

# Merlin Musings

**Fifth in a series**

*Ted Devey*

## Merline Engine Applications (continued)

### Two engine aircraft

Most aircraft fitted with two or four Merlin engines were bombers, however some two engine aircraft were classed as fighters or fighter bombers. Two engine aircraft using Merlins included the De Havilland Mosquito and the Bristol Beaufighter.

Heavy bombers were powered by four engines and will be considered in the next chapter in this series.

Twin engine aircraft are rather a mixed group as some of a kind were powered by Merlins and others by radial engines, principally Bristol Hercules sleeve-valve engines; others were powered exclusively by Merlins.

### Bristol Beaufighter Mk II

The Beaufighter was intended for long-range operation equipped for various roles; as a night fighter (it was one of the first aircraft to be fitted with radar), torpedo-bomber, ground attack fighter, and attacker of shipping. The Beaufighter first saw service in 1940

after the Battle of Britain when the Luftwaffe began bombing raids at night on Britain and made use of its radar.

Initially they were fitted with Bristol Hercules sleeve-valve radial engines but when engine production lagged behind airframe production, Merlin engines were fitted to production aircraft. Of about 5500 Beaufighters built, 442 Mk II aircraft were equipped with Merlin XX engines.. After catching up in production the remaining Beaufighters were powered by Bristol Hercules engines.

### De Havilland Mosquito

The Mosquito was of unique design and construction. The airframe was built almost entirely of wood, usually a very thin veneer ranging from .035" to .80" in thickness separated by a sandwich core of Balsa .75 to 1.25" Thickness. In tropical areas, Mosquitoes suffered from delamination of the veneers due to high temperature and humidity environments. However, in the cooler temperatures of the European theatre of war, laminated structures were quite stable and reliable. Mosquitoes were adapted for a number of different roles, low-altitude 'hedge-hop' bombing runs, long range reconnaissance, attacks on shipping and submarines (Coastal Command), ground attack etc. Initially, Mosquitoes equipped for bombing could carry 1000 lbs. of bombs, 2 250 lb. bombs in the bomb bay and 2 250 lb bombs under the wings.

Eventually, Mosquitoes could carry 4000 lbs of

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bombs. With a special modification to the bomb bay, a single 4000 lb bomb could be carried. Low-flying Mosquitoes would precede raids by heavy bombers by laying down coloured incendiaries to precisely locate specified targets, thus improving the accuracy of the raids by heavy bombers.

Hedge-hopping was a specialty of Mosquitoes whereby the plane would fly at low altitudes just above ground foliage and below radar beams thus avoiding detection. The use of wooden construction provided two advantages, 1) relief of metal supplies that were of limited availability and 2) very low radar reflectivity because wood absorbed radar energy whereas metal returned radar energy quite efficiently. Mosquitoes were more difficult to detect by

radar than airplanes of metal construction.

About 6400 Mosquitoes were built in Britain in a dozen variants while about 1300 were built in Australia, and Canada (at Downsview, Toronto, which is now the location of the Toronto Aerospace Museum).

All Mosquitoes were fitted with Merlin engines. Early production models were fitted with Merlins equipped with 2-speed single-stage superchargers. When later models were fitted with 2-speed 2-stage Merlins, higher altitude performance was considerably enhanced often as high as 30,000 feet. Mosquitoes were very versatile aircraft due to the high performance of Merlin Engines. About 1100 Mosquitoes were built at Downsview and were fitted with Packard Merlins from Detroit.

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## Trans Canada Airlines North Stars

*Bill Tate*

In late 1943 the outcome of World War II was showing in favour of the Allies. This allowed the Government of Canada to begin looking for an aircraft that would meet the needs of the Royal Canadian Air Force (RCAF) and Trans Canada Airlines (TCA). At that time, only the Lockheed Super Constellation and the DC-4 were the only two commercial aircraft types available. The former was experiencing technical problems with its testing and development; the latter had a proven track record in commercial aviation and in a military application known as the C-54.

The Government of Canada chose the DC-4 to be called the North Star, to be built in Cartierville outside of Montreal. TCA decided it would need an aircraft suitable for oceanic services but it would require a larger power plant. The available power plant of the day (Pratt and Whitney) P.W. R-2000 Dash 9 rated at 1100 horse power was suitable for domestic operations but not for oceanic services. Winter operations (runway conditions) in Canada resulted in the requirement for an additional 200 horse power per engine for the North Star. The Rolls Royce 620 series engine rated at 1725 horse power was selected for the aircraft.

The advantage was that the Rolls-Royce power plant had a proven military track record and a two stage super-charger for high altitude flight at a low speed and medium speed setting. At an altitude of 23,000 feet, in the medium speed setting for the supercharger, it could produce 1150 h.p. per engine. For fuel economy for trans-oceanic flight, a power

setting of 990 brake horse power per engine was used. When the aircraft and power plant were chosen, the humour of the day suggested it was an illegitimate aircraft conceived in Canada by an American father with an English mother!

The aircraft was built under license in Cartierville, Quebec, to help establish a Canadian aviation presence and to assist in the transition from a war-industry to a post-war economy.

Of the 71 aircraft that were eventually built, the bulk of production was for TCA (20 aircraft), the RCAF (24 aircraft) and BOAC (22 aircraft known as the Argonaut). With the war concluded, Douglas announced that the DC-6 would be built which was larger and pressurized. Since the choice for the DC-4 had been made, TCA entered into discussion with Douglas to determine if the DC-4 could be pressurized. It was decided that it could be done but with major modifications required as the initial aircraft was not built to be pressurized. Further modifications included the use of the landing gear for the DC-6 and using the DC-6 fuselage with an 80-inch section removed (same size of DC-4). Versions of the aircraft types built were the C-54 GM (the first version for the RCAF), the DC-4 M1, (the final version for the RCAF), DC-4 M2 (pressurized passenger for TCA), CL-4 (DC-4M2) design for BOAC for its Imperial Route Structure to the Far East). The C-4-1 was built for Canadian Pacific Airlines (CPA), four were delivered and used on trans Pacific service, and finally the CL-5 V.I.P. transport (4 Pratt Whitney R-2800 radial engines) of which only one was built for the Government of Canada for V.I.P. services.



Figure 1: DC4M North Star at Vancouver International Airport (Photo courtesy of Mel Lawrence)

Roll out of the first aircraft was 20 July 1946. Initial flight tests showed the aircraft had very easy handling characteristics. During testing, it was determined that the four bladed propeller could generate the best second segment climb characteristics in an engine-out situation. Although 79,850 lbs was the maximum gross take-off weight, the four bladed propeller met second segment climb requirements at 82,700 lbs versus 80,200 lbs for the three-bladed propeller. By using the conservative figure of 79,850 lbs., this assured a more conservative margin in an engine-out consideration. The DC-4 M2 built for T.C.A. had the Rolls-Royce Merlin 722 or 724 engine (the 722 series engine had a 4 bladed propeller which was used on over seas flying and the 724 series engine a three bladed propeller for domestic flying).

The North Star had a gross weight of 79,850 lbs, a maximum landing weight of 72,000 lbs, a maximum zero fuel and oil weight of 68,000 lbs and an empty weight of 45,620 lbs. The DC4-4M2 North Star could reach a maximum speed of 325 MPH and had a cruise speed of 250 MPH (The Canadair North Star by Larry Milberry). T.C.A. used 900 Brake horsepower for cruise and alternate planning, which at 20,000 feet gave a combined fuel flow of 1772 lbs per hour. The stalling speed at maximum weight was 108 knots.

The trans-oceanic model was based on maximum fuel of 3,002 Imperial Gallons (20,943 pounds of fuel), assumed a 50 knot tailwind at 20,000 feet, (maximum pressurization was 4:16 p.s.i. giving a 8,000 foot cabin at 20,000) and used 900 brake horse power, for a maximum range of 2500 nautical miles, also allowing for 40 minutes to an alternate airport, plus 30 minutes holding over the alternate, and plus contingency reserve fuel.

The electrical system had four 28 volt direct current generators (300 amps continuous) with two alternating current inverters of 115 volts, 400 cycles. The hydraulic system was used for the landing gear,

flaps, and brakes which were normally powered from the number three engine along with electric hydraulic pumps. Emergency landing gear extension was accomplished by a hand pump in the cockpit with trapped hydraulic fluid. On one flight with H.R.H. Prince Phillip the aircraft lost its hydraulics and the gear had to be hand pumped down. Prince Phillip said "nice rowing chaps".

On signing the contract, TCA agreed to pay a total of \$13,320,000 for twenty aircraft in 1947 dollars or \$660,000. per aircraft. Using Bank of Canada C.P.I. adjustment for today's dollars would show the value of the contract to be \$144,450,875.00 for the 20 aircraft of \$7,175,475.00 per aircraft. As the reader can appreciate, this was a huge capital acquisition for TCA but the government of the day wanted the money to remain in Canada plus having the skill-set to built large aircraft to stay here as well.

Before the DC-4 M2 was in production, TCA acquired six unpressurized C-54 GM aircraft to start its 'transoceanic' service to England in the fall of 1947. The DC-4 M2 served on this route until 1961.

As with most new aircraft the airplane came in heavy. TCA had a weight reduction plan set-up from 1948 to 1951 which had 731 lbs removed for oceanic services and 1134 lbs removed for domestic operation.

The initial layout was for forty passengers in a first-class configuration. This luxurious design included separate men's and ladies changing rooms with separate toilets and even had a table in the powder room for ladies. In the cabin fabrics were used to help reduce the noise levels. Fabric colour was chosen carefully to help reduce the anxiety of the first time flyer as well.

First class airfare Montreal to London was \$561.60 return in 1947 dollars. Using Bank of Canada C.P.I. adjustment, this would be \$6,090.36 in today's dollars.

Even the pilots were considered in the design as crew bunks with air mattresses were included. The management of the day wanted pilots to maintain peak efficiency by allowing for adequate crew rest in flight.

For long-range navigation, LORAN, which had been the exclusive domain of the military, was used, making TCA the first airline in the world to use it. (Planned flight time Montreal to London Heathrow was 10 hours - the fastest time recorded was 8 hours, 45 minutes).

The North Star did suffer from noise. As the engines were a V-12 configuration, the exhaust stacks were inboard and outboard on each engine. This produced unacceptable noise levels giving it the nickname of "Noisy Star" by passengers. An engineer in TCA by the name of MacLeod designed the famous MacLeod crossover exhaust system. This crossover

exhaust system reduced noise levels to a more acceptable level by diverting the inboard exhaust to the outboard side of each engine.

For domestic operations the interior was changed from 40 first-class seats to 62 tourist class with a 40-inch pitch. A freighter version of the North Star, with a 18,000 lb load capacity, was used by TCA for the shipment of live cargo in a heated pressurized environment with a capacity of 18,000 lbs. Utilization was eight hours per day - the highest of any piston-propeller aircraft of the time.

TCA's North Stars, from 1947 to 1961, had a total 5,292,358,341 revenue passenger miles - the highest year was 1954 with 600,339,345 revenue passenger miles. On retirement, the average aircraft had flown 40,000 hours and the combined fleet total was 750,000 hours.

The era for the TCA North Star ended on 30 April 1961, the last passenger flight which was flown by Captain Maurice Labine (his brother Ray was a Spitfire photo reconnaissance pilot in WW II sent me solo in 1967). The last TCA cargo flight was July 1, 1961. The Captain was Don Orr.

The fleet was put up for sale & some flying char-

ter work in Europe, some running guns in Africa and the last one flown was used by the National Research Council until 1975 when parts for the engines could not be found.

There is only one aircraft of this line intact and that is fin number 17515 of the RCAF, a C-54 GM that Project North Star is bringing back to museum display readiness after 40 years of outdoor storage.



Figure 2: Captain Bill Tate, in his office

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## The Life of Robert Holmgren

1939-2007

By Tracey Holmgren

Once upon a time there lived a young Danish boy who sought excitement and adventure in a great country named Canada. And so began Robert's journey to a far and distant land ...

Robert Holmgren was born at Stockholm, Sweden, on September 26th, 1939. He was the first child of Ingrid Marta Ragnhild Berg and Marius Holmgren, followed by his sister Susanne and 15 years later by his brother Lennart.

In 1946 when Robert was just six years old, his family moved across the North Sea to Denmark so that his father Marius could obtain employment with Canadian Pacific. Once there, they settled into a community on the outskirts of Copenhagen called Hellerup.

During his early school years, Robert led a full life. He excelled at school and his favorite subjects were physics, chemistry and gymnastics! He also preferred individual sports and enjoyed the 60 meter dash, the long jump and the triple jump. By his own admission, he had a good social life- not a lot of friends but a few close ones and they were always

getting into trouble, boys being boys! His favorite childhood memories evolved around his Wolf Cub and Boy Scout years, especially the summer camps and jamboree's.

When he was just 12 years old, Robert experienced his first flight: he had entered a magazine contest and won the grand prize, a plane ride to anywhere he chose, in Denmark. So, alone, and with true Viking courage, Robert boarded a DC 3 destined for Alborg, which was the furthest point on the map. And thus his love of aviation was born.

Always a hard worker, Robert's first job as a young boy was a paper route. He also worked as a delivery boy for a grocery store and then worked for several years for a fish monger.

When he turned 17 years, Robert began his pre-engineering studies at the Polytechnic Institute of Copenhagen. Aviation was his goal and he had a plan. But first, Robert had to complete two years of compulsory military training in The Royal Danish Air Force from 1958-1960. Now free and at the tender age of 21 years, Robert embarked on his greatest adventure of all: he left his family and friends in Denmark to begin a new life, several time zones away, in a great land called Canada.

Robert had been exposed to Canada through his father whose work for Canadian Pacific entailed

many business trips to Canadian cities. So, with just fifty-four dollars in his pocket, his father friend's address and his father's blessing, Robert boarded a BOAC aircraft in Copenhagen and flew to Dorval, Quebec.

On July 12, 1960, Robert landed on Canadian soil and became a landed immigrant. Shortly after Robert obtained room and board on St. Catherine Street West for twenty-five dollars a week and became fast friend with his Lithuanian landlady.

Almost immediately, Robert applied for a job with Canadian National Canadian Pacific in Montreal and was hired as a Telecommunications Specialist. His job was to receive and transmit messages in Morse code, text strips and punch marks. His salary was a little over fifty dollars a week. He also studied electrical engineering at Sir George Williams University, which is now known as Concordia University in Montreal. Robert remained with CNCP for about a year until one day he looked in the paper and noticed an interesting advertisement for TCA who were about to introduce DC jetliners out of Montreal. Robert applied and was hired within the purchasing department for the DC 8 on May 30th, 1961. It was during the course of that interview that Robert expressed interest in becoming an avionics mechanic. Less than a year later he was approached by the head of the Avionics Department, who wanted to recruit Robert into his team as a promising young Learner Mechanic. Robert jumped at this golden opportunity and life was good.

During the summer of 1963 Robert met his bride to be, Helen Bethune. Helen was a beautiful brunette from the east coast and worked as a flight attendant for TCA. Love blossomed and on September 12, 1964 Robert and Helen were married. The following year on June 1st, 1965 their first child was a born, a healthy baby girl named Tracey Jean. Robert and Helen, down to one income, struggled to make ends meet while they etched out a living in a one bedroom apartment in Lachine, Quebec.

Finally, on a cold February 21st, 1966, and far from his Danish shores, Robert proudly became a Canadian citizen. And so, with new citizenship in hand, Robert strove diligently to provide for his new family. By day he continued his apprenticeship with TCA and at night he "burned the midnight oil" studying to become an engineering technologist. Sleep was a commodity! However, despite hardship, Robert prevailed and graduated from engineering in 1966. Less than a year later their second daughter, Robin Caroline, was born on February 3rd, 1967.

As life continued in 1969, one engineering position became available within the Air Canada (TCA) organization. There were many applicants. However Robert's hard work, determination and dedication got him noticed and got him the job. The

everyday struggles were becoming easier. Soon after his new job as an engineer began, the airline faced its first strike and Robert faced unemployment. With now four mouths to feed and mounting stress, Robert landed a job with Dorval Taxi Service and "drove like stink" burning up the roads between Dorval and Montreal, working 12-16 hours a day just to stay afloat. Perhaps that is how Robert acquired his superior driving skills.

On January 15, 1973 Robert's third child was born. Finally, a son Robert Roy Martin joined the ranks and completed a family of five.

Following his promotion, Robert and Helen bought their first home in Pierrefonds, Quebec. There was room for the children to play and grow. As time passed the family would live in Kirkland, then Cap St. Jacques. That's when Helen and Robert formed a small business named "Now and Then Antiques". The business flourished and involved everyone in the family. Robert's children became experts at stripping furniture. The extra income helped make ends meet and as Robert would say, "put food on the table".

In the summer of 1980, Robert and Helen decided to move the family into a little Ontario town called Hawkesbury. Robert continued to work in Dorval and commuted daily to and from Hawkesbury.

From 1961 to 1987 Robert remained with Air Canada, ultimately achieving the title of Manager of Maintenance and Performance. He retired October 1987 after almost 27 years and went to work for Nationair, Mirabel. At Nationair, Robert became Manager of Maintenance and Performance. Later on he was Director of the Stores Department and the Production and Planning Administrator.

Tragedy struck in 1989 when Robert's wife Helen was diagnosed with cancer. Helen succumbed to the disease on November 22, 1989 and the family was fractured. Robert's eldest daughter had just left the nest and was making her way in the world however Robert had to cope with his devastating grief and care for his two remaining children. The family rallied and time healed. Robert left Nationair that year joined Bombardier Aerospace Regional Jet Division, Montreal and then in Downsview, Ontario from 1992-1994.

In January 1991 Robert met a wonderful lady named Lucette Bertrand and once again, love blossomed. They were married in the hills of Harrington, Quebec on a snowy October 9th, 1993. Robert inherited a step-son, Derek, a step-daughter, Lyne, and the entire Bertrand clan. His Christmas list was growing!

Robert decided that retirement didn't suit him and that he was going to work for himself. He and Lucette decided to invest in a home inspection franchise. His diligence and professionalism eventually resulted in a word-of-mouth success and he

enjoyed his work. Robert also took up wood working. Robert's motto "go big or go home" prevailed and one by one he purchased various wood working machines and transformed his basement into a shop. Robert enjoyed this pastime immensely and produced several beautiful pieces of furniture for his kids and grandchildren. The last item he ever made was a swing seat made of solid ash for his grandsons. It currently hangs under a century maple tree in Orangeville.

On October 31st, 1996 tragedy struck Robert again when he was diagnosed with prostate cancer. Robert felt that the demands of his cancer treatments would not allow him to properly conduct the home inspection business and subsequently he sold the business and tackled his cancer. In typical fashion, he educated himself about his disease and challenged his doctors. He took an active and informed role and chose his treatments. He ran half marathon, cycled, hiked and skied, to build his immunity.

It was around this time that Robert took an active interest in the Canadian Aviation Museum located on the Ottawa River close to his home in Gloucester. He volunteered many hours conducting tours until an old dilapidated aircraft on the tarmac caught his eye. This aircraft was the North Star and she had been sitting exposed to the elements for over 40 years and was in bad shape. Ironically, it was the same type of aircraft that his first wife Helen had worked on as a flight attendant many years before.

Robert made inquiries with the museum and was informed that there were no foreseeable plans for the North Star as there were no funds allocated for it, nor any room in the hangar. In true Viking fashion Robert didn't take no for an answer. He considered the plight of the North Star 'an embarrassment to all Canadians'. After all, the North Star was Canada's first passenger aircraft and as such could not be left to rot outside. Undaunted, Robert worked tirelessly and put forth a proposal. The proposal listed the names of over 200 experienced and passionate avionics volunteers wanting to restore the North Star. "Project North Star" was born.

Funds were raised and the necessary equipment was donated or bought. Progress was evident despite working in frigid conditions throughout the winter months. Robert realized that the grand old lady needed to be protected from the elements. So he became the driving force behind the proposal to house the North Star in the museum second hangar. Hard work and dedication by all those involved finally resulted in the North Star finally getting a home.

Robert's passion for life, for his family and for his beloved North Star made him a busy but happy man. He tackled issues head on, often leaving turbulence in his wake. Partly because of his deteriorating health, and partly because of his natural born impatience, Robert felt that he was running out of time. He desperately wanted to see the North Star to completion. His attitude was "never give up". This fortitude battled his cancer for 11 years so that he could see the births of nine grandchildren: Gunnar, Torunn, Max, Isabella, Eva, Cole, Sanna, Nolin and Lars. Robert was grateful for this time and felt fortunate to have experienced so much in life.

A month before Robert's death his daughter Tracey sat down with him to compile his life history. When she asked if he had a message for the North Star crew, he replied "When the hell are you going to get it finished?" He then laughed and added "Keep up the good work".

To the question: 'If he could go backwards and forwards in time, where would he go? His answer "The Vikings, their journeys spanning 600 years and their arrival at L'anse aux Meadows' (NFLD) and "Another inhabited planet because life must exist elsewhere". That was Robert, the consummate explorer and optimist.

On October 17th, 2007 at 0441 hrs, Robert laid down his sword and died peacefully at the May Court Hospice in Ottawa. Lucette, Tracey, Robin and Robert were by his side as he left to begin his new journey to yet another distant land. He was courageous to the end.

Bon Voyage, Robert. Peace, Dad.

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## Miscellany

### Photographs

*Photos in figures 1 to 6 by Chris Payne.*



Figure 1: John Corby works on engine mount



Figure 2: Refurbished engine mount



Figure 3: Keith Penney admires Bill Tate's polishing skills



Figure 4: Engine panel, looking good



Figure 5: Steve Hardy, new man on the job



Figure 6: Bill Tate (right) shows new hand Murray Beaulieu how to remove old rivets

## Newsletter distribution

The NStar Chronicle is delivered to members by e-mail or by regular post to members not having e-mail addresses.

## PNSAC scedule of events – 2008

- March 20 - Board Meeting
- March 29 - Member's Meeting
- June 5 - Board Meeting
- June 14 - Annual General Meeting
- July 1 - Canada Day
- August 30 - 426 Squadron Association visit
- September 11 - Board Meeting
- September 20 - Member's Meeting
- November 27 - Board Meeting
- December 6 - Member's Meeting

## Reader's comments

I was pleasantly surprised to receive the NStar Chronicle. Those words, North Star, always brings up fond memories as this was the first aircraft I worked on after my immigration from Holland in 1952.

This Chronicle filled in many holes about the North Star history.

My first years in Canada were taken up working on this noisy and beautiful aircraft while building a house and looking after my first children.

Gone through the total aircraft overhaul at Dorval, I got my license and even taught a short time about aircraft controls. So many good memories from working and flying with it to many destinations which showed me many places in this beautiful world. Called up to go and repair the aircraft in many far-away places was always very interesting.

Enjoying, most of the time, my life since entering the eighties, the North Star will always have a separate place in my heart.

Newsletters like this will always be welcome.

Thank you, greetings  
Adrian van Zyl

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