accordingly, the Government of Canada made the decision to adopt the popular T-33 trainer, itself a tandem two-seat derivative of the Lockheed F-80C Shooting Star fighter, as its new, primary jet trainer for the RCAF and RCN, albeit with one important proviso. To be manufactured in Canada, by Canadair Limited in Montreal, under licence from Lockheed, it was to incorporate a different powerplant from that of its American cousin.

A rare co-operative effort of resources from three nations; the United States, for the original airframe design and licence; the United Kingdom, for the new engine, and Canada, for the construction materials and manufacture, eventually led to the successful production of the Canadian version of the popularly called “T-Bird” trainer.

So successful was this aircraft in the eyes of the aircrew, that soon it was adapted, as an aerobatics display aircraft dubbed the Red Knight, to make a vivid and lasting impression with the ordinary Canadian citizen in the street for more than a decade.

As this history is being written, it has been 50 years since the RCAF’s colourful Red Knight first thrilled North American crowds with dazzling displays of solo jet aerobatics. The overall brilliant red painted T-33 Silver Star shone brightly wherever it appeared, and forever etched itself in the eyes and minds of young and old alike who were fortunate enough to have witnessed many or even just one of its numerous appearances from 1958 to 1968.

Cover Photo Caption:
1963 Red Knight pilot Bud Morin pulls this brilliantly crimson-coloured, Canadair-built Silver Star, RCAF serial 21574, into the vertical during a photo session on 25 May 1963. This is the aircraft on display in the Canada Aviation Museum.
(CF Photo PCN-4567)
T-33 Development History

The dawn of the jet age in the late 1930s and early 1940s, with radical configurations of aircraft and jet engines emanating from German, Italian and British factories, some being tested in the heat of battle during the Second World War, heralded the need for a complete overhaul of aircraft designs.

As early as 1939, unaware of engine developments in Europe, Lockheed was in the process of designing its own experimental turbojet powerplant. The design progressed in earnest during 1940, and by 1942, the truly advanced Lockheed Model L-1000 was made public. This revolutionary twin-spool, axial flow powerplant with a high compression ratio, promised, initially, an extraordinary 15.57kN (3,500lbf) of static thrust with the potential of 24.46kN (5,500lbf) thrust with afterburner. While the development of the L-1000 was underway, Lockheed’s engineering genius, Clarence (Kelly) Johnson led a design team that came up with the idea of a truly radical, twin-engine, stainless steel aircraft, featuring thin wings and canard foreplanes in a blended body design. This futuristic fighter, called the Lockheed Model L-133, was projected to achieve 1,006km/h (625mph) at 15,240m (50,000ft). In March 1942, a proposal was submitted to the US Army Air Forces (USAAF) by Lockheed towards the combined development of the L-1000 engine and L-133 airframe; however, surprisingly, they showed little interest in such an innovative concept. The idea of a single manufacturer supplying both the powerplant and airframe was not well received by the government. Undeterred, these developmental projects certainly paved the way for the Lockheed engineering team in their future design endeavors.

Kelly Johnson had been asked by the USAAF to take a look at the Bell XP-59A Airacomet fighter, then undergoing flight tests at Muroc Army Air Field in California, with a view to quickly designing and building a new high performance fighter to replace the P-59. The Bell design was not meeting performance expectations and certainly would be no match for German jet aircraft, some of them, just taking to the skies over Europe.

This was an opportunity that Johnson had been trying to implement for awhile. He set-up a small, tightly controlled, and secretive Advanced Development Projects section with 28 engineers and 105 shop workers hand-picked from the Lockheed plant. They had but one object – to get a good airplane built on time. The team segregated themselves next to the main plant, near a plastics factory, in a shack made out of shipping crates with a discarded circus tent for the roof. This facility became the more famously dubbed ‘Skunk Works’, nicknamed after the foul-smelling factory in the popular L’il Abner cartoon strip.

On 18 June 1943, at Wright Army Air Field, Ohio, Johnson promised General H. “Hap” Arnold of the USAAF, and his Lockheed bosses that his team could design, build and deliver the new prototype fighter in just 180 days, later telling his team to do it in 150. Following approval of this offer, Johnson’s crew diligently set to work on 23 June, and actually completed the new Model L-140 (XP-80) aircraft in a remarkable 143 days!

The first Lockheed XP-80 prototype, USAAF serial number 44-83020, painted a glossy spinach-green and affectionately named “Lulu Belle”, had been designed around the available blueprints for the British de Havilland-built Halford H.1B (later called Goblin) turbojet engine which generated 13.34kN (3,000lbf) of thrust. On 8 January 1944, the premiere flight, of what was to become the USAAF’s first operational jet fighter (the ‘P’ in the designation stood for Pursuit was later changed to ‘F’ for Fighter) took place from the Muroc Flight Test Base, located on the northern portion of Rogers Dry Lake. Company chief test pilot Milo Burcham piloted “Lulu Belle” on its first flight, an abbreviated five-minute hop, cut short due to landing gear retraction problems.
Burcham wrung out the aircraft on another 20-minute test flight later that morning, reaching a speed of 426 knots (788km/h / 490mph). Ultimately the XP-80 would achieve a top speed of 437 knots (808km/h / 502mph), the first American aircraft to exceed 435 knots (805km/h / 500mph).

A subsequent prototype, the XP-80A Gray Ghost (44-83021), named for its light pearl-grey paint scheme, and follow-on production aircraft had the more powerful 17.80kN (4,000lbf) thrust General Electric I-40 turbojet engine installed. Due to this powerplant’s larger size, an almost entirely new airframe was designed and built around it, with the XP-80A completed in just 138 days.

Produced too late to see battle, four YP-80As were shipped overseas to Europe in the waning days of the Second World War, but the new American jets were not risked in any action. They were used basically for indoctrination flights, flying principally from England and Italy. However, within a few short years, the new production model of the popularly named Shooting Star, was seen fit for combat and was deployed to the Far East Air Forces (FEAF) of the recently formed (June 1948) United States Air Force (USAF) when the Korean conflict erupted in June 1950. While serving there, the new fighter racked up an impressive tally of nearly 100 enemy aircraft shot down, including history’s first jet-versus-jet aerial combat kill, a Soviet MiG-15, on 8 November 1950.

The advanced design of Lockheed’s first-generation jet soon gave birth to a number of equally, if not more successful progeny. The most famous derivative of the Shooting Star came about in 1944 as Lockheed upper management and engineers shrewdly sensed, and pushed the need for a dual control jet trainer, at a time when test pilots and numerous operational service pilots were being killed in a spate of P-80 accidents. The Air Force, ever mindful of the lack of available funds after the war, did not immediately pursue the idea, so Lockheed elected to take the somewhat risky initiative and develop a suitable two-seat jet trainer using corporate funding and the skilled personnel of the secretive Skunk Works facilities.

A P-80C, USAF serial 48-356, was selected from the production line and modified into the proposed transition trainer by inserting a 98.0cm (38.6in) splice ahead of the wing to accommodate a second cockpit for an instructor, with an additional 30.5cm (12.0in) plug added behind the wing. Lockheed designated this prototype the TP-80C (later TF-80C) and it made its debut flight, with company test pilot Tony LeVier at the controls, on 22 March 1948.
Although the new tandem-seat training aircraft was longer and heavier, it proved to be more aerodynamic, and thus faster, than its fighter forebear was. The prototype made the rounds of USAF bases and USN stations across the nation quickly generating large production orders, in numerous batches, for the newly designated in May 1949, T-33A basic trainer.
The US Navy also had requirements for a jet trainer, as advanced and instrument trainers for its carrier-training role, and decided to choose Lockheed to supply 699 navalized versions from the Fiscal Year (FY) 1949 to FY 1955 batches of the USAF T-33A-1-LO production model.

The first 28 Navy aircraft delivered were initially designated as TO-2s (the earlier TO-1-TV-1 having been the US Navy version of the land-based P-80C). The designation TV-2 was later received by these and all subsequent aircraft of this production run, with a final designation of T-33B being applied to all such aircraft remaining in US Navy and US Marine Corps service after 1962.

Prior to the acquisition of a small number of the single-seat TO-1-TV-1 fighter, the Navy had set a requirement for a jet fighter with development beginning on such an idea in 1942. The Navy, as had the Army Air Forces, tried out the YP-59A Airacomet fighter at their Naval Air Station Patuxent River, Virginia, and had also found it lacking in performance for their needs.

Follow-on jet experience for the Navy came from the mixed powerplant Ryan XFR-1 Fireball, in 1944, which had a piston engine in the nose, for low-speed approach and control, and an axial flow turbojet in the tail for the takeoff and the high-speed and cruise regimes. The propeller would be feathered when the jet engine was operating. Only a few examples were built before the war ended, most serving as test aircraft, and all subsequent contracts were cancelled.

With the advent of the new carrier-capable McDonnell Aircraft Corporation XFD-1 Phantom in 1945, proving itself in the first takeoff and landing of a jet propelled aircraft on an American aircraft carrier on 21 July 1946, the US Navy was finally well on its way down the jet path.

The US Navy TV-2 trainer came straight from the USAF T-33A production line at the outset in bare metal with Misawa drop tanks under the wingtips. Although “U.S. NAVY” titles with the BuNo underneath were displayed on the tail, the aircraft’s data block under the cockpit carried its original USAF designation and serial number. Later, new production examples with the larger Fletcher wingtip fuel tanks, were painted in the Navy’s glossy white and red high visibility markings, with TV-2 and associated BuNo stenciled under the tail. However the TV-2 did not adequately fulfill the Navy’s carrier training needs (the F9F-8T Cougar did however) and they were soon relegated to instrument and advanced training, converted to drones, or just general-purpose hack duties with the Navy and Marines Corps. (Canadair and Lockheed via Bill Upton Collection)

Lockheed had foreseen the need for a more advanced T-33 trainer design for combined USAF / USN service. In 1952 they started work on another company-funded demonstrator, which bore the Temporary Designation number L-245, and the initial title of “Lockheed T-33B Trainer”. An Air Force T-33A (serial 52-9255) was removed from the assembly line and duly modified at the Lockheed facilities in Burbank, California to serve as the prototype for the private venture L-245 design proposal.
This prototype incorporated a raised rear cockpit providing the instructor with a better view, thus necessitating a resultant reshaping of the canopy, imparting a somewhat humped appearance to the aircraft. A new instrument panel in a revised cockpit layout was also instituted. A dorsal spine/fin was blended in later to offset unsatisfactory airflow over the tail surfaces, also adding to the distinctive shape of the aircraft. Other aerodynamic improvements included the incorporation of a boundary-layer control (BLC) system for the flaps and leading edge slats on the wings for lower approach speeds, essential for the carrier training role. Additionally, a retractable tailhook and a catapult attachment point were fitted to the strengthened airframe along with a more robust undercarriage for the definitive USN carrier-training task. The powerplant chosen for this heavier aircraft was the 24.02kN (5,400lbf) thrust Allison J33-A-16A centrifugal flow turbojet. At the time, both Allison and General Electric produced the J33 engines.

This demonstrator, painted in Lockheed’s ‘Star’ white and gold livery, bearing civil registration N125D, was rolled out on 30 November 1953, and first flew on 16 December, piloted by Tony LeVier. Following aircraft modifications necessitated by the flight test programme, LeVier proceeded to take N125D on a series of demonstrations to US Air Force and US Navy bases around the country. The Air Force, very satisfied with their versatile T-33As, paid little attention to the new trainer. However, suitable interest was eventually expressed by the US Navy for this definitive carrier-capable variant, and a production contract for an initial eight of the newly designated T2V-1 SeaStar trainers, to be powered by the Allison J33-A-24 turbojet engine, was awarded to Lockheed in May 1954.

Full development testing and renewed demonstrations of the prototype in November 1954, now painted in pseudo US Navy training colours and markings, and more aerodynamically akin to the production T2V-1, soon attracted additional production orders for the SeaStar. Production amounted only to 150 aircraft, these being manufactured between January 1956 and 1958.

The T2V-1 SeaStar (became the T-1A in 1962) entered service in 1957 at NAS Pensacola, Florida, but partly due to maintenance problems associated with the BLC system, was soon relegated to a short service life in the role of advanced trainer for the Navy and Naval Air Reserves. They too were eventually supplanted in the carrier training role by the dual seat F9F Cougars and later, the North American T2J-1 (T-2A in 1962) Buckeye jet trainers.
Canadian “T-Birds”

When, in September 1951, Canadair Limited was selected to manufacture the new jet trainer, the originally installed 20.46kN (4,600lbf) thrust Allison J33-A-23 engine of the American version of the T-33 was required to be replaced. As had the first P-80 (XP-80), a British engine was selected to power the Canadian-built version of the T-33. The more powerful and reliable Rolls-Royce Nene Mk 10 centrifugal flow turbojet engine, with 22.68kN (5,100lbf) static thrust capability was chosen for the aircraft, providing better all-round performance. The majority of the delivered engines originated from the United Kingdom, with additional engines being manufactured locally by a new Rolls-Royce of Canada Ltd. plant, established near Montreal Airport. In an effort to facilitate the initial aircraft deliveries, a couple of engines were even procured from Hispano-Suiza in France.

T-33A Silver Star Mk 1

In the interim, to rapidly expedite the necessary jet training experience prior to the commencement of the Canadair production run, twenty Lockheed-built T-33A-1-LOs were provided to the RCAF, on loan from the United States, starting in May 1951. These fast training jets, designated for RCAF service as T-33A Silver Star Mk 1, carried 1,000 litre (220 Imperial gallon) underslung Misawa fuel tanks on the wingtips, and many were supplied without crew ejection seats. The modern day, stringent safety requirements imposed upon aircraft designs, are far cries from the token programmes extant during the 1950s. Manually bailing out of a stricken training aircraft was de rigueur at the time, due to ejection seats not being seen as a necessity, therefore many of the early T-33s were delivered with uncomfortable, fixed bucket seats. Most of these early USAF service T-Birds were replaced by later, uprated, ejection seat equipped models, with the older, fixed seat versions put up for some type of disposal, with this urgent Canadian need of trainers being a prime candidate.

The USAF “loaners” were assigned a sequential series of 14xxx-range RCAF serial numbers, from 14675 to 14694, displayed on the top of the tail. These serials did not correlate with the USAF serial number system of 51-4xxx. RCAF unit codes were displayed prominently on the nose. RCAF post-war low-visibility fin-flash and Silver Maple Leaf roundels were posted on the tail and rear fuselage, respectively.
Three Lockheed Silver Star Mk 1s (14687, ‘676 and ‘677), along with two Canadair Sabres, are seen deployed on the flight line at Bluie West, Greenland, in 1955. These T-Birds have by now traded in their small, underslung fuel tanks for the larger Fletcher wingtip tanks. Also, note that ‘687 finally has ejection seats for this soft helmeted crew. These trainers were eventually delivered to Greece (‘687 & ‘676) and Turkey (‘677) following their service with the RCAF. (CF Photo PL-86170)

Canadian T-33A

In August 1952, an agreement was negotiated for an additional ten T-33A aircraft to be obtained, also on loan from the USAF, to augment the RCAF instructor training needs. This new batch of aircraft was readily distinguishable by the longer Fletcher center-mounted, jettisonable tip tanks, with a capacity of 872 litres (192 Imperial gallons), as well as now incorporating ejection seats for the crew.

These unpainted examples remained designated as Lockheed T-33As, and they visibly retained their assigned USAF serial numbers (51-6713 to 51-6717 and 51-6743 to 51-6747), abbreviated to the standard five digits, on the tail. They carried the representative American “TR-” buzz codes, in black, on the nose, yet sported a splash of colour with the Canadian Silver Maple Leaf roundels on the rear fuselage sides and upper wing surfaces. There was no RCAF fin-flash on the tail.
The majority of the initial batch of T-33A “loaners” was sent to No. 1 Operational Training Unit (OTU) at RCAF Station Chatham, New Brunswick to train instructors for the new Sabre Conversion Unit there. Others were deployed to the Central Flying School (CFS) at Trenton, Ontario. With the later addition of the second batch, aircraft were also routed to the No. 3 (AW) OTU at North Bay, Ontario, for CF-100 conversion training.

What the T-33 Silver Star was initially chosen to do, train pilots to fly the latest jets in RCAF service like the Avro Canada CF-100 (middle) and Canadair Sabre. (CF Photo PC-648)

The remaining of these thirty American aircraft (some had been written off in crashes) were eventually returned to the United States once deliveries of the new Canadair-built T-33AN Silver Star Mk 3s to the RCAF began in 1953. Of the originals, a few ended up in Greece and Turkey under the Mutual Defense Assistance Programme (MDAP). Others have been preserved and are on static display in North America and Greece. The sole example of a Silver Star Mk 1 remaining in Canada, serial 14678, is apparently in very poor condition, stored amidst some of the retired McDonnell CF-101 Voodoos in a little used hangar at CFB Bagotville, Quebec.
To verify that the incorporation of the British engine into the American airframe was feasible, another Lockheed-built aircraft, T-33A-1-LO, c/n 580-5492, bearing USAF serial number 51-4198, was modified in November 1951, as the prototype for the planned production examples of the T-33AN Silver Star Mk 3 trainer. The aft fuselage interior was modified with newly designed forgings for the engine support structure to accommodate the larger and more powerful Nene engine, as well, multiple tailpipe designs were tried out before satisfactory performance was obtained, tasks that proved both time-consuming and expensive. This aircraft received the RCAF serial number 14695, with the ‘N’ suffix in the new designation standing for the Nene powerplant installation. The modified aircraft received the Lockheed and USAF designation T-33-A-NX, while in Canadian test service it was known simply as the Silver Star Mk 2.

The sole Lockheed-built Silver Star Mk 2, RCAF 14695, is seen here at Canadair on 22 January 1953. Note that the black-stenciled nose and tail markings, “T-33 A-NX’, were incorrectly annotated on the bare-metal aircraft and should have been marked as “T-33AN-X’. Canadair test pilot Hedley Everard strikes a pose on the wing for the company photographer. Everard had earlier performed the first flight of this uniquely powered T-Bird, from the Cartierville Airport located facilities, on 28 October 1952. More than 100 test flights and a similar number of ground runs were performed with this prototype during its Canadair-based test programme. (Canadair via Bill Upton Collection)

After the Canadair/RCAF Nene engine test and integration programme was completed, the singular Mk 2 aircraft was assigned to the Flight Research Section of the National Research Council (NRC) at Uplands, Ontario, to participate in various test projects. Seen here in July 1955, with fluorescent red-orange tail and nose panels, and the CEPE unit code, ‘PX-695’ is set to evaluate a configuration of vortex generators on the wings. (NRC via Bill Upton Collection)
Canadair Ltd. CL-30 / T-33AN Silver Star Mk 3 / CT-133

Canadair eventually signed the contract for an original aircraft order of 576 Canadair model CL-30, tandem-seat trainer aircraft, on 1 April 1952, amid much controversy over the high production cost, per plane, as produced in Canada compared to purchasing them directly from the United States. However, the economic and social benefits derived from manufacturing the airframe, some engine manufacturing and follow-on support maintenance located in the Montreal region, far outweighed the detractors.

Subsequently, in mid-1955, an additional order for 80 aircraft was placed, bringing the final total to 656, pending a lingering decision on the selection of a new basic, *ab initio* jet trainer, which, in the end, became Canadair’s premiere aircraft design to reach production as the CL-41A / CT-114 Tutor. Although the Tutor was to replace the T-33 in most training needs, the venerable T-Bird would eventually be seen to outlast its ‘replacement’ in RCAF/CAF/CF service, once the Tutor was retired in August 2000.

Lessons learned with the Lockheed Silver Star Mk 2 pattern aircraft modifications soon paid off for the Canadair manufacturing programme, and by the end of the first year, production had reached a peak delivery of two aircraft per day.

The first jet-powered trainer to be built in Canada, the 1st Canadair CL-30, c/n T-33-001, rolled off the Cartierville-based Plant 1 assembly line, then performed its maiden flight on 22 December 1952 with Canadair test pilot William (Bill) Longhurst at the controls. It was officially taken on strength by the RCAF as a T-33AN Silver Star Mk 3, serial number 21001, on 30 January 1953. It served initially as a test support aircraft, with the RCAF’s Central Experimental and Proving Establishment (CEPE), located at Uplands Airport, Ontario.

All of the Canadair produced CL-30 models could be readily identified visually by the unique, oval-shaped, engine cooling air ejector pipe, on the upper port side of the aft fuselage. This had been added to the Canadian version due to early problems associated with the Nene engine generating more heat than the Allison engine installation found on the American Lockheed-built T-33 aircraft.
Following their rollout from the production line, and prior to delivery to the customer, test runs of the Rolls-Royce Nene engines, and all associated CL-30 aircraft systems were required to be performed. These tests were carried out within the confines of the brightly coloured “Hush House” complex, located adjacent to the south side of Canadair’s Plant 1 facility. (Canadair via Bill Upton Collection)

T-33AN Specifications:

- Length: 11.48 m (37 ft 8 in)
- Height: 3.56 m (11 ft 8 in)
- Wing Span: 12.98 m (42 ft 7 in)
- Weight, Empty: 3,828 kg (8,440 lb)
- Weight, Gross: 7,620 kg (16,800 lb)
- Speed, Cruise: 306 km/h (190 mph)
- Speed, Maximum: 917 km/h (570 mph)
- Service Ceiling: 14,325 m (47,000 ft)

(3-View drawing by Serge Rezjukow)
The first Silver Star Mk 3 is seen at Uplands bearing CEPE unit code PX-001. It had been modified for photographic pacer duties, housing two tracking cameras in a revamped nose section, to record details of the air firing trials of the Canadair/Westinghouse CL-20 Velvet Glove air-to-air missile test vehicles in 1953 and 1954. (NRC via Bill Upton Collection)

Canadian Silver Star production ended by the end of 1958, with the delivery of the final Canadair-built example, c/n T-33-656, to the RCAF as 21656, occurring on 24 March 1959. Here is that same last-built aircraft, as Canadian Forces CT-133 133656 of No. 434 Squadron, appropriately at Canadair’s 50th Anniversary celebration in June 1994. (Bill Upton Photo)

To promote their newest production aircraft, Canadair generated a novel public relations display for their first Family Day Open House, held in May 1954. A CL-30 was taken from the line and ‘re-made’ into a full cutaway display, extolling the virtues of the trainer to Canadair employees, their families, and sub-contractors. Later, a PR display featuring a similarly cutaway CL-30, serial 21488, a separate R-R Nene engine, and Sabre 23463, made the rounds of industry trade shows, as seen here. (Canadair via Bill Upton Collection)

The standard RCAF public relations ‘photo op’ of their new aircraft to enter service was seemingly always over the iconic Niagara Falls, Ontario. Here is a basic Silver Star 3PT in high-visibility Dayglo markings, RCAF serial 21041, doing its PR duty for the RCAF photographer. (Canadair via Bill Upton Collection)

The ‘Mark’ or ‘Mk’ nomenclature seen in the original designation was soon dropped from conventional use, and the basic aircraft was known thereafter as the Canadair Silver Star 3.

Four sub-types of the Silver Star were produced, these employing suffix letters to the designation. These suffix letters were eventually dropped from official use in 1971. These variants were initially known as:

**Silver Star 3AT** - Armament Trainer; equipped with a K-14C optical gunsight, two 0.50-caliber Browning machine-guns in the nose, and underwing stores pylons.

**Silver Star 3PR** - Photo Reconnaissance; with four Vinten cameras located in the modified nose section, for forward, vertical, left and right imaging. Also carried underwing stores pylons.

**Silver Star 3PT** - Pilot Trainer; the basic, dual control, jet trainer.

**Silver Star 3PTS** - Pilot Trainer SARAH; with Search and Rescue and Homing equipment installed.
Also, by 1971, an overall change in the Canadian Armed Forces aircraft serial numbering system resulted in the Canadian T-Birds acquiring the type designator CT-133. Thus the ‘133’ and the last three of the original serial number became the new registration, eg; aircraft serial number 21656 became 133656.

T-33AN Silver Star 3AT, RCAF serial 21075, displays its nose mounted machine-gun ports and single weapons pylon under each wing for a selection of common stores, including bombs, targets or chemical tanks. High-velocity aircraft rockets (HVAR) were carried on spring loaded posts. (Canadair via Bill Upton Collection)

The Silver Star 3AT was capable of carrying a variety of weapons underwing including, as seen here, a symmetrical combination of a 454 kg (1,000 lb) general purpose bomb on the outboard wing pylon and a brace of four 12.7 cm (5.0 inch) HVARs on retractable, inboard posts. (Canadair via Bill Upton Collection)

A nice banking, air-to-air shot of No. 408 Squadron Silver Star 3PR, RCAF 21565 displaying its unique reconnaissance nose profile and underwing stores pylons (for carrying and delivering the same stores as the 3AT) to good effect. Only five aircraft were converted to 3PR standards, and they were all home based at RCAF Station Rivers, Manitoba. (CF Photo Z-10569-18)

Somewhat worn looking, but still flyable, this former RCAF 3PR recce trainer, serial 21556, still bears some remnants of markings and colours of its former service. In private hands at Mojave Airport, California, since 1977, it is civil registered as N99179. Seen here in 1993, it sits amongst the myriad of aircraft types that populate this unique facility. (Bill Upton Photo)

The SARAH detector system antennae are seen under and on each side of the nose of RCAF Silver Star 3PTS, serial 21304, seen while at Canadair on 7 January 1958. This aircraft was from No. 2 Advanced Flying School, Portage la Prairie. (Canadair via Bill Upton Collection)
Canadian Air Force Service

As new CL-30 Silver Star Mk 3 aircraft emerged from the Canadair manufacturing facilities, the sleek and nimble jet trainers soon began to make their way into RCAF/RCN service across the country.

On 23 June 1953, the aerodrome at RCAF Station Portage la Prairie, Manitoba was host to the arrival of its first operational jet trainer, Silver Star 3PT, serial 21025 destined for No. 2 Advanced Flying School (AFS). Some of the 3PTS variant also made their way initially to No. 2 AFS. The assets of No. 2 AFS were soon merged with those of 2 FTS at RCAF Station Moose Jaw in 1964.

No. 3 AFS located at RCAF Station Gimli, Manitoba received 21046 as its first of many Silver Star 3PT aircraft on 21 August 1953. In addition to RCAF pilots, the initial cadre of RCN pilots received training with 3 AFS beginning in 1953. European NATO pilots soon followed suit.

A trio of CL-30 Silver Stars pilot trainers of No. 3 (F) OTU, North Bay, loosely formate for a photo shoot. Notice that the inside portion of the tip tanks does not have any anti-glare black applied as yet. Then, JF-423 banks away from the camera revealing the non-standard wraparound arrangement of the red search markings applied under the wing. Dual hard point attachments for rocket-assisted take-off (RATO) bottles, and later, for luggage or instrumentation pods, can be seen under the fuselage at the wing trailing edge. (Canadair via Bill Upton Collection)

These RCAF Silver Stars from the Weapons Practice Unit (WPU) at Cold Lake, Alberta are seen being employed as target tugs, similar to those employed by the RCN. At left is serial number 21118 HY-118 in bare metal and bright fluorescent red-orange Dayglo markings, reeling out dual Delmar Radop targets over the range. At right, it can be seen that the high-visibility Dayglo doesn't wear very well and soon fades out as evidenced by 21098, with a single target deployed and trailing behind. (CF Photos PCN-209 and PC-1347)
Two CT-133s, serials 133333 and 133546 from 425 ‘Alouettes’ Squadron, at CFB Bagotville, Quebec, taxi back in after landing. These aircraft were used basically as general-purpose Base Flight trainers for the home-based 425 Squadron CF-101 Voodoo pilots on which to maintain their currency. (Bill Upton Photo)

Outfitted with an ECM jamming pod and a chaff dispenser under the wings, this sometimes called ‘EW-133’, otherwise known as CT-133 133483, belongs to No. 414 (EW) ‘Black Knights’ Squadron, based out of North Bay, Ontario. It rests on the transient ramp at Burlington, Vermont on 10 June 1981. (Bill Upton Photo)

Some of the delivered T-Birds made their way to the RCAF’s premiere test organization, the Central Experimental and Proving Establishment (CEPE) at Uplands. This establishment was formed at Rockcliffe, Ontario, prior to the Second World War and moved to Uplands in the post-war period. There, the initial new Silver Star trainers were test flown and evaluated for acceptance prior to their introduction into RCAF service.

Other examples of these versatile aircraft delivered to CEPE were somewhat modified for varied test purposes. These were included in the move when the CEPE relocated to its new location at Cold Lake, Alberta, becoming an integral part of the small fleet of unique test and research aircraft based there. In 1971, the Alberta-based unit was renamed the Aerospace Engineering Test Establishment (AETE).

The last Silver Stars with the AETE were retired in March 2005.

The first CEPE airborne ejection seat test bed, T-33AN 21505, performs another in a series of ejection seat tests over the vast Cold Lake test range. These tests helped to validate pilot’s seats and survival equipment under realistic conditions. (CF Photo AEC84-257)

AETE’s CT-133, serial 133413, lands at London Airport, Ontario, in June 1990. It soon went on to become the latest of the Establishment’s ejection seat test bed aircraft, replacing venerable 133505, which was retired to Mountain View in 1990. (Bill Upton Photo)
Canadian T-Birds in Europe

As part of Canada’s European NATO commitment, a contingent of RCAF Silver Stars was assigned to each of the four Wings of No. 1 RCAF Air Division, with the Wings located in England, France and Germany. In 1970, No. 1 Air Division was renamed as 1 Canadian Air Group (CAG), and it remained so until it was disbanded in 1993.

For the most part, the majority of the assigned Silver Star aircraft were painted similar to the camouflaged RCAF Sabres then deployed to Europe, consisting of a dark, variegated combination of greens and greys, and later, to the similarly camouflaged scheme of the European-based CF-104 Starfighters. Between the Sabre and Starfighter eras, some of the allotted Silver Stars retained their initial natural metal finish, especially those involved with the airborne radar target towing role.

Besides the target towing missions, the European T-Birds were used for general-purpose liaison and administrative support duties, instrument training, and pilot proficiency.
Canadian Navy Service

All of the Royal Canadian Navy (RCN) Silver Stars were transferred from the RCAF, starting in 1954. All-Weather Naval Air Squadron VT 40, based in HMCS Shearwater, Nova Scotia, received its first Silver Star in January 1955 to provide extensive jet training for the McDonnell F2H-3 Banshee pilots of Fighter Squadron VF 870. One of the T-33s of VT 40 and two-man crew set an unofficial cross-Canada speed record, from Vancouver to Halifax, in March 1956.

VT 40 ceased to exist in May 1959, when it was merged with the training functions provided by VU 32 Utility Squadron, also based at Shearwater. The training role of VU 32 changed following the departure of the Banshees in 1962 to that of providing the T-33s as simulated aggressors against ships and shore units, and serving as target tugs. Similar functions were provided by the Silver Star fleet of VU 33 Utility Squadron operating out of Patricia Bay (popularly known as Pat Bay), British Columbia.

From 1953, all ‘new’ aircraft types destined for RCN service were first evaluated and cleared by the flight-test and engineering development unit VX 10 based at Shearwater. Silver Stars 21495 and 21620 served in VX 10, with ‘620 eventually becoming a Red Knight aircraft. AETE absorbed VX 10’s assets in 1970.
Specials and Anniversary Silver Stars

As a result of the unparalleled longevity of the T-33 Silver Star in Canadian service, it was inevitable that certain aircraft and unit milestones would eventually be reached, and accordingly, some aircraft were painted up in special commemorative markings to reflect these honorable achievements.

The menacing “Mako 1” sharkmouth scheme applied to CAF CT-133 133504 for the Shearwater based VU 32’s disbandment was seen at CFB St. Hubert in June 1992. A similar sharkmouth scheme adorned some F-80Cs deployed to Korea and an Indonesian Air Force T-33. In July 1992, VU 32 was integrated into 434 ‘Bluenose’ Combat Support (CS) Squadron. (Bill Upton Photo)

VU 33’s commemorative deep sea blue with white wave stripes “Anchor Clanker” disbandment colour scheme was applied to CT-133 (unofficially designated ‘TE-133’) 133102, also seen in June 1992. This aircraft carries a DPT-1 Threat Emitter on the nose. CFB Comox then became the new home for CT-133s of VU 33 with 414 ‘Black Knights’ (CS) Squadron. (Bill Upton Photo)

In 1993, to celebrate 434 Squadron’s 50th anniversary, aircraft 133579 “City of Halifax”, was painted in this two-tone “Schooner 50” scheme. (Bill Upton Photo)

Here is “Schooner 50” in tight formation with a 434 ‘Bluenose’ Squadron stablemate, CC-144A Canadair Challenger 144605, in June 1993. (Bill Upton Photo)

414 ‘Black Knights’ Squadron painted 133174 in honor of the unit’s 50th anniversary in 1991. (Bill Upton Photo)

133450 took the ‘Black Knights’ markings to a darker 1960s ‘Red Knight’ look in 1994. (via Craig Kaston)
Shearwater’s No. 434 ‘Bluenose’ Squadron applied commemorative “T-Bird 50th Anniversary” markings only to the tail of this overall low-visibility painted CT-133, serial 133346, seen here at Ottawa in May 1999. (Bill Upton Photo)

The first aircraft to display the celebratory markings of the T-33’s achievement of 50 years of service came from 417 Squadron with 133299 painted in blending greys, with “50 Years of T-Bird Flight 1948-1998” on the nose, and “T-33 Mk III” on the wing tanks. (Bill Upton Photo)

As a tribute to commemorate the 75th anniversary of the RCAF, No. 414 Squadron outdid itself when they painted 133119 in this special colour scheme as a Heritage Flight participant in 1999. (Bill Upton Photo)

Trenton’s non-flying unit, ATESS / ESTTMA (previously known as the AMDU and No. 6 RD), painted up former AETE test aircraft 133190 for one of their own to proudly put on static display in 2002. (Bill Upton Photo)

Originally intended to have an airframe life of 4,000-hours in Canadian service, numerous Silver Stars were known to have exceeded the 10,000-hours mark by the time they were officially retired in early 2002, after some 54 years of diligent service. The test aircraft associated with AETE soldiered on, but they too were eventually put out to pasture in 2005. Most made their way to the ‘largest non-flying squadron in the air force’, located at Mountain View, Ontario for long term storage and eventual disposition. Some of the semi-preserved, grey, green, and black painted T-Birds seen in this long lineup on the tarmac have since gone to museums for static display, private contractors rivaling for DND support contracts or to Warbird enthusiasts, with their aim to ‘keep ‘em flying’ at air displays. (Bill Upton Photo)
T-33AN Civilian Test and Research Aircraft

Edwards, Patuxent River, Boscombe Down, Ramenskoye, all evoke the image of exotic experimental, research, military, or commercial aircraft being pushed to their limits in the real world environment in order to validate designs, systems, and component features. Canada’s involvement with flight test research has been around just as long as these more well known establishments, although not as well publicized, and has still produced much data in the field of aircraft research and investigations that is second to none.

Canada’s own scientific test agency, the National Research Council (NRC), acquired two ex-RCAF/RCN T-33ANs in the mid-1960s, for their National Aeronautical Establishment (NAE), later named the Flight Research Laboratory (FRL), fleet of research and test aircraft located at Uplands Airport, Ontario.

![A rare occasion of seeing the FRL T-33s, C-FWIS and C-FSKH, together on the Uplands tarmac, along with the NRC’s big, Convair 580 research platform, C-FNRC, looming in the background following a research mission. (Bill Upton Photo)](image)

The first NRC T-Bird acquired was former RCAF serial number 21379, in 1965, following its service use with the RCAF/CEPE, co-located at Uplands. Assigned the civil registration CF-SKH-X, this multi-purpose testbed was used as a microgravity research vehicle, performed atmospheric turbulence research, large aircraft wake turbulence measurements, and with underwing rear firing flare pods, conducted cloud-seeding experiments in concert with the NAE’s de Havilland Canada DHC-6-200 Twin Otter.

![In 1977, CF-SKH-X is seen equipped for cloud seeding experiments, with silver-iodide flares in modified 7.0 cm (2.75 in) seven-tube rocket pods under each wing. The former T-33 luggage pod, mounted under the fuselage on the RATO bottle hard points, was reconfigured internally to house a Doppler radar or other instrumentation as necessary. Note the National Aeronautical Establishment title on the rear fuselage. (NRC via Bill Upton Collection)](image)
Next to arrive at the NAE was T-33AN 21590, in 1967, fresh from the RCN’s VU 32 squadron. Given the civil registration CF-WIS-X, it was used initially for pilot training. Later, it was used to study the effects of Clear Air Turbulence (CAT) during project “Haven Hop”, conducted with NASA in early 1970. Other missions included cloud physics, and Alberta hail studies projects. Eventually, in 2003, due to ongoing budget cuts, C-FWIS was sold and made its way to a new, private owner in the United States as N590RC.

In front of the NAE Flight Research Section hangar in May 1970, CF-WIS-X carries an instrumentation pod under the fuselage. Near the top of the fin it sports the NAE Flight Research “Goose” emblem. (NRC via Bill Upton Collection)

In 1973 and 1974, both aircraft were employed to support the Canadair CX-84-1 V/STOL flight test programme being conducted with aircraft CX8402 down at NATC Patuxent River, Maryland.

The nose of C-FSKH bristles with a long instrumentation boom and various antenna and sensor probe mounts for the data gathering and recording equipment, located in the nose compartment. (Bill Upton Photo)

Still wearing National Aeronautical Establishment titles on the rear fuselage, C-FWIS sports the modified nose radome that housed a Bendix RDR-11 radar antenna for cloud physics studies in 1970. (Bill Upton Photo)

The tails of the two NRC T-Birds reflect some remnants of their early markings in September 1998. ‘SKH displays the barely discernable National Aeronautical Establishment title, and its French counterpart below the cheat line, on the rear fuselage, while ‘WIS bears witness to the faded remnants of its former RCN serial number, 21590, below the cheat line, directly under the horizontal tail. (Bill Upton Photo)
Bob Laidlaw, an aeronautical engineer with North American Aviation (NAA) in the 1960s, founded Flight Systems Incorporated (FSI) of Newport Beach, California, in 1968. In the early-1970s, FSI began operations at Mojave Airport, California, initially acquiring Canadair-built, ex-RCAF Sabres and ex-RCAF/CAF T-Birds that were formerly owned by Flight Test Research Inc. (FTR), based out of Long Beach, California.

Additional Sabres were procured from ex-RCAF and former South African Air Force stocks, with the majority being converted by FSI into QF-86E full-scale aerial drone targets, and some being employed as target tow aircraft. The small fleet of Silver Star aircraft was principally employed for FSI corporate duties, as well as contractor-based airborne test support, photographic chase, and other research programmes.

Some of the Canadair-built T-33AN Silver Star aircraft of FSI included:
N301FS (ex-CAF 21555), **N302FS** (ex-RCAF 21024), **N303FS** (ex-CAF 21342), **N304FS** (ex-RCAF 21192), N305FS (ex-CAF 21159), N306FS (ex-CAF 21306) and N307FS (ex-RCAF 21566).

Registrations shown in bold designate the initial T-33s that were acquired from Flight Test Research Inc.

The corporate colours of overall white with light blue cheat stripes, and the registration N301FS, identify this as one of the FSI T-Birds. One of the readily identifiable features of the Canadian-built T-Birds is the oval shaped engine-cooling vent on the port side upper section of the aft fuselage. (Bill Upton Photo)

T-33AN N302FS was obtained by FSI from Flight Test Research in 1977. It is seen here configured as an icing test rig aircraft, with a deployed boom and spray arm attached, used during the Mojave-based flight tests of the new Canadair CL-600 Challenger business jet programme. (Canadair via Bill Upton Collection)

N303FS with dark blue FSI fuselage cheat lines had previously been known as RCAF 21342. After being stricken from the RCAF register in April 1964, it made its way through various civilian owners before finally ending up at Flight Systems Inc. in Mojave. (Bill Upton Photo)

N305FS displays the complete standard Flight Systems Inc. corporate branding, with the full name displayed within the light blue cheat line at the nose, and the logo and name repeated on the tail. Behind, with the dark blue cheat lines, is FSI’s F-4D Phantom, N430FS, named “The Blue Barron”. (Bill Upton Photo)
Warbirds and Civilian Variants

Following a somewhat successful tenure in the RCAF, many of the Canadian made T-Birds found their way, by various means, to a second life in the service of various test agencies, foreign air forces, and into the hands of civilian owners worldwide. Many of the civilian owners are part of the ever-growing Jet Warbird movement, and the more powerful, nimble, and robust T-33AN easily filled their needs to show early post-war jets to those too young to have experienced them.

The large, civilian Warbird movement in the United States is a last respite for displaying these aircraft to the next generation of pilots and crews, after their service lives are spent. Due to the large number of Canadian aircraft available on the market, enthusiasts can pick one up for relatively low-cost, and with a good resource of spare parts, can effectively transform the discarded relics into prized, personal display mounts.

This spectacular highly polished example is ex-CAF 21118 with the badge and sash markings of the United States Strategic Air Command (SAC) emblazoned across the fuselage. The insignia of a one-star general appears on the vertical tail fillet. (Bill Upton Photo)

Cleanly grey-painted, this US Air Force marked beauty is actually the former FSI-owned N306FS, now in civilian hands and carrying its original RCAF serial number, 21306, on the tail. It too carries the SAC fuselage sash and a one-star general’s insignia. (Bill Upton Photo)

Former RCAF 21456, now NX333MJ, is decked out in the immaculate US Navy “Blue Angels 0” paint scheme representing the team’s former TV-2 support aircraft. This Canadian T-Bird had initially been loaned to the RCN from the RCAF, so it’s apropos that it is painted in the USN display team’s markings. (Bill Upton Photo)

Aptly named “T-BIRD II”, the Lockheed / Aermacchi / Rolls-Royce contender for the Joint Primary Aircraft Training System (JPATS) competition, a modified Aermacchi MB-339, was seen at Patuxent River NAS in May 1993. It lost out in the competition finally relegating the “T-Bird” name to history. (Bill Upton Photo)
The RCAF’s Red Knight

For the aviation enthusiast, there is nothing quite like the sight of a bright red jet airplane against a deep blue sky, purposefully trailing clouds of thick white smoke during an aerobatics performance. From the late 1950s into the 1990s only one aircraft display could truly satisfy that image.

The RCAF’s Flight Lieutenant (F/L) Roy Windover initially developed the brilliant red T-33 Red Knight solo aerobatics performance. The story began on what he had seen at the 1957 Toronto Canadian International Air Show (CIAS) at the annual Canadian National Exhibition (CNE) when he was a flight instructor with the Central Flying School (CFS). Apparently, RCAF pilots were not permitted to fly more than simple manoeuvres at smaller air events so at the epitome of Canadian air spectacles, the CIAS, an American exchange pilot, Captain Charles Rose, was brought across the border to fly the RCAF jet aerobatics performances. This rattled Windover somewhat and he was determined that he would be flying a RCAF jet aerobatics performance at that venue in 1958. Captain Rose had utilized a Canadair-built T-33, serial number 21057 when he practiced his display routine. Later, after having his idea approved at the highest levels for a new T-33 aerobatics performance, Windover was assigned this particular Silver Star, and authorization to repaint the aircraft in a brilliant scheme to distinguish it from the ranks of the standard trainers. The colour chosen was the standard fluorescent red-orange that was used on the tip tanks. When the newly painted aircraft emerged from the paint shop for some publicity photos, the photographer remarked that the aircraft reminded him of the scheme worn by First World War ace, Baron Manfred von Richthofen, The Red Baron. And so, the name Red Knight was informally bestowed to this soon-to-be legendary performer and his aircraft.

F/L Roy Windover takes the first Red Knight aircraft, RCAF serial 21057, with CFS unit code SU-057, flying on its first aerial photoshoot, over the Bay of Quinte, then pulls up vertically above the cloud deck, near its RCAF Station Trenton, Ontario home base. (CF Photos PC-3139 and PC-3137)

As he had envisioned, the first “official” performance flight of the T-33 Red Knight, piloted by F/L Roy Windover, occurred on 5 September 1958 at the annual CIAS. Here Roy poses with ’057 and his similarly coloured helmet, back on the tarmac at Trenton. (CF Photo PCN-679)
In 1959, to commemorate the Golden Anniversary of powered flight in Canada, as well as the 35th anniversary of the formation of the RCAF, an aerobatics display team of Canadair Sabre Mk 5s was formed at RCAF Station Chatham, New Brunswick. This team had the mandate to showcase the dual anniversaries during a coast-to-coast display tour during the year. First skippered by Squadron Leader (S/L) Fern Villeneuve, the team became world renown as the RCAF’s Golden Hawks. The Hawks’ flew numerous displays, thrilling millions of spectators with their famed gold, red and white painted Mk 5 Sabres, and from 1961, the ultimate Mk 6 version, from 1959 until their untimely disbandment in 1964.

For the 1960 aerial display season, Red Knight aircraft 21057 was repainted to properly represent its moniker, now with the simple, bold outline of a knight’s helmet stenciled in black on each side of the nose. A new Red Knight pilot, F/L Bob Hallowell, capably took over the reigns from Roy Windover, for the cross-country display tour.
Following the successful conclusion of the busy 1960 season with aircraft 21057, a new, spare/alternate Red Knight aircraft was deemed necessary to meet future scheduled appearances. Canadair T-33AN, RCAF serial 21574 was selected, and during February 1961, both of the Red Knight display aircraft were re-painted and adorned with the new, and final, knight’s helmet emblem on the nose.

Bob Hallowell passed the principal Red Knight duties over to F/L Ray Goeres for the 1961 display season. A second Red Knight pilot, designated as the Alternate Red Knight, the honour going to Flying Officer (F/O) Dave Barker, soon joined him.

With numerous display performances successfully achieved across the country, the workload eventually took its toll on the aircraft. In 1961, the backup Red Knight trainer, serial 21201 was retired and later sold to France, then, in 1963, the original Red Knight display aircraft, 21057 was lost in a fatal crash. Red Knight 21574 was retired early in 1964 due to structural fatigue. Newer mounts were needed so, in 1963, aircraft 21620, from VX 10 test squadron, and then, in 1965, aircraft 21630, were chosen to continue on with the legacy of the famed solo performers.
Brilliant Red Knight aircraft 21057 climbs away on another Public Relations photo shoot. Notice that the oil spray pipe runs along the full length of the fuselage side, from an oil tank in the armament section of the nose compartment, to the engine exhaust. Unfortunately, on 21 August 1963, this first of the famous Red Knight aircraft, with F/L Bud Morin at the controls, fatally crashed during an airshow performance at RCAF Station Gimli, Manitoba. (CF Photo PCN-3364)

F/O Tex Deagnon takes new Red Knight mount 21630 for a spin during a PR photo shoot in 1965. (CF Photo PCN-5589)

During Canada’s Centennial year in 1967, the dual T-33 Red Knight aircraft (21620 and 21630) were called upon to support the numerous North American displays planned out for the country’s newly formed Centennial Aerobatic Team, the Golden Centennaires, flying Canadair-built CT-114 Tutor jets. Flight Lieutenant J.E. (Jack) Waters was the prime Red Knight pilot with Flying Officer R.E.M. (Rod) Ellis as the Alternate. Like in the earlier days of the Golden Hawks, these Red Knights also helped to fill in the gaps at the show venues where the Golden Centennaires were not scheduled, or could not appear. In their own right, just these two Red Knight pilots accomplished a remarkable 101 display appearances during 1967, with Jack Waters being the most prolific of this small cadre of pilots, recording a total of 94 of these.

1967 Red Knight pilot F/L Jack Waters poses with aircraft 21630 (CF Photo via Mel Roy)
Two other T-33 aircraft were earmarked for general liaison and support duties to the *Golden Centennaires* and these were painted in a similarly gleaming Gold/Red/Blue scheme as their *Tutor* jet teammates. These aircraft were generally flown by O.B. Philp (Commanding Officer), Denis Gauthier (Personnel Administrative Officer and French commentator), and ex-*Golden Hawks*’ Lead Lloyd Hubbard (Public Information Officer and English commentator).

The rarely seen nine-plane formation of the *Golden Centennaires* flying over the Canadian Rockies, taken in early February 1967, prior to the start of the display season. Following the tragic loss of solo pilot F/L Dave Barker on 15 February, they continued on as an 8-plane team. (Canadair via Bill Upton Collection)

The later progeny of the *Golden Centennaires* was the 2 Canadian Forces Flying Training School (CFFTS) Formation Demonstration Team that eventually spawned the famed *Snowbirds*. Another T-33 (133275), painted overall white, was assigned to the team in 1972 for general support duties, with a supplemental *T-Bird* (133604), that remained in the natural metal scheme with *Snowbird* markings on the tip tanks and tail, assigned later for liaison tasks. A series of *Tutor* jets, painted in the *Snowbirds*’ schemes, and numbered from “10” to “15”, ultimately replaced them both over the following years.

The original overall white with red high-viz scheme of the 2 CFFTS Formation Demonstration Team, and the initial Snowbirds team (1972), is displayed here to good effect, with the aircraft in a precision line abreast team photo. (CF Photo PCN72-65)

Wing Commander O.B. Philp, Flight Lieutenant J.L.D. Gauthier and Squadron Leader L.J. Hubbard confer in front of their two parked *Golden Centennaires*’ support *T-Birds*, serials 21490 and 21592, during a visit to Canadair in early January 1967. (Canadair via Bill Upton Collection)

*T-33 Silver Star 133275 was the support aircraft for the Snowbirds’ team coordinator from 1973 to 1976. It was painted white to honour the original 2 CFFTS Team and sported the new crest of the Snowbirds on the tail. (Bill Upton Collection)*

*T-33 Silver Star 133275 was the support aircraft for the Snowbirds’ team coordinator from 1973 to 1976. It was painted white to honour the original 2 CFFTS Team and sported the new crest of the Snowbirds on the tail. (Bill Upton Collection)*
A fine shot, in the climb, with F/L Jack Waters at the helm of the last Canadian T-33 Red Knight aircraft, RCAF 21630 in 1967. The only marking changes included the new Canadian flag on the tail and the RCAF Small Leaf Roundel on the fuselage. A red and black luggage pod used for cross-country flights, hangs below the fuselage. (Bill Upton Collection)

The last official performance by a RCAF/CAF T-33 Red Knight aircraft was performed on 9 June 1968. Captain Dave Curran was at the controls of 21630 for CFB Portage la Prairie’s annual Armed Forces Day display. Captain Curran was instrumental in keeping the Red Knight display alive, suggesting that a new mount, namely the Canadair CT-114 Tutor, was better equipped for the task. It was an existing design, more rugged and capable than the T-33, and one that he himself had flown as an instructor, thus easing the transition for him between aircraft types.

Two former Golden Centennaires aircraft (26153 & 26154) were chosen from those remaining in storage at Mountain View, and were painted in new Red Knight and CAF colours and markings conceived by Curran, with 1967 Red Knight pilot, Jack Waters. Tutor 26154 was considered the primary Red Knight demonstration aircraft and 26153 was the spare, normally piloted by the Commentator.

The two aircraft performed some demonstrations during the remainder of the 1968 season and the early part of 1969. Unfortunately the reign of the Red Knight came to an abrupt end on 13 July 1969, when Tutor 26154 lost power, went out of control, and crashed during a display for some Italian Air Force officials visiting Moose Jaw, killing young Red Knight pilot Brian Alston.

In the twelve-year annals of the Canadian military’s Red Knight, the scarlet painted Silver Stars and Tutors made more than 600 appearances, an achievement rivaled only by the current Canadian military aerobatics display team, the Snowbirds.
The RCAF *Red Knight* show routine was fifteen minutes long and consisted of the following manoeuvres:

- Short field take-off
- Tight 360° turn cleaning up the aircraft
- Slow roll
- Loop
- Inverted pass
- Cuban 8
- Four point roll
- Landing loop
- Reversing landing and take-off
- Dirty roll with flaps and wheels down
- Outside Cuban 8
- Series of rolls into a 360° turn
- Vertical 8
- Vertical roll
- Red Knight Ditch landing

**RCAF/CAF Red Knight Pilots**

For the first years the *Red Knight* was a single aircraft manned by the pilot with a support technician. By the 1961 season, and subsequent years, the *Red Knight* team consisted, usually, of two aircraft, two pilots (the Primary and Alternate) and a technician for each aircraft.

In the overall history, 18 pilots were involved as *Red Knights*, of these, 3 would perish in fatal crashes (*).

<table>
<thead>
<tr>
<th>Year</th>
<th>Rank</th>
<th>Name</th>
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<tbody>
<tr>
<td>1958-59</td>
<td>F/L</td>
<td>Roy Windover</td>
</tr>
<tr>
<td>1959-60</td>
<td>F/L</td>
<td>Bob Hallowell</td>
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<tr>
<td>1961</td>
<td>F/L</td>
<td>Ray Goeres</td>
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<tr>
<td>1961</td>
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<td>Dave Barker (Alt.)</td>
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<tr>
<td>1963</td>
<td>F/L</td>
<td>Bud Morin*</td>
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<td>1963</td>
<td>F/L</td>
<td>Wayne MacLellan (Alt.)</td>
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<td>1964</td>
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<td>F/L</td>
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<td>F/O</td>
<td>Capt. John Reid (Alt.)*</td>
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<tr>
<td>1969</td>
<td>F/O</td>
<td>Capt. Robert Cran (Alt. proposed)</td>
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* = Alternate Red Knight pilot

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Two of the Canadair designed and built CL-41A/CT-114 Tutor trainers (26153 and 26154) became the official mounts of the CAF Red Knight team from July 1968 to July 1969. Here, both aircraft paid a visit to Canadair in April 1969, sandwiching the white-painted Canadair CL-41G prototype (26015). At rear is Red Knight aircraft 26153 with pilot Dave Curran and technician Corporal R.J. Hawes. Posing in front of 26154 are pilot Brian Alston and technician Corporal Larry Hunt. Sadly, Alston would lose his life in the crash of this aircraft just three months later, all but closing the story of the Red Knight. (Canadair via Bill Upton Collection)
The 1989 Red Knight

After a hiatus of some twenty years, the Red Knight solo aerobatics display was resurrected in the United States by the family teams of accomplished Warbird pilots, George and Rick Brickert, and Frank Sanders, his wife Ruth with sons Dennis and Brian of Sanders Aircraft, located in Chino, California. For the emerging Jet Warbird movement, they had in mind to present an exciting new airshow act to the American public and decided to set out to accomplish this task.

Rick and Dennis initiated the purchase of an ex-RCAF T-33, serial number 21273, and restored the classic aircraft at the Sanders’ facility in Chino during the fall of 1988. It soon emerged in a bright red scheme representative of the original Red Knight, with a newly stylized knight’s helmet and “Red Knight” legend on the nose. The knight’s sword adorned the tail and his lance was displayed horizontally on the tip tanks. For such an expensive endeavor, various sponsor’s logos were splashed along the sides of the fuselage. Under the tailplane, the aircraft carried the civil registration N12413 (later changed to N233RK), along with “Canadair T-33 Mk 3 Serial No. 273” titles in white.

Frank Sanders, a long-time member of the Society of Experimental Test Pilots (SETP), had custom designed the Sanders Smokewinders smoke generating system for use in the T-Bird’s stock tip tanks, to help distinguish the new Red Knight aircraft’s display routine. The system had previously been used for USAF and USN military jet demonstrations (F-16, YF-17 and F-20), and NASA / FAA wake turbulence vortex studies. With an extensive expertise in design and engineering, Frank had earlier acquired ex-Royal Canadian Navy Hawker Sea Fury fighters, one of which he meticulously converted into the famed, record-breaking, Pratt & Whitney R-4360 powered, Dreadnought air racer, flown by Rick Brickert at the Reno Air Races in the early 1980s.

In 1989, the 45th anniversary of the establishment of Canadair Limited was to be celebrated. The author contacted Robert St-Pierre, General Manager of Expo Air ‘89, early in the year, to discuss a couple of ideas regarding that year’s air show event, scheduled to be held at the nearby St. Hubert airport on 9 and 10 September. It was proposed that this newly established Red Knight, flying the near vintage Canadair-built T-Bird, make an appearance at the show to honor the anniversary event, along with the famed Snowbirds. As an added bonus, to mark the reappearance of this renown act, the author was given the coordinates of the original Red Knight pilot, via George Miller (former Golden Hawks and Snowbirds pilot), with the express idea of introducing the man who started it all, to the man who desired to continue the legacy. A photo presentation, coordinated by the author, with the talented help of Canadair’s Photo and Graphics departments, was prepared, and publicity for the event was generated.

A weekly in-house publication, “Canadair News/Actualité Canadair” was issued on 1 September 1989, with the title “Snowbirds and Red Knight to fly over Canadair” in an effort to inform all Canadair employees to show up for this special occasion. It announced that these aircraft would perform two flypasts over the Canadair facilities on Thursday, 7 September during the noon hour, and would later perform at Expo Air ‘89.
The Canadair flypasts, to commemorate the home where these aircraft were built, were to have a photographer in the T-Bird, and another one in a Snowbird. They would take turns shooting the other display aircraft against the backdrop of the prominent Plant 1 “CANADAIR” sign and facilities, this never having been done before for these aircraft.

Tragically, the weekend prior to the Montreal show, two of the Snowbirds aircraft accidentally collided, and crashed, at the Toronto air show, thereby sadly canceling their planned Canadair flypasts and Montreal International Air Show appearances.

Coach and pilot Frank Sanders, along with aircraft technician/pilot George Brickert, whose son Rick was another of the 1989 Red Knight pilots, flew their glistening red T-33 in on the Friday prior to the weekend show for the standard press junket and static display setup.

The author, with fellow Canadair photographer, Lucio Anodal, met the aircraft and crew as they were prepping the bird for the day’s PR activities, which included a familiarization flight for Lucio.

30 years later, Roy recounted first to his three-man audience, then later over the public address system to the thousands of spectators watching the 1989 Red Knight performance on 9 September that:

“The whole thing started ‘cause Yanks were flying Canadian jet aircraft at Canadian air shows, so the Red Knight aerobatic solo was formed. Now, after all these years, it seems to have come full circle, ‘cause here we have, once again, a Yank flying a Canadian jet aircraft at a Canadian air show!”
The following ten minute routine description was provided by the 1989 Red Knight Air Shows:

- Take-off
- 90/270
- 4 point roll
- Cuban 8 with roll and a half
- Vertical half roll (Family 9)
- Loop with roll on top
- Double roll climbing at 60°
- Over the top
- Double vertical roll up
- Double vertical roll down
- High g 90/270 to slow pass
- Wake turbulence demo (clean pass)
- Landing

With the patented Smokewinders streaming white, 1989 Red Knight, Frank Sanders, puts his aircraft through its paces at Expo Air '89, at the St. Hubert Airport, Quebec, on 9 September 1989. (Bill Upton Photo)

Alternate pilot George Brickert taxis out in the 1989 Red Knight T-Bird, N233RK, at El Paso, Texas, on 14 October 1989. This aircraft was lost, with pilot Frank Sanders, in a fatal crash at Roswell, N.M., in 1990. (Bill Upton Photo)

The upgraded, and modern looking, front and rear offices of the 1989 Red Knight T-33 aircraft, N233RK. (Bill Upton Photos)
The Museum’s T-33 Red Knight Aircraft

The T-33 Red Knight aircraft preserved on display in the Canada Aviation Museum started out as Canadair T-33AN Silver Star Mk 3PT, c/n T-33-574. Bearing RCAF registration and serial number 21574, it first took to the air, for a 2.8-hour test flight from the Canadair facilities on 20 February 1957. It was formally accepted by the RCAF on 7 March at RCAF Station MacDonald, Manitoba, for NATO pilot training with the Pilot Weapons School.

From May 1959, aircraft 21574 was principally based with 1 AFS at RCAF Station Saskatoon, Saskatchewan, in its prime role as that of a pilot trainer. This RCAF Station eventually became the formal first home of the Red Knight when the Central Flying School (CFS) moved their operations there, from Trenton, in July 1959.

Following the end of the 1960 Red Knight show season, this particular Silver Star was chosen to shed its ‘Silver’ bare-metal RCAF look for a bright crimson colour to become the new spare Red Knight aircraft, replacing the unadorned former spare T-33, serial 21201.

Along with the first Red Knight steed (21057), the two aircraft were ferried to Northwest Industries Limited in Edmonton and, during February 1961, were transformed visually into the bright Red Knight standard colours and markings that became the renowned style on these, and two subsequent T-Birds, from 1961 to 1968.

Red Knight aircraft ‘574 went on to thrill international crowds as the backup and primary performer from 1961 to 1964 while based out of the new home of the Red Knight at Portage la Prairie, Manitoba.

Eventually some structural problems were found with the airframe by No. 6 RD mechanics at Trenton, and 21574 was declared permanently grounded in early 1964, thus ending its distinguished career as a Red Knight display aircraft.

This Red Knight was transferred, on paper, to the National Aeronautical Collection at former RCAF Station Rockcliffe, Ottawa on 19 May 1964. This aircraft, complete with its Nene engine, arrived by the end of the month, where it has since been seen on display.
Red Knight T-33AN 21574 arrives newly painted at the original RCAF Station Rockcliffe hangars, at this time to become part of the National Aeronautical Collection in May 1964. (CAvM Photo 19605)

Pristine RCAF Red Knight aircraft, serial 21574, sans wingtip auxiliary fuel tanks, rests on the ramp at the Rockcliffe Flying Club, adjacent to the National Aviation Museum, Ottawa, in June 1995. (Bill Upton Photo)

As a reminder to the original intent of the aircraft type, the instrument blind flying hood can still be seen stowed on the port sill of the rear cockpit. When it was required for use, it would be deployed along the two arched rails under the canopy. (Bill Upton Photo)

Unfortunately, 1964/1965 Red Knight pilot F/O Tex Deagon’s surname incorrectly appears on the displayed aircraft as “DEAGON”. (Bill Upton Photo)

T-33 Red Knight 21574 sits on display in the Jet Island area of the Canada Aviation Museum in 2008. An equally famed aerobatics successor, the Snowbirds’ CT-114 Tutor, serial 114108, repose just beyond the nose of the T-Bird. (Bill Upton Photo)
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