

Merlin Musings

Twelfth in a series

Ted Devey

Overhauling a Merlin 622 (2)

After re-mounting the Crankcase Upper Half on the rotary work-stand, other sub-assemblies were dismantled, cleaned, re-assembled, then fastened to it in turn. When brought into condition for return to the assembly, outside surfaces were 'clear-coated' to protect them from oxidation and to preserve the bright appearance obtained from glass-bead blasting. Internal surfaces and parts were coated with 'flyway oil' to protect them from corrosion over many years.

Crankshaft

The Crankshaft was mounted on a support stand on the workbench allowing rotation to access the six connecting-rod bearings. All bearing shells were retained by their bearing caps, seven main bearings on the crankcase and six bearings on the connecting rods. Each bearing journal, main and crank throw, was enclosed by a metal cap and a small through-bolt. In turn, these were taken apart, cleaned and re-assembled. The six crank throws had sludge traps containing solids formed in the engine during running. The cranks function as centrifuges at speed,

separating solids from the liquid in the lubricating oil.



Figure 1: Ted Devey (L) , Peter Houston and crankshaft. Oil holes are visible on the crank journals that feed through the connecting rods to the wrist pins on the pistons

High pressure lubricating oil is fed from both ends of the crankshaft and flows through drilled passages and holes to the main and crank bearings, and onto lower cylinder walls from holes drilled in the crankcase. Thus, the internal parts of the engine are lubricated and the oil drains away to the sump (crankcase lower half) removing a lot of heat from

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the inside of the engine. The sump is drained by scavenge pumps and the oil is returned to the oil tank on the firewall via the oil-cooling radiator at the front of the nacelle. The crankshaft forms an important part of the lubrication system. The condition of the main and crank journals was very good and measurements indicated very little wear.

On completing overhaul and cleaning of the crankshaft, it was remounted on the Crankcase Upper Half, the cap bolts were torqued, and the horizontal bolts which go from one side of the crankcase to the opposite side through the bearing caps were replaced and tightened. Every piece of the engine was cleaned before they were returned for assembly: nuts, bolts, studs, washers etc. The crankshaft was then ready to receive the pistons and connecting rods.



Figure 2: Don Craig working on the oil distribution piping inside the crankcase, rotary stand in the inverted position

Pistons and Connecting Rods

Merlin pistons are similar to automotive pistons with three compression rings and one oil control ring. The wrist-pin fastens the piston to the connecting rod small end, held in place with two circlips, and is free floating. There are two types of connecting rods, one type for the port cylinder bank and another for the starboard bank. Each bank contains six cylinder liners. opposing Pistons are connected to one common crank for each pair. Instead of one common crank bearing being shared by two side-by-side connecting rods, a 'blade and fork'; arrangement is used. One rod is 'forked' so that the other 'blade' rod fits over it. Since the fork rod uses the full width of the crank journal, the force on the piston when fired, is spread over the entire area of the journal surface. When the blade piston is fired, its force is applied across the entire bearing area through the forked rod bearing. In

this manner, the force on each piston is taken by the full width of the crank bearing rather than just one-half. Bearing shells are used for both the main and crank bearings as in automotive practice.

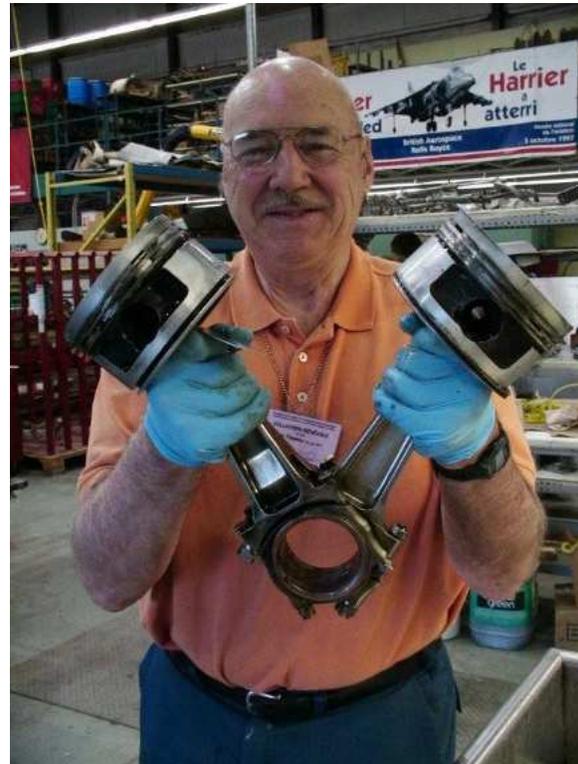


Figure 3: Tim Timmins holding a piston-connecting rod pair that shows the fork-and-blade configuration

Because of corrosion between some piston rings and cylinder sleeve walls, a number of rings broke on dismantling and were replaced with new rings. The pistons were cleaned with great care and the use of harsh abrasives was avoided. This was very time consuming. Pistons were marked with the letter 'T' which indicated orientation toward the intake valves. Corrosion was most pronounced in cylinders which had exhaust valves open to the atmosphere. In Port Bank cylinders two and five, an oil-soaked bumble bee carcass was found on top of each piston!

When the overhaul of the six piston-connecting rod assemblies was completed, they were remounted to the crankshaft awaiting later return of the two cylinder banks to the engine assembly.

Cylinder Blocks

The cylinder block assemblies comprised the block itself of cast aluminum, and the cylinder head, also cast aluminum. These had to be separated for processing. The head is fastened to the block by means

of studs anchored in the head casting with nuts bearing on the block. Earlier Merlins used conventional nuts along the inboard and outboard sides of the block. The Merlin 622 fitted to North Stars was specially beefed up to withstand piston pounding service on military and commercial planes for many hours at a time on long overseas runs.

To withstand the high thermal expansion of aluminum castings, the studs were made about 2 inches longer and the nuts were extended to match the threads on the end of the studs. The added length of both stud and nut functions as an axial spring allowing stretch to prevent pulling the stud out of the aluminum head by stripping threads in the casting. In addition, two such stud/nut combinations were added at each end of both blocks for more strength. The procedure for separating the head from the block was described in eleventh (previous) chapter of this series at page three of the NStar Chronicle.

The blocks were cleaned and the cylinder liners honed before assembly to the crankcase and piston

assemblies. Some liners had very little corrosion, but those exhaust valves open to the atmosphere had pitting on the inside walls. It was felt that if this engine was ever to be ground run, this corrosion would be acceptable, but, if the engine was to be returned to flying status, many cylinder liners would need to be replaced.

The cylinder heads were in very good shape. The camshafts were removed, cleaned, and the valves were removed and lapped to their seats with grinding compound. Both heads were in excellent condition and only required cleaning and valve lapping.

The cylinder heads were re-assembled and fitted to the blocks. The camshafts remained off the heads until valve timing was done. At this point, camshaft drives were fitted in conjunction with valve timing, using markings on the forward end of the crankshaft visible through an aperture in front of the crankcase. Manual instructions were carefully followed to avoid the possibility of valves running afoul of the pistons when turning the engine over.

PNSAC

A North Star Summer

Bruce Gemmill

In the last issue of the NStar Chronicle we explained the plans for refurbishing the cockpit of the North Star over the summer. Because of restrictions on the use of chemicals inside the storage hangar, it was necessary to move the aircraft outside so that important restoration work could be done on the interior. The North Star was towed out of the hangar on May 27th, but already a great deal of preparation work had been done on the interior. The plan was to strip as much equipment, accessories and fittings from the cockpit area as possible, then clean and prepare all metal surfaces for repainting.

Once the aircraft was positioned and chocked, stairs were moved into position to provide access, and the ventilation system was connected to outlets in the cockpit windows. Each day it was necessary to run out electrical cables for lighting and ventilation. An air compressor was available for days when drilling and riveting needed to be done.

Much of the first few weeks were spent removing layers of old insulation to expose the interior 'skin' of the aircraft. More weeks were spent scraping off the underlying layer of adhesive. This allowed for more thorough cleaning of all surfaces and would make painting much easier. This operation exposed

several small areas of corrosion that needed to be repaired before further work could be done.



Figure 1: The North Star cockpit stripped of most equipment and fittings, in preparation for repainting

Over in the restoration shop, several volunteers cut and shaped new pieces of aluminum, following detailed patterns and measurements taken from the corroded areas. Severely corroded metal was cut out and new pieces riveted into place. Lesser damage was often treated by grinding down the corroded surface and treating the area with Alumiprep to stop further corrosion.

Meanwhile, years of dirt and grease were slowly stripped away. The tight confines of the cockpit meant room for only two volunteers who often worked on their knees or contorted around equipment racks to get into every nook and cranny. During this work the interior temperature often exceeded 40 degrees C, even with a high flow fan operating.

After most of the cleaning had been done, badly deteriorated sections of the wood floor were removed for restoration and temporary flooring installed. This provided an opportunity to clean under the cockpit floor, but also added more work to the already taxing schedule.

Stripping the old layers of paint was the next step. The radio rack and the rear portion of the cockpit have as many as five layers of paint. Three distinct metal primers were used – grey, green and yellow zinc chromate. Some surfaces were only painted

with this primer to protect the metal from corrosion. Most of the forward portion of the cockpit was then painted either black (instrument panels, windows and lower surfaces) or dark green (metal bulkheads and ceiling). The rear of the cockpit was originally painted light yellow, but at some point in the life of the North Star this area was painted over with light green enamel.

This is where the restoration work stands as of the end of August. We had hoped to have some painting done by now, but the cleaning and stripping have proved to be much more labour intensive than we thought. This effort will continue into October when the North Star will be moved back into the storage hangar for the winter. Interior work will resume next spring. In the meantime, over the winter we will restore the floor panels and refurbish all the fittings and equipment removed from the cockpit.

PNSAC

Airline Transition Training

Author recently bid for and was awarded a position on the Airbus 330-300

Captain Bill Tate

Commercial airline industry pilot positions are awarded on the basis of seniority, pay progression or formula pay. Greater pay is earned for heavier and faster aircraft, depending on a pilot's status (Captain, First Officer or Relief Pilot). Pay is based on status and number of years of service. In Europe, for example, a Captain with thirty years of service will generally fly domestic and get paid more than a Captain who flies overseas with fifteen years of service.

Airlines typically post equipment bids twice per year based on economic forecasts and retirement postings. Contractual arrangements are based on a consensus between the pilot group and the company calls for a mandatory retirement age of sixty.

A pilot will bid on a position based on a preference for working conditions. For example, bidding for a junior Captain or First Officer position (otherwise known as bottom of the list) on the heaviest aircraft will let a pilot hold what his or her seniority level allows. The result, at the end of a training course, would be for a pilot to hold reserve or stand-by status that would mean, if needed, being airborne within three hours of receiving a telephone call from Crew Scheduling. The other choice would be holding a senior position on the equipment type or status of choice. This latter option means that you receive your choice of vacation dates, days off, destinations

etc.

Another important option to consider is the time-frame in which you want to receive training. For example, if you ask for a delayed course, you are the last to be trained. An associated advantage is that when your training is finished, you step into blocked flying, which is better than being on reserve or stand-by. Training is divided into four segments that include ground school, simulator, line indoctrination training and base check. Ground school involves Computer Based Training (CBT), which reviews systems via audio and video with questions after each segment. For example, to review the electrical system takes approximately three hours; eight days are needed to complete all systems modules.

There are also formal classroom lectures for performance that are very dry and should not be taught late in the day.

A daily four-hour CBT training session is divided into learning normal check and flight procedures followed by abnormal procedures. The computer based trainer is a basic mock-up of the aircraft cockpit with a touch sensitive screen. The user can push a switch and observe the resulting actions.

The CBT will also fly, but without visual or motion, to allow one to practice normal and abnormal procedures in preparation for normal cockpit discipline. There is a formal examination with a passing grade of 75% at the end of ground school. You are released to full flight simulator only after you have successfully completed all of the above items in the ground school environment. I should also note that

all of the day-to-day items on the normal checklist are required to be performed by memory.

There are twelve four-hour sessions in full flight simulator which have a 1 1/2 hour briefing followed by a 1 1/2 hour debriefing. In each session, you are either the pilot flying (PF) or the pilot not flying (PNF). The rationale for this is to expose you to either flying the simulator or problem solving through ECAM (Electronic Centralised Aircraft Monitor) procedures in conjunction with the Quick Reference Handbook (QRH).



Figure 1: A-330-300 instrument panel

ECAM procedures will be generated by the fault in the form of an electronic checklist, that, when followed, leads you to the status of the fault and gives you performance corrections, for example, for landing distance. The ECAM works on three levels, a Level One fault being the most critical, e.g., Engine Fire sounds repetitive chime illumination of Master Warning Light (red) and brings up the check list to follow on the engine warning display. As each item of the check list is accomplished, the item disappears, and when the electronic check list is complete, this will now lead you through the status page showing what systems have been lost and what performance factors are to be allowed for the condition of flight.

A Level Two fault, e.g., loss of one hydraulic system, generates a single chime with the illumination of the Master Caution Light (yellow) along with the check list to be followed by status with associated performance factors to be applied. A Level Three warning only presents itself as a flashing status message, a very low level failure, e.g., the failure of one channel of a dual channel sensor.

The lesson plans always start out easy and end up in more "interesting" scenarios. One situation that comes to mind dealt with the Enhanced Ground Proximity Warning System (EGPWS), a very sophisticated database that knows the elevation of terrain over which you are flying. Coupled with GPS, it is accurate to 0.09 nautical miles. In one demonstration, we were leaving Vancouver, climbing to 3,000 feet and flying up Howe Sound toward a high elevation at 300 kts IAS. The first warning, "Terrain, terrain," is given as the terrain is displayed on our Navigation Display screen. Three colours are used: green (you are above), yellow (possible hit), and red (you are impacting the obstruction).

It is interesting to watch the colours change to red, while thinking of previous accidents at the same time. The next warning is "Whoop, whoop, pull up." The memorized drill is "Fire Wall", where thrust goes to TOGA (take off, go around) and pitch up to the pitch limit of 25 degrees nose up. The climb rate of 5,000 feet/minute is very impressive and is held until the aircraft is clear of the obstruction.

The side stick "normal law" has built in protections for flight that will not allow the aircraft to stall in this recovery. However, in an emergency turn it will hold 67 degrees of bank and two and a half G if needed, which is never used in normal day to day flying.

Part of the training qualifies the crew for Cat III landings with zero ceiling and 75 meters forward visibility. Some people might say it is easy because the autopilot does the work, but it is a very precise procedure that has no margin of error.

The Cat III is flown heads down until you are on the ground in the flare of the landing; the runway is still not visible and only becomes visible once the nose wheel is on the ground.

An endorsement ride for a pilot's licence follows the completion of all lessons. Both crew members work through numerous engine cuts in all phases of flight as well as component failures with associated performance issues.

On completion of the simulator, you are assigned to LITC (Line Introduction Training Captain) who, for Captains, will fly as the F/O in the right seat for four sectors in a minimum flight time of 25 hours, which includes oceanic procedures. The transition Line Check follows with a Captain, endorsed by Transport Canada, to confirm that you are qualified

to fly in the position you were awarded from your original bid.

While training, your average day in ground school starts at 08:30 and finishes by 21:00 after you have reviewed the day's lesson and prepared for the next day as well. At the end of the transition course, not only is there a sense of relief on completing all items in the prescribed manner but also a sense of the

combined history of over 75 years of collected experience handed down from one generation of pilots to the next.

One other note of interest for anyone who would like to try the course for an endorsement of his or her A.T.P.L. (Airline Transport Pilots License), most courses will cost in the neighbourhood of \$50,000, aircraft rental not included!

PNSAC

PNSAC Board's Report to Members

6th Annual General Meeting

June 13, 2009

Introduction

We are pleased to be able to report that the Association has had a very good year. Restoration of the #1 power plant is nearing completion and steady progress is being made on the propellers and spinners. The remounting of the #1 power plant on the North Star later this year, complete with propeller and spinner, will be a significant and highly visible milestone for Project North Star. The aircraft has been moved outside for the summer so work can start on the flight deck. We have only managed to recruit a couple of volunteers since our last report which means we still cannot cover the weekly time slots for restoration work. There is still no prospect of weekend work.

We continue to have a high turnover in membership with an attendant loss in revenues. However, we were able to cover a significant increase in expenditures this year through an increase in donations.

An Association By-Law was approved by members at a General Meeting in December 2008. A system for the filing and custody of important corporate documents was adopted recently.

We reported last year that the Association web site would be upgraded. This project has taken much longer than expected but we now expect the new site will be ready later this year.

PNS Volunteers

We note with gratitude and a sense of pride the steadfast support of our volunteer restoration work force. Two of our volunteers, Ted Devey and Jim Riddoch, have recorded over 2000 volunteer hours and several more will reach that number this year. Our volunteers are accounting for a very large share of

the total volunteer effort at the Canada Aviation Museum.

Fund Raising

There are two ongoing fund raising programs for Project North Star. The Museum Corporation receives donations which are held in a North Star Trust Fund and PNSAC appeals to its members and others for funding support. The funds available are sufficient for the current level of activity. Corporate support over the past year included a donation and laptop computer from Lockheed Martin, propeller restoration by Hope Aero, aircraft parts from Millardair and transportation for these parts from Mississauga to Ottawa by Triple K Transport. We also received liaison radios, a BC 348 receiver, donated by the Nanton Lancaster Society Air Museum, and an ART 13 transmitter, a personal donation from John Phillips, a volunteer at the Museum.

Administration

Board members rely almost exclusively on e-mail for the conduct of Association business. This correspondence is held in individual working files. Other formal records such as minutes of meetings, By-Laws, corporate documents and financial records are held and maintained at different locations. These arrangements are not ideal and we have initiated some changes. A Corporate Minute Book has been purchased and it will be maintained by our Corporate Secretary. This will ensure that all corporate documents are readily available, thus facilitating continuity in Association affairs.

Future Events

The North Star will be part of the Canada Day display at the Museum again this year. Also, it will be

on display during the Classic Air Rallye, 29 and 30 August. Volunteers will be needed for both events.

Chief Engineer Progress Report

Presently the Nr 1 Engine and Mounting Frame have been completely disassembled, cleaned, inspected, repaired to original standard and almost completely re-assembled. This has been a long arduous task, a great learning curve and a source of pride of accomplishment by all the volunteers involved. Recently, the engine was removed from its rotating jig and re-installed in the main ground engine frame where the rest of the Quick Engine Change assembly has been installed. The latter includes the mounting frame, intake flap assemblies, fire suppression system, oil and coolant systems, radiators, electrical components and hydraulics. The supercharger, two-stage intercooler and auxiliary gearbox are being overhauled and reassembled for reinstallation to complete the Nr 1 Engine Quick Engine Change Assembly (QEC). The spinner from Nr 3 Propeller is also currently in rework.

On completion, the engine will be ready for remounting on the airframe bulkhead. The latter will need to be cleaned and stencils redone prior to attaching Nr1 Engine. All of this should occur in the coming months and, hopefully, the engine remounting can occur later this year, possibly by early fall.

Parallel with this work is the complete overall of Nr 1 and Nr 2 Propeller Assemblies, thanks to Mike Hope and his staff at Hope Aero in Mississauga. Nr 1 Prop has been re-installed in Nr 2 Engine while Nr 1 Engine is being overhauled. Nr 3 Propeller has been removed and similarly Nr 2 Prop will be installed on Nr 3 Engine until Nr 2 Engine is overhauled and remounted on the aircraft. This work also involves considerable effort by the volunteers to remove, clean, repair and re-assemble the mating parts such as the spinner, prop frame assembly and various other attaching parts.

Meanwhile, a great deal of preparation work was needed to allow the North Star to be moved outside. All openings have been sealed with wire mesh and/or aluminum tape. All three engines were covered with tarps tied down with ropes to prevent further weathering. The cockpit area will have a temporary cover when work is not in progress. A special ventilator system has been received and adapted for installation through a cockpit window. Work is progressing in stripping the cockpit interior, removing all insulation and exposing interior skin surface which is corroded in some areas.

It would be remiss of us not to mention the cooperation and support of the Museum staff that have

been patient and encouraging in their involvement, particularly Mike Irvin, the CAVM Project Manager. Fortunately he has a good sense of humour.

Looking ahead, the next major task is the completion of the cockpit area. After the removal of instrument panels, seats and various other equipment, it became obvious that nothing less than a total strip of the cockpit interior frame assembly and flooring, including insulation and windows, will be required to tackle interior skin corrosion. This poses a considerable problem as the aircraft cannot be painted or worked on with chemicals while in the Storage Facility. Accordingly it was agreed to do this work with the aircraft positioned outside. The North Star has been positioned outside, between the Storage Hangar and Main Museum, with access to power and water to support the cleaning and painting work to follow. Close attention has been paid to safety issues, including the provision of a powerful ventilation system and explosion proof lighting. The aircraft will remain outside until the end of the summer, to allow as much work to be done as possible, before returning it to the Storage Hangar for the winter.

We will exhibit the aircraft on Canada Day and at the Classic Air Rallye in August, but will have to limit the access to the cockpit area. Hopefully, we can arrange some interesting displays in the cabin area to recall some of the service duties this aircraft was involved in, and we will have Nr 1 Engine on display.

Although some may be disappointed with the progress to date and the non-availability of weekend work, it must be borne in mind that this type of restoration is very demanding, requiring patience, skill and resourcefulness to deal with the detailed restoration and preservation of the aircraft, and making or securing replacement parts. Currently we have a small group of dedicated volunteers who regularly attend the museum and maintain continuity of work, which is essential in a project of this size.

Treasurer's Report for year to 31 March 2009

This year the Association's finances remained stable. The year ended with an increase in cash in the bank, \$19,196 this year compared to \$18,472 last year. Membership fees decreased from \$2,986 to \$1,320, but donations-in-kind increased from \$7,663 to \$12,622. On the expenditure side, there has been an increase over the amounts spent last year, restoration costs increasing from \$336 to \$6,663 and tools from \$874 to \$2,986.

Regular monthly donations continue to be received but have not increased during the last year. These monthly donations provide a regular income

to the Association. Members are encouraged to start monthly donations; application forms are available from the Treasurer or Membership Secretary.

The Association has a chequing account at TD Canada Trust and a savings account at ING. The bank account with the Royal Bank was closed a few months ago. On June 9, 2009, the chequing account had balances in excess of \$1,800 and the ING saving account a balance of almost \$18,000. The payables on June 9, 2009, amounted to less than \$700 and there were no receivables

Membership

In 2008 we had a total paid membership of 73. This was down from a membership of 104 in 2007. We introduced membership cards and a permanent membership number. The membership year was changed to match the fiscal year of 1 April to 31 March. It is hoped this will encourage more new members to join during North Star displays. We continue to distribute the NStar Chronicle four times each year to all members.

So far this year, only 39 members have renewed. However, we expect to receive a number of new members, as well as more renewals during planned events this summer. We also introduced Pay Pal as a method of payment for online memberships and donations last year. Although we experienced some initial problems, this should make payment easier.

Communications

The Web Master has been contacted about redesigning the web site using existing templates and methods to speed development and reduce costs. This

work is still ongoing, and there is as yet no new site ready for review. It is planned to have more up-to-date photographs and information about the North Star restoration work. Members will be advised when the new site is read.

Conclusion

It will be very gratifying to see the Nr 1 Power Plant back on the aircraft later this year. Its restoration has been the focus of our efforts for some time now and we are pleased to report that the workmanship meets the demanding Museum standard and reflects great credit on our volunteers. The decision to move the aircraft outside during the summer months to allow work to proceed on the flight deck is welcomed.

The Association must find ways to recruit and retain more members. We need their memberships and donations to sustain operations in the long term. More volunteers are needed to cover off the available time slots during the week. Failing weekend work, this is the only way to improve productivity. These are challenges we must address.

We recognize the value of good communications in finding support for Project North Star and we will endeavour to make needed improvements.

The Board is pleased to report that we have received excellent support from the Museum staff. In addition to Mike Irvin, mentioned earlier, we offer special thanks to all who have assisted us in some way, with special mention of Jovic Nicolas and Linda Dupuis. Thank you also to all members and others who have made donations to PNSAC. Your support is gratefully acknowledged.

The Board respectfully submits its report to the members of PNSAC.

PNSAC

Miscellany

Photographs (Classic Air Rallye by Chris Payne)



Figure 1: Bruce Gemmill, on right, with visitor to the PNSAC display at the Classic air Rallye



Figure 2: PNSAC sales at the Classic Air Rallye, L to R, Bill Tate and Ted Slack



Figure 3: Surplus aircraft instruments for sale at the Classic Air Rallye



Figure 4: North Star 17515 was not on display at the Classic Air Rallye, hence the dejected look

Newsletter distribution

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

Annual General Meeting

The 6th PNSAC Annual General Meeting was held on June 13, 2009 in the Bush Theatre of the Canada Aviation Museum. The Board presented its Report to Members, which is reproduced in this issue for the benefit of those members not able to attend the AGM. Elections for Board members were held; Keith Penny was replaced on the Board by Ron Lemieux. The Board composition and member responsibilities

are presented below. Two new officers have been appointed, one for research and one for documentation.

PNSAC schedule of events

- September 12, 2009. Members' Quarterly Meeting in the Bush Theatre of the Canada Aviation Museum commencing at 10:30 A.M.
- December 5, 2009. Members' Quarterly Meeting in the Bush Theatre of the Canada Aviation Museum commencing at 10:30 A.M.

Canada Day

Our members manned a display of completed restoration work in the Storage Hangar during the Canada Aviation Museum Open House on Canada Day, answering questions about Project North Star and inviting them to support the Project through membership in PNSAC or a donation.

Classic Air Rallye

Flightworks, in cooperation with the Canada Aviation Museum, staged their third Classic Air Rallye at the Museum on the 29th and 30th of August 2009. Unfortunately, the program had to be cancelled on the first day due to bad weather. There was the usual large number of classic aircraft flown in for the event, including several from Vintage Wings. Most of these aircraft appeared in the flying display on the second day of the Rallye. Volunteers again manned a display in the Storage Hangar, answering question about our restoration work on the North Star, recruiting new members and raising funds for Project North Star through the sale of surplus aircraft instruments and donated artwork.

Letters

Jim Shipton wrote: In August 1958, I was the navigator on a 412 Squadron VIP North Star 17518 on a flight to the high Arctic. At Resolute Bay we dropped off the Air Officer Commanding, Air Transport Command, Air Commodore Fred Carpenter (known as "Flat-Top" because of his crew cut). He was on an inspection tour of the annual ship resupply operation at Resolute. We then proceeded to Alert.

On board was retired RCMP Inspector Henry Larsen, the renowned Captain of the St. Roch, that sailed through the Bellot Strait from East to West in 1941-42. He circumnavigated the Canadian Arctic after a winter locked in the ice.

After take-off he was invited to sit in the co-pilots seat, where he began a running commentary on the names of geographic features below: islands, lakes, capes, points. My topographic maps confirmed his observations; the crew was duly impressed.

The other crew members on this flight were: Doug Spence, Ralph Weber, Bill Davidge, Des Callaghan and Paddy McClintock.

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