



The NStar Chronicle

Merlin Musings

Fifteenth and final in a series

Ted Devey

Closing Comments

This is the final chapter of Merlin Musings in which an attempt was made to provide a thumbnail sketch of the line of aircraft engines built over a half century by Rolls Royce, Ford of England and Packard of Detroit. These were V-12 in-line liquid cooled power plants. Merlins were principally used in military aircraft (fighters, fighter-bombers, and bombers) during WWII. The last and ultimate of these engines was the Merlin 622 built by Rolls-Royce in Derby, England after the War. They powered 4-engine DC-4s (pressurized passenger) and C-54s (non-pressured cargo carrying) aircraft. DC-4s were used by Trans Canada Airlines, Canadian Pacific Airlines and British Overseas Airways Corporation (the British called them Argonauts). C-54s were flown by the RCAF as transport planes to carry cargo to distant places, and on some occasions military personnel. Merlin engines were very loud as there were no mufflers provided; their exhausts emitted blue flames which were quite visible at night.

For the long piston-pounding service of transport aircraft in passenger and freight service, the basic Merlin engine had to be substantially beefed up and

a large cooling capacity was installed for the cooling of the main engine, the intercooler and the lubricating oil which removed much heat from the inside of the engine. The result was the 600 series of engines; the Merlin 622 version was used for North Stars.

After the North Stars were retired from service, many of the engines found their way into the boat and airplane racing circuits. The 622, the Ultimate Merlin, being the most rugged of all the Merlins was highly suitable for 'souping up' to meet the arduous demands of flat-out air racing. In particular, P51 Mustang fighters were made over into racing machines. The originally fitted Packard Merlins were replaced by much altered Rolls-Royce Merlin 622s. A description of what happens in the engine of a P51D Mustang highly modified for all-out racing powered by a much-enhanced surplus Rolls-Royce Merlin 622 appears in the December, 2,008 issue of the NStar Chronicle, "One Second in the Life of a Racer"

For further information on the 622 for racing, Google "Reno for Gearheads" on the Internet and bring up an article by Graham White describing, for Race #4, 'Dago Red – Highly Modified P51D'

Wikipedia has extensive coverage of aircraft engines; a search for "Rolls Royce Merlin" will turn up much information on Merlins.

The overhaul of North Star Engine #1 has been completed and it now rests in its permanent position on the aircraft.

Contents of this volume:

Merlin Musings	1	North Star Models	4
Road Trip to Montreal	2	Project North Star – Progress Report	5
A Happy Landing for 'B for Berty'	3	North Star Team Effort	6
		Membership Renewal	6
		Miscellany	7



Figure 1: Fully restored Nr 1 engine proudly displayed.

Engine #2 gas been removed as a complete Power Pack and is being dismantled for overhaul in a manner similar to #1.

This completes Merlin Musings as a series. A new series will appear in future NStar Chronicle issues in which the overhaul of Engine #2 will be described with details of the various sub-assemblies and components.

PNSAC

Road Trip to Montreal

Visit to Air Canada and Aveos

Captain Bill Tate

The impetus for a road trip that Tim, Jim, Gordon Perrault, and I had to Montreal on April 07th was our routine discussions in the lunch room at the Canadian Aviation Museum. During our lunch breaks, discussions would sometimes revolve around how we could get a major corporation on board to assist both the museum and our project, the restoration of the North Star. In most cases the conversation would reach a dead end, as contacts that we knew were either retired or have moved on.

Last year, on December 04th, I was operating a flight from Montreal to Frankfurt. While I was in the middle of our emergency briefing with my First Officer, we had Calin Rovinescu, C.E.O. at Air Canada and the C.E.O. of Lufthansa Wolfgang Mayrhuber came into the cockpit to say hello. After our introductions I invited Mr Rovinescu back for the de-icing procedures, take-off, and landing in Frankfurt after securing approval with the duty pilot.

During the flight, our conversation centered on volunteering in the community, although not widely known and certainly not advertised, Air Canada is highly involved in community volunteer work. For example, six volunteer relief flights delivered close to 184 metric tonnes of supplies directly to the Air Canada Clinic and Orphanage in Haiti, the safe passage of 89 orphaned children to their new families in Canada, 777 evacuees along with doctors and aid workers. Other examples of volunteering in the com-

munity was during the last conflict between Lebanon and Israel, when the company flew refugees of Canadian citizenship home; the delivery of relief supplies to New Orleans after the devastation of Hurricane Katrina. The most important charity however is the "Dreams Take Flight" employee driven program that raises funds to charter an airplane and fly children, whose live expectancy can be measured in months instead of years, to Disneyland or Disney World for a day.

At the end of the flight Mr Rovinescu and I exchanged business cards. We both made a commitment we would keep in touch. Due to the usual scheduling conflicts associated with work schedules, vacations, etc., it took until this week where everybody was available for our meeting at the same time.

On arrival at the Air Canada Headquarters in Montreal, we registered with security and were escorted to the first of two meetings with the Air Canada/Aveos teams. It became readily apparent that the mood was "what are the problems and how can we help you with them." With that tone quickly established; major points of the restoration were discussed along with other requirements that include a Memorandum of Understanding (MOU), defining the scope of work and identifying the need for future regularly scheduled meetings.

After a brief adjournment, our group was escorted to the corporate headquarters building for our meeting with Mr Rovinescu, where we discussed the global aspects of aircraft restoration. It became readily apparent to us how tightly scripted a C.E.O. schedule is as his secretary reminding he had less

than 50 minutes to catch a flight for another business meeting. After our meeting with Mr Rovinescu we returned to our previous meeting where the final details regarding assistance with our project were discussed.

After the meeting, we were taken to the B-747 hangar where we then started our tour of two aircraft. The first was a B-777 parked in Bay #1 that was undergoing a heavy maintenance check; the second was a tour of an A-330-300. After touring the aircraft, we walked past a B-767-300 that was in the shop for heavy maintenance.

After the tours of the aircraft in the hangar bays, we then saw some of the maintenance shops where we saw very specialized equipment used to maintain the fleet. As an example, the hood for the ventilation system in one part of the shop that was used in the

curing of composite materials was over 20 feet by 20 feet! One shop had the "dirty job but someone has to do it feel" that involves seven maintenance workers who are responsible to repair aircraft toilets, a very high priority item in an airline as passenger capacity is limited the number of operational toilets in the aircraft. As those who have not been in the industry, you would be surprised at what people try to flush down a toilet!

Just as we were leaving I asked our Aveos guide about the capital cost associated with setting up the shop we were just in, to which he replied, with a bat of an eye, "over five million dollars." After our good-byes we left for a brief but excellent lunch at Mon Village, located near Hudson on the auto route 40, as suggested by Jim.

PNSAC

A Happy Landing for 'B for Berty'

Chris Payne

On the brisk morning of November 14th, 1940 you are walking east on Park Road and headed directly to the National Physical Laboratory (NPL) at Bushy Park in Teddington on the west side of London. Partly cloudy, the sun keys on scattered patches of snow. The NPL on Hampton Road is the centre for the national standards laboratory, and is the largest applied physics organisation in the U.K. The NPL is working on graphene – a new form of carbon well-suited for electronics and photonic devices.

While continuing to walk east on Park Road, you happen to look up to the roof of 63 Park Road to see the entire geodetic skeleton of a twin-engine Wellington Mark IC (R3167) resting on top of the house as if it had floated down like a snowflake. All the activity which left the skeleton of the plane on the roof occurred shortly after 0100 Hrs, and that activity included all of the ammunition in the plane 'cooking off' in the flames. The neighbours believed that the Jerries were strafing the neighbourhood. This was the third and last round trip for B for Berty. Sergeant Frank Swatton, Sergeant Jim Bowler, and Sergeant Andrews had been on course after the eight and a half hour flight, but after encountering snow clouds and a lot of static electricity which caused the front guns and props to glow blue, the wireless set and instruments also caught the blue contagion and ceased to function. Without an aerodrome in sight, and petrol down to the last gallon or ounce, Sgt. Frank Swatton marshalled the crew through the bottom

door. They went out at 3000 feet straight into the snow clouds. All landed safely: Frank head-first into a hedge, Mac on the edge of a gravel pit full of water, navigator Andrews landed on a hospital roof, walked off the roof and ended up in the very same hospital with a sprained ankle. The fourth crew member –Ginger– landed in a tree in Hounslow military barracks and hung there for two hours before the Fire Brigade came to his rescue. Sergeant Bowler (second pilot) writes: "I'm not in the slightest superstitious, but it's interesting to know that it was my 13th operation, on the 13th of the month!"

During his free time, Mr. Corby was brandishing a machinegun on behalf of the Middlesex Home Guard – defending Hampton Court Palace and King George himself if necessary.

John Corby: "My daughter and I were visiting Hampton Court Palace – about two miles from where I lived from '39 to '47. And, uh, anyway my daughter was doing a video bio of my life. At the Palace I started talking to Steven Flower, a tour guide at the Palace. He didn't know that I had been in the Home Guard. The NPL was located on the fringes of Bushy Park in the same area as the Palace. He was writing a book: "Palace at War" I had taken official photos of the Home Guard in front of the Palace. Also, he had gone throughout the Hampton area to find how many bombs (including V-1's which had peaked at 100 a day by the summer of '44) had dropped in the vicinity of the Palace. Early in the war this Wellington had been dropping leaflets on Germany and had run into a snowstorm. With a very inexperienced crew and short of fuel, the pilot gave the order to bail out. The Wellington came down – pancaked down –

on top of the house – and caught on fire. (There was no Home Guard at this time. It was formed in June of 1940 after Dunkirk, and stood down after December of 1944.) After landing safely by parachute they almost immediately got a new Wellington – the first mission was to Brunsbutel, a German naval base. The early Wellingtons were not very good. Almost one a day crashed during training.

"Among the bombs that fell was one that landed near the NPL's tank – an indoor water tank almost 2000 feet long. This had been in constant use for testing ship models. The one tonne bomb burrowed its way under the tank, travelling through the soft clay

at an angle. The Bomb Disposal Unit (BDU) dug under the building to reach it. After removing as much material around the bomb as possible, they tied a rope around the fins and attempted to drag it out with a tractor. This simply pulled off the fins. Unable to remove the bomb, it was decided to drill two holes in the case – one to inject steam and the second to allow the yellow explosive to ooze out. After this operation the empty seven foot casing of the bomb, with fins re-attached, was stood up at NPL's main gate with a slot in the side to collect donations for the Red Cross."

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North Star Models

There are no model kits for the North Star aircraft. However, this has not prevented modeling enthusiasts from building excellent replicas through ingenious combination and modification of available kits. Major Robert Johnson¹, Commanding Officer, F/Lt Graham, Royal Canadian Air Cadet Squadron, Greenwood NS, has built not one, but three North Star models. He explains his interest in North Stars this way "I feel it best represents the RCAF ... it put Air Transport Command on the map for Canada with its global reach". He provided the following photos of his models, along with explanatory notes, for publication. Photos of his models can also be viewed at a new Photo Gallery, devoted to North Star models, on the PNSAC web site. [View North Star models by Robert Johnson.](#)



Figure 1: C5 on the left, Search and Rescue North Star on the right.

¹Robert Johnson is a volunteer at the Greenwood Military Aviation Museum where he is the Director of Restoration for the Bolling-brooke Project.

"For the C-5 model I used the 1:1444 scale Minicraft DC-6B and shortened the fuselage fore and aft of the wings. The propellers are from a DC-4 kit. I used CMAD sets #120, 121 and window set 122 to finish the model." For the SAR North Star I used a 1:144 scale Minicraft DC-4 coupled with engine nacelles and propellers from the CMR Czech Master Resin Shackleton MR2. These pods look pretty close to the actual item in this scale and were easy to splice onto the firewall. You have to remove (sand) the DC-4's air induction scoops off and putty over to make it smooth and symmetrical. I used Humbrol paints throughout and decaled with CMAD sets #117,118 and window set 119 to finish it off as a SAR bird out of Gander"



Figure 2: C54-GM North Star model by Robert Johnson.

"This model is a 1:72 scale "Mach 2" C-54 Skymaster converted to a C54-GM, North Star 17515, just be-

fore retirement. She is now part of the National Aeronautical Collection in Ottawa. I used a Flight Path Avro Lincoln conversion kit for the MK 85 Merlin nacelles as they are identical to the North Star. They were straight forward resin pods and easy to work with. However, the "Mach 2" kit was a challenge. There were so many issues, I dare not recount them all, but with time and patience, it came out pretty good. The kit allows you to go nuts improvising on the scratch build details such as the numerous an-

tennae, scoops and even the Janitrol heater exhaust on the upper cabin. I used Humbrol silver #11 with a gloss coat. I mixed various hues for the nacelles and gloss Blaze for the SAR markings. The engine exhaust stains were a mixture of various colors laid over each other for effect. I used Testors gloss white for the upper cabin and Re #1103 for the prop spinners that came from a Revell Lancaster Mk1. I finished it off with CMAD sets 117 and 118 which turned out really well"

PNSAC

Project North Star – Progress Report

Nr 1 Engine

Since our last edition, significant progress has been made on the restoration of North Star 17515. The assembly of Engine Nr 1 was completed with the installation of the supercharger and intercooler. After that a number of pipes, hoses and other fittings were attached to the engine and frame. While this work was carried out, several of the exterior cowl panels needed to be taken apart and reformed, as they would not close properly over the engine. The auxiliary gearbox was installed on the firewall, as this needed to be in place before the engine could be attached.

Nr 1 Engine Installation

Once the engine work was completed, plans were made to re-install engine Nr 1 on the aircraft. This required fitting a lifting rig to the mounts built into the two engine covers. A test lift was conducted in the engine shop, using the lifting rig and the shop crane, to test weight and balance, with the engine still attached to the engine stand.

On February 22nd the engine was moved to the storage hangar and positioned under the outer nacelle on the port wing. A fork lift was used to lift the engine by its lifting jig just enough so the bolts that held the engine frame to the stand could be loosened and removed. Then the lift began. Once the engine was raised level with the nacelle, the 3000 lb assembly needed to be prodded and jostled by hand to line up the four engine mounts, so the mounting bolts could be inserted and tightened. The operation took about four hours, but was completed successfully, to the great relief of the entire crew.

Shortly after this, the cowl panels were replaced

and Nr 1 propeller installed back on Nr 1 engine. Just three more to go!

Cockpit

As this was being done, the remaining cockpit windows were removed and disassembled. This proved to be a challenging and frustrating task, as the methods of construction and the sealing materials made it impossible to take the window frames apart without some damage to the old seals. Ron Lemieux developed considerable skill at coaxing the seals out with a heat gun and scraper. Work on the windows was delayed while searching for possible sources for window seals and other parts. Of particular concern are the emergency escape windows on each side of the cockpit. These windows have two panes of glass with a laminate core that provides the attachment points between the pane and the window frame. This laminate had deteriorated so badly that most of it separated from the glass on removal. As well, the inner weather strip is cracked and torn in numerous places. Ron manufactured aluminum strips that would effectively sandwich the glass and secure it to the frame, at the same time allowing for weather proof caulking to be applied to prevent any leaks.

The front windshields have now been re-assembled and installed on the aircraft, along with the side view windows and emergency escape windows. All frames were cleaned and painted, new fasteners purchased, and all window glass was caulked inside and out to ensure a water tight seal for when the aircraft is outside for display.

Murray Beaulieu has completed the remanufacture of the wood cockpit floors that had rotted away after water seeped in through the poor window seals. Murray also rebuilt the rudder pedal assemblies, while Guisepppe Zanetti disassembled, cleaned and re-assembled the control columns. These main assemblies are all waiting to be installed in the cockpit.

New fiberglass insulation was added to the cockpit walls. Work is now underway to re-install many of the components removed from the cockpit to allow painting. The emergency hatch was repainted and installed with a new weather seal. Many pipes, heat-

ing controls and electrical parts are being returned to their proper positions.

A major rebuild of the centre consol that houses the engine and flight controls is now underway.

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North Star Team Effort

Over the last few months our volunteers have been evaluating progress and discussing ways to improve the way we work together. We felt that we would enjoy a greater sense of purpose if we were more closely attached to our regular tasks. We decided to form specific teams with assigned tasks and priorities.

Each of our regular volunteers is now assigned to one of the following teams: Engines, Cowls/Floors/Windows/Doors, Cockpit or Engine Frame & Accessories. Each team has a team lead and

an alternate who is responsible for assigning daily tasks, coordinating team efforts, and ensuring project documentation is maintained.

We now have a Priority Task Board located in the restoration shop that lists the current top work priorities to keep the teams focused on the most important outstanding work.

We have also initiated a regular monthly volunteer meeting, normally held the first Monday of each month, during our lunch break. Here, we review priorities for the next several months, discuss issues with particular tasks underway, and get feedback from all the volunteers on issues of concern.

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Membership Renewal

This is a reminder to all our members and project supporters that the membership year runs from 1 April to 31 March. For those of you who have renewed their membership for 2010, thank you. And for new members who have just joined Project North

Star, welcome.

For those who have not yet renewed, you can find a membership form on our Web site at <http://www.projectnorthstar.ca/members.html>.

Your continued support of the North Star project is vital to our success.

PNSAC

Miscellany

Photographs

Photos in this section by Chris Payne.



Figure 1: Jon Tasseron and Ted Devey prepare to remove the Nr 2 power plant. The fully restored Nr 1 power plant is on the right.



Figure 2: Nr 2 power plant removal. Bill Tate and Tim Timmins supervise the extraction of one of the four main attachment bolts from the mounting frame by Ted Devey.



Figure 3: Ron Lemieux working on the control pedestal.

Newsletter distribution

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

Coming events

The Canada Aviation and Space Museum will be holding an open house on Canada Day.

Annual General Meeting

The PNSAC Annual General Meeting will be held in the Bush Theatre of the Canada Aviation and Space Museum one Saturday, 12 June, 2010, commencing at 1030 a.m.

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