



The NStar Chronicle

Merlin Musings

Sixth in a series

Ted Devey

Merline Engine Applications (continued)

Four engine aircraft

In 1936, the British Air Ministry issued a specification for a medium bomber which spawned designs leading to the Handley Page Halifax and the Avro Lancaster heavy bombers. Handley Page initially responded with an HP56 design using 2 Rolls-Royce Vulture Engines. The Vulture was a woe-begotten engine of 4 banks of 6 cylinders spaced 90 degrees, a complex design (cross section in the form of an X) suffering frequent connecting rod failures. In time, the Air Ministry staff requested a redesign using four engines which ultimately resulted in the Halifax aeroplane. Early Halifaxes, in the Mk.I and II series, were equipped with Merlin engines. The first Mk.I flew in October, 1940, powered by four Rolls-Royce Merlin X engines, 1280 hp each, driving 3 bladed variable pitch metal propellers. The bomb load, up to 13,000 lb, was housed inside the fuselage. The Mk.II was fitted with more powerful Merlins, providing a substantial improvement in performance. After 2,050 Mk.I and Mk.II series aeroplanes were

built, by mid 1943, the Mk.III version of the Halifax appeared with the more powerful Bristol Hercules Mk.XVI radial engines of sleeve-valve construction rated at 1615 hp. Halifax aeroplanes were modified for various roles including bomber, reconnaissance and coastal patrol.

The Air Ministry Specification for medium bombers led Avro to propose its 679 Manchester with the first prototype flying in July 1939 using two Rolls-Royce Vulture engines. The new bombers entered service in 1940 but the inadequacy of the Vulture engines soon became apparent. Rolls-Royce was too busy with Merlin improvement and production to find time to improve the Vulture. In the summer of 1940, the Manchester design was modified so that it could be fitted with four Merlin Engines. In January 1941, a new prototype, the Manchester Mk.III, took to the air. Flight tests were very encouraging and so a new aeroplane (officially designated Lancaster Mk.I) went into production. The first production series Lancaster flew in October 1941. The new bomber was an excellent aeroplane and the production rate was very high. It was used extensively on operations from the beginning of 1942 to the end of the War. The Lancaster bomb bay was 33 feet long and many aeroplanes were modified to carry huge blockbusters: 5,000 lb, 12,000 lb, and the Grand Slam at 22,000 lb. A number of Lancasters were modified to carry special bombs (depth charges) that destroyed 3 dams in the Rhur Valley in May, 1943. These were the famous 'Dam Busters'.

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Due to the high demand for Merlin Engines, the Lancaster Mk.II was fitted with Bristol Hercules engines of 1735 hp, starting in March 1943. The Mk.IIs were not equal in performance to the Merlin equipped Mk.Is and only 301 Mk.IIs were completed.

There were 3,039 Lancaster Mk.III bombers built. In Canada, 430 Packard Merlin equipped Lancasters were built by Victory Aircraft at Malton, near Toronto. These were designated Mk X, the first one rolled off the assembly line in August, 1943. After the War, many Lancasters were modified for photo reconnaissance and aerial survey work and remained in service until the 1950s. In all, a total of 7366 Lancasters were built.

Merlin engines, built by Packard Motor Company of Detroit, were shipped to Britain to aug-

ment production by Rolls-Royce and Ford of Britain, to Canada for Mosquito and Lancaster production, and to the US for P51 Mustang fighter production at North American Aviation.

The Merlin engine, in various Marks, was installed in a wide variety of aircraft types which were employed in numerous roles: fighters, bombers, reconnaissance, and maritime patrol.

The North Star with four Merlin 622 engines is currently being restored at the Canada Aviation Museum and will be the subject of the next article in this series. Rather than being produced by the thousands as were wartime aeroplanes, the North Stars were built by the dozens for civil passenger and military transport services.

PNSAC

The Height of Luxury: The RCAF C-5

Captain M. Joost, Office of Air Force Heritage and History, 1 Cdn Air Div

When the RCAF received the Canadair C-5 in June 1950, she was arguably the most luxurious of any Aircraft in Canada, if not the world. For 16 years, she ferried dignitaries to all continents except Antarctica, logging over 2,500,000 miles in 9,500 hours in the air. All who flew her or in her appreciated her, yet in her final moments, she suffered an indignity undeserved of such a fine Aircraft.

Canadair C-5 When the RCAF needed another North Star for VIP transport in 1950, Canadair produced a slightly larger version with a DC-6 undercarriage and Pratt and Whitney radial engines. The cabin was pressurized to 8,500 feet and divided into two compartments. The main portion had room for 24 passengers with seating that could be converted into double beds. Thick carpets and insulation reduced outside noise. Behind this section was the galley, with washroom and cloakroom for these passengers.

It is in the rear compartment that luxury was the byword. Here there was seating for 13. It had its own private washroom with hot and cold water. The furniture consisted of two divans, a semi-circular lounge, an executive desk with swivel chair, a filing cabinet and a telephone to talk to the captain. The divans could be converted to 3/4 size beds.



Figure 1: Canadair C-5

The C-5 was pressed into service even before the RCAF took her on strength. On 7 July 1950 she carried Prime Minister St. Laurent to Calgary to open the Calgary Stampede. Only on 29 July was she accepted by the RCAF. Over the years, she carried Princess, now Queen Elizabeth, Prince Philip, Queen Juliana and Prince Bernhard of the Netherlands, Emperor Haile Selassie of Ethiopia, and Prince, now Emperor Akihito of Japan. Then there were Prime Ministers, Cabinet Ministers, foreign dignitaries and senior military officers.

The C-5 had no regular flight commitments. Each flight was a special case, although some runs, such as Ottawa to London and Ottawa to Paris were more frequent. Then there were trips of longer duration, such as Prime Minister St. Laurent's 11 country trip around the world in 1954, and the repeat for Prime

Minister Diefenbaker in 1958. For many of its flights, the C-5 had to arrive at a specified ramp time as there were often guards of honour or dignitaries at the ramp. It is a testament to the crew and Aircraft, and with some help from air traffic controllers, that they invariably arrived on time.

There was a fair degree of competition within 412 Squadron to be a member of her crew. There was no crew exclusively assigned to the C-5 - all "VIP personnel" were eligible - but the standards required to be a member of the VIP personnel were high. Just to qualify as a First Officer, a pilot had to have two years experience in a transport squadron with experience on trans-Atlantic and trans-continental flights, plus a minimum of 3000 hours, of which 1000 had to be on four-engined Aircraft.

All this travelling was not without its lighter moments. While carrying Defence Minister Brooke Claxton to Japan to visit Canadian troops, the No. 1 engine sprung a bad oil leak approaching Tokyo. With a very large reception committee awaiting his arrival, including General Matthew Ridgeway, oil was sprayed over the assorted dignitaries. The RCAF footed the bill for new uniforms.

The C-5 was retired on 28 August 1966. The one blot on her record occurred at that time - with no

fault on the part of the Aircraft! In typical Canadian fashion, the C-5 had been refurbished that year at a cost of over \$383,000, including \$40,000 to overhaul three spare engines. Yet, the C-5 was sold for \$49,000. Needless to say, the Globe and Mail had a field day and the Auditor-General was not amused. The new American owner failed to get US certification for the C-5, and she was stripped of useful parts and scrapped.

The last word on the C-5 should go to His Royal Highness, Prince Philip. His comments are illustrative of the Aircraft's and crews' efforts. While approaching Vancouver during the Prince's tour of Canada in 1955, the hydraulic system failed. The co-pilot and flight engineer took turns hand-pumping the landing gear and flaps all the way to the ramp. Exhausted after an otherwise ordinary landing, they breathed a sigh of relief, hoping the Prince had not noticed anything. To their chagrin, he was standing in the doorway and quipped "Nicely rowed, chaps!"

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North Star Propeller Restoration

The North Star propellers were manufactured by Hamilton Standard. They were three bladed, constant speed, with full feathering and a reversing capability. The reversing feature was not used on North Stars. The blades were made of an aluminum alloy and had rubber anti-ice alcohol feed shoes installed on the leading edges.



Figure 1: Mike Hope (centre) briefs PNSAC members on propeller restoration

The #1 propeller was removed from the engine several months ago and shipped to Hope Aero in Mississauga for restoration. This involved putting the propeller through the Company's program for repairing aluminum blade propellers which included the following: paint removed by media blasting, full inspection, blades measured and stripped, blade bore polished, airfoil damage repaired, computer scan to guide repair and adjustments, blades anodized and painted, propeller reassembled and statically balanced to eliminate vibration. These procedures are outlined in some detail at www.hopeaero.ca/propeller_tour_2007.htm. The propeller was returned to the Museum in December where it is fully assembled and ready for reinstallation on the 1 engine when its restoration is complete. All aspects of the propeller restoration, from removal to reassembly at the Museum, were supervised personally by Mike Hope, a member of PNSAC and staunch supporter of Project North Star.



Figure 2: Hope Aero Technician Errol Brown with complete propeller mounted on the balance stand. (Photo courtesy of Hope Aero)

PNSAC

North Star Kiosk

The long awaited North Star Kiosk is on prominent display in the Canada Aviation Museum. It features an audio visual program, providing the public information on Project North Star. The video images were provided by Jacques Menard and Chris Payne. Jacques is also the narrator for the sound track, which includes information on the North Star and describes the role of volunteers in the restoration of the aircraft. A special thanks to all who have helped with the design and production of the North Star Kiosk.

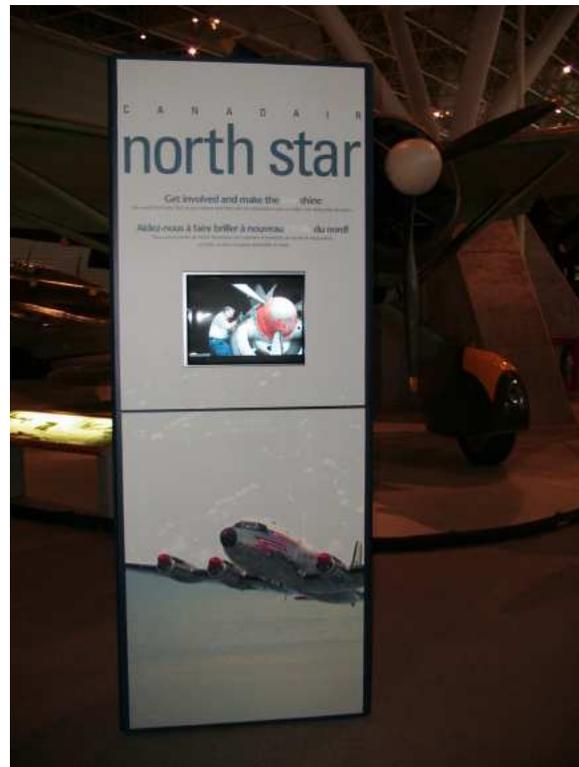


Figure 1: The North Star Kiosk.)

Miscellany

Photographs

Photos in figures 1 to 7 by Chris Payne.



Figure 1: Steve Hardy, Peter Houston, and Ted Devey



Figure 2: Lockwiring by Gary Dupont



Figure 3: Ed Hogan with coolant tank



Figure 4: Spinner and restorer – Bill "Tally-Ho" Tate



Figure 5: Cowling ring dis-assembly

Newsletter distribution

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

Member's Meeting

The next Member's Meeting is scheduled for March 30, 2008, commencing at 12:30 hours in the Bush Theatre at the Canada Aviation Museum. Members will have an opportunity to visit the storage hangar following the meeting. Note that the second in the Centraires Concert Series, "Folk Song Fantasy" will be presented at 14:00 hours in the Museum.

Reader's comments

I am following Project North Star with great interest, having flown in this aircraft as a member of UNEF. My duties as a Royal Canadian Service Corp driver were to meet the North Star at El Arish and pick up whatever cargo was brought in, usually mail which was very important to the Canadian troops serving in the UNEF. Some of the cargo was beer shipped in for Canada Day 1959. I took this photo of North Star 17515 in Athens just as we were about to depart for Pisa, Italy



Figure 6: RCAF North Star in Athens Greece 1959

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