



# The NStar Chronicle

The Project North Star Association of Canada

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## Editor's Notes

*Roger Button*

Putting out this edition of the Chronicle has been an example of great co-operation from members and non-members alike. Thanks are owed to a number of people. Our member Gary Whitten was instrumental in getting the necessary permission from Air Force Magazine to publish the "Diversion to Alert" article. Allan Bowes, another member, suggested that we should try to get the "Civil Merlins" article into an edition of the Chronicle. Following his suggestion we contacted Ben Dunnell, the editor of Aeroplane Magazine. Through Ben's offices we were able to secure permission to reprint this article. The "Civil Merlins" was part of a comprehensive 17 page Aeroplane Database article on the Merlin. If any members wish to read the entire article it was published in the July 2017 issue.

In addition thanks go out to the other contributors, namely Richard Lodge, Garry Dupont, Neil Raynor and Bruce Gemmill. Bruce took the lead in putting together the Progress Report. Finally, I would like to thank Drew Hodge our stalwart publisher of this edition. We are always on the lookout for content for the Chronicle so please do not hesitate to bring forward any ideas that you might have. Enjoy.

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# Notes from the President

*Richard Lodge*

Since the last issue of the NStar Chronicle we have taken part in the 70th Anniversary celebrations of the first non-stop transcontinental flight across Canada which was flown by a North Star. We partnered with the Museum for this event and were very pleased to welcome representatives from the RCAF who joined us for the day. After the formal part of the celebration, when impressive plaques of the aircraft made by our member Chris McGuffin, had been presented to the RCAF and the Museum Director General, Chris Kitzan, everybody moved to the Reserve Hangar and the aircraft was opened to our association members, guests and in the afternoon to 90 members of the public who had pre-booked a tour. Réjean(Réj)Demers, the Museum Special Project Manager, guided the tours assisted by several of our members. Towards the end of the tour session someone in the main Museum activated the fire alarm. The Museum was promptly evacuated, and the public was recommended to go to the Reserve Hangar until the fire issue had been dealt with (it turned out to be a false alarm). Quite unexpectedly Réj and the guides found themselves surrounded by many Museum visitors who had not signed up for the North Star tour. Unperturbed by this event, RÃ'l'j and the guides welcomed the unscheduled visitors and gave them an impromptu tour of the aircraft. Both our treasurer and our membership secretary were pleased with the days' result!

As I write this the days are getting longer and Réj is planning work to be done on the aircraft when it is moved outside onto the ramp in the spring. Each year we do work on the aircraft which cannot be done inside the Reserve Hangar during the winter. We also prepare the aircraft for display when, once again, we open the aircraft to enable the public to

view progress made in the last year.

This year we are planning two major display events. The first will be on the Doors Open Ottawa weekend (June 6 and 7). This is a great time for our members to meet the public, many of whom have an interest in aviation. Our second main event, on Canada Day, is enjoyable for all the members who sign up to be part of the team meeting the public. There are always large crowds, many of them family groups, If any of you reading this article would be interested in joining our members for either of these events please contact me (my co-ordinates are on the back page of this issue of the Chronicle)

Shortly before Christmas a major milestone, in the restoration of the North Star, was reached. Work on Merlin engine #4 was completed and it was dragged on its cradle by the Museum forklift truck to the Restoration hangar for later mounting on the aircraft to join the other three restored engines. Chris McGuffin put some video clips onto our Facebook page of the engine being dragged through the Museum parking lot and into the hangar. Watch for more of our Facebook messages since Chris frequently posts new items.

In the late fall we welcomed the appointment of Erin Secord as the Museum's new Manager Conservation Services. She is responsible also for conservation of the collections at the Science and Tech Museum. Erin has now been able to join us at two of our Members' meetings.

Finally, we are now working to update the Memorandum of Understanding between PNSAC and the Museum. Much has changed since the original agreement was signed in May 2006.

Our next Members' Meeting is scheduled for Saturday, June 20, 2020 which will also be our AGM. Do reserve this date in your calendar if you can be in the Ottawa area on that day. The meeting will be held at the Canada Aviation and Space Museum. More details will follow later.

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# Conservator's Corner

Bruce Gemmill, Réjean Demers, and Garry Dupont

The past year was a very busy one for the North Star restoration crew. In the Engine Shop, under the careful watch of Crew Chief Garry Dupont, members Charles Baril and Richard Lodge worked to fit the final pieces on engine 4 including; all the cowl frames and panels, main and auxiliary radiator flaps under the engine, the engine air intake duct and associated actuators. All the hard work in setting up sheet metal repairs to the cowl panels paid off. However, fitting the large steel exhaust panels around the 12 exhaust stacks was particularly challenging. It's no longer a secret that ratchet straps and wooden 2"x4" blocks have become part of the standard North Star tool kit.

While that work was underway, Jacques Roy, Peter Scartozzi and Charles Baril were busy stripping equipment, pipes, hose and cables from inside the nacelle where engine 4 will soon be installed. Will Assad and Neil Raynor also helped with this. After equipment removal, many hours were spent carefully cleaning and removing oil and corrosion prior to painting. In some areas a small bead blasting gun was used to remove rust from nuts and bolt heads that could not be taken out for cleaning.

Most notably were efforts by Charles Baril, who spent many months inside the nacelle; cleaning, inspecting and masking off for painting. The work took so long that special heating ducts and insulation needed to be positioned around the nacelle to keep it warm enough for RAl'jean Demers and Bruce Gemmill to apply a coat of primer and silver paint. (insert photo of North Star with orange tarp). Soon after the paint was applied, the North Star was moved inside for the winter. This occurred November 8th, just 3 days before our first snow storm of the winter.

While all that work was underway, the Airframe Crew was busy on the structures work. Peter Trobridge, Michel Cote and Robert Desjardins fabricated and installed several replacement parts for main cabin airframe assemblies that had suffered from years of corrosion. The crew accomplished a complete review of necessary repairs from front to back of the main cabin. A hole was patched near the door to the crew area, at forward bulkhead (station) 301. This offered Chris McGuffin an intro to sheet metal repairs. Similar corrosion damage around the windows required parts shaped on wooden jigs made in the shop. Through careful planning and creative solutions, repairs were completed at STA: 360, and 381. New repairs carried out at starboard STA: 460, 480, 501, 541, 560, 621 and currently, floor repairs in the

loading area near the cargo doors.

The Carpentry Crew, led by Chris McGuffin measured, cut and trimmed new plywood panels for the interior walls of the main cabin. These were painted green to match the original colour scheme, then set aside until for later installation. Next came the floor panels. Richard Houle and John Makadi assessed these, according to the amount of damage caused by wear and tear, as well as leaks around windows and doors. Some panels were salvaged with a few minor repairs, then painted. These are now ready for installation. Several others were so badly damaged that completely new panels needed to be made. (Photo of wall and floor panel)

Finally, work started on the third group of panels. These floor panels had significant damage to one or two edges. The damaged areas need to be cut away and a new piece added by bevelling the adjoining pieces using what is called a "scarf joint" so the adhesive bond is strong. A special jig was constructed to do this work, allowing an electric router to run at an angle to produce the joint. A Resorcinol Formaldehyde adhesive will assure a long-lasting repair.

Many of the volunteers got to work on the large collection of accessories that had been removed from nacelle #4. This included pumps, plumbing, fluid and air lines, control cables, bell cranks and pulleys, electrical harnesses, valves and filter canisters. Each needed assessment, cleaning, repair, polishing or painting as well as documentation and photographs of the work undertaken. (photo of fuel filter, junction box).

Phil Chrysler and Brian Cole went to work on the many fairings and access panels that also required cleaning and polishing to be ready to be placed back on the aircraft. A special mention here for Ted Devey, who, before retiring from the shop had his hand on a few cowl panels and nacelle components.

Several special projects were also undertaken during the year. John Makadi removed the nose radome to determine what radar equipment had been removed, in case we are able to find a source for missing equipment. We removed the upper rotating navigation beacon to fix a persistent leak, this necessitated a twin tower scaffold assembly to safely reach the top of the fuselage. Neil Raynor and Will Assad overhauled a propeller stand the Museum had not used for many years. It got a fresh coat of paint and new wheels and tires, and is now holding two North Star propellers, until they can be installed on the appropriate engine. (photo of prop stand, two propellers). Michael Hope assisted in removal of Prop. #1 and assembly of soon-to-be-installed Prop. #4. Phil Chrysler and Brian Cole fabricated cables and

special fittings to secure the landing gear so the aircraft could be safely displayed. Other duties such as; an inventory of replaced / restored and spare components were carried out. All of these were packed and stored in a new location of the Reserve Hangar.

Number #4 engine has now been moved to the Reserve Hangar. The crew are prepping the oil tank for clear coat then it will be assembled and ready to install. Once this is completed the plan is to carry out some deep cleaning and renovations in the shop starting by relocating the varsol cleaning tank. The paint shaker has been repaired and the base has been painted ready for assembly. The paint shaker will be relocated where the varsol tank was. The old roll away tool box has been replaced by a new Snap-On unit. There have been lots of comments on the or-

ange colour but the price was right.

Currently, work is on-going to complete the rear (main) cargo door and quilted liner installation. Nacelle #4 installation of restored components is advancing in small steps, due to the complexity of inter-related systems and locations. Scaffolding is in place, over the forward fuselage area above the cockpit to assess air-frame requirements and treatment methods to be used on exterior hull surfaces. Restoration records are also being reviewed by Conservation Special Project Manager RÃ©jean Demers. The Work Order / Task Card format is lending well to Museum information uploading tools. Efforts are underway to recruit two to four new shop volunteers, and RÃ©j invites any new applicants referred by PNSAC to apply.

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# Our Members

## *Interview with Garry Dupont*

### *1. What is your background in aviation?*

I graduated from the Confederation College Aircraft Maintenance course in the Spring of 1975. After returning to my home town in the Red Lake District I gained employment with Red Lake Seaplane Service. After completing the course I had to apprentice for 18 months before writing the final exam for my Aircraft Maintenance Engineers' License. I successfully wrote my final exam in December 1976 and obtained my AME certification. In February 1977 I was hired by Perimeter Aviation in Winnipeg Manitoba. There I obtained my Turbine Engine and Pressurization Aircraft endorsements. I started my 30 year career with the RCMP Air Services Branch in February 1981. My career took me to Edmonton Alberta, Goose Bay Labrador, Winnipeg Manitoba then finally to Ottawa. I finished my career as Quality Assurance Manager.

### *2. How long have you been involved with Project North Star and how and why did you get involved?*

I attended the very first meeting held for Project North Star. This was at my wife's suggestion that it would be a good retirement pastime.

### *3. What has been the history of your involvement to date?*

While I was employed I worked an evening shift every 4 weeks so I would come in to CASM in the morning for a few hours. Upon my retirement Mike Irving had me work in the engine shop, which I have been doing since my retirement. I also have been on the board of directors for a number of years.

### *4. What has been the highlight of your involvement?*

The biggest highlight for me was installing number 2 engine. It was about half completed when I started in the engine shop. This is the largest engine I have ever installed in my entire career.

### *5. What has been the most challenging part of your involvement?*

One of the most challenging parts was learning how the engine worked with all its systems. I found a RCAF training manual in the office and took it home. Over several months of reading I started to understand what made this monster of old technology tick. Another challenge was learning the British Hardware system and tools. A further challenge was reading the old manuals which were written before they were standardized by the ATA chapter system which all aircraft manuals follow today. Learning the art of conservation was also a challenge but was made easier by the guidance of Mike Irving.

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# Diversion to Alert

Malcolm G. Morrison, RCAF F/L Ret.

*This article was published in Air Force Magazine in April 2019. It was brought to our attention by Gary Whitten. The article is republished with the express permission of Malcolm Morrison, RCAF F/L Ret. and the publishers of Air Force Magazine.*

Immediately after New Year 1960, while based at RCAF Stn Trenton, and flying North Stars for 426(T)Sqn., I was assigned to be the First Officer on a flight to pick up an entertainment troupe of 30 Passengers from Montreal. This was planned as an 8 day trip providing entertainment to personnel working along the Quebec, Ontario and Manitoba sectors of the Mid Canada Detection Line.

At the height of the Cold War, The Mid Canada Line was to be the main detection line between Canada and the USSR. It was located approximately along the 55N latitude parallel, and stretched from Hopedale, Labrador to Dawson Creek, B.C. The system was put into service in 1957, and decommissioned in 1964. The more northerly DEW radar line began full operation in 1957.

Our 426Sqn crew consisted of Captain â€¢ F/O H.(Hank) Zbesheski, First Officer â€¢ F/O M.G.(Mac or Mo) Morrison, Navigator â€¢ F/O Roger Fridel, Radio Officer â€¢ F/O Peter Dragovich, Flt Engineer â€¢ Sgt Miller, Flt Engineer â€¢ Sgt Sopaz, Trans Tech â€¢ LAC Hall.

It should be noted that, on northern flights such as this, it was normal to have two Flight Engineers on the crew, due to the difficulty of fueling and servicing the North Star in remote and unsupported airfields. Had there been plans to travel north of Churchill, we would normally carry an extra navigator as well. Another part of the Squadron normal operating procedure was that; providing the First Officer was Type qualified and current, the Captain and First Officer would switch seats on alternate legs. The North Star did not have nose wheel steering available in the co-pilot's position.

Typically, on the day prior to departure from home base the whole crew would meet and review the trip Itinerary, and fully discuss any foreseen issues that might be expected. We were all aware of the anticipated cold weather, the short snow packed runways at most of the planned stops, and the lack of any useable hangar facilities that could accommodate a North Star, with the exception of RCAF Churchill.

Having introduced the issue of cold weather, I

must now digress for a moment to explain one of the severe consequences of cold weather on aero engines in 1960. At ambient temperatures below minus 18 deg. C, 90w oil is below its "pour point"; in other words it would not flow through either a filter or a radiator such as the type required to cool the oil on the North Star. Each engine had a 25 gal oil tank located in the wing immediately behind the engine firewall. To ensure that the oil system worked after a prolonged (30 to 40 minute) engine shut down in temperatures below minus 18 deg. C, the requirement was to dilute the oil with raw gasoline directly from the main fuel system. As an example at a temperature of minus 34 C the dilution time was approximately 3 minutes when the oil temperature had cooled to 40 deg. C. After start-up the next morning the gasoline had to be boiled out of the oil for approximately 35 minutes once the oil had reached a 40degC.temperature.

These procedures were called "oil dilution" and oil "boil-off". The dilution and boil off times which I have cited are approximations only, since I have not had access to the Standard Operating Procedures for the North Star for quite some time.

The reason for dwelling on the oil dilution procedures is that, in January of 1962, North Star #17520 operated by 412 Sqn. was lost at Hall Beach NWT, during a VIP tour of Dew Line sights. Within minutes of takeoff from Hall Beach in minus 40C conditions, the crew experienced 3 engine failures in rapid succession. Under very difficult conditions, they were able to force land the aircraft on the infield of the airport. Fortunately, all passengers and crew were able to exit the aircraft without injury. On a subsequent trip in April of 1964 doing a similar Dew Line site tour in #17502, I witnessed the remains of 17520 still sitting in the infield, a stark reminder of oil dilution requirements.

To continue with my story, with the exception of St. Hubert and Churchill, there were no stairs available to board or deplane our passengers on, and thus the passengers were required to climb down a rather slim aluminum ladder each time. This process could amount to more than a 30-minute exercise each time, and in those temperatures this raised the oil dilution issue. We fully briefed on oil dilution procedures prior to shut-down, and burn-off times that would be required after engine startup and warmup the following morning. It was agreed that, in spite of the extended periods, the passengers would be required to board and remain seated, during the boil-off period prior to take-off, and that we would perform both the dilution and boil-off while the passengers were on board the aircraft.

Our planned itinerary was as follows:

- 8 Jan—Trenton to St. Hubert to Sept Iles PQ—overnight at RCAF Stn Moisie
- 9 Jan—Sept Iles to Knob Lake—overnight at RCAF Stn Knob Lake
- 10 Jan—Knob Lake to Great Whale PQ—overnight at RCAF Stn Great Whale River
- 11 Jan—Great Whale to Winisk ON—overnight at RCAF Stn Winisk
- 12 Jan—Winisk to Churchill MB—three overnights at RCAF Stn Churchill
- 15 Jan—Churchill to St Hubert to Trenton

RCAF Stn Moisie was not part of the Mid Canada Line but was part of the original Pinetree line. The airport at Sept Iles was not part of RCAF Moisie, but was managed by the Federal Department of Transport. The airports along the Mid Canada Line, although used by some civilian contractors, were all operated by the RCAF.

The schedule, as planned, was to arrive at each of the entertainment destinations in the late afternoon so that the Troupe could have supper and then prepare for a show at approximately 8pm each evening. The exception would be the days at Churchill, during which time the Troupe would travel for 4 to 5 hours via train from Churchill to RCAF Stn Bird, about 180 mi. to the south, entertain the base personnel, and return to Churchill the following day.

As they say "all the best laid plans of mice and men", something is bound to cause a SNAFU. The following is an account of what happened, in the best chronology that my memory and my log book records can account for.

#### **Day 1, 8 Jan 1960, North Star #17502:**

The flight from Trenton to St. Hubert was uneventful, and our passengers had already arrived, so that there was a minimum of delay in boarding. The fuel load was topped up to the maximum that we could carry, bearing in mind that fuel at Sept Iles would have to be purchased on a DPO (detached purchase order) at a significantly higher cost than normally paid by the RCAF. We also tried to minimize the fuel requirements at the Mid Canada sites due to the need to use fuel cache supplies from barrels at those destinations.

The 3:05 hour flight to Sept Iles was also uneventful, with the arrival being in darkness and in a light snowfall. Our passengers deplaned, via the ladder, to an awaiting bus after remaining seated on board the aircraft while the crew carried out the mandatory

oil dilution procedure prior to securing the aircraft for the night.

#### **Day 2, 9 Jan 1960, North Star #17502:**

The planned chock to chock time for the leg Sept Iles to Knob Lake was 1:15 Hrs., but was logged as 2:00 Hrs., because of the engines on to engines off time required to accommodate the boil off and dilution procedures. The flight was uneventful; however, the landing in calm wind conditions on a 4,500 ft. runway and with the extra fuel load was, to say the least, challenging. The packed snow condition did not offer good braking action.

#### **Day 3, 10 Jan 1960, North Star #17502:**

The overnight temperature dropped to minus 40C as was forecast, and by noon had not gone up appreciably. The passengers were loaded onto an ice-cold aircraft and told that it would be at least 40 minutes before we could commence our take off and thus turn on the main cabin heaters. They were told that they could come into the crew area 3 or 4 at a time and share what heat came off the cockpit heater (which had a blower attached to it), and do that until such time as we had finished the boil-off prior to take-off.

The engine start-up sequence on the North Star was normally 3-4-2-1. Startup in cold weather was always tricky, in that the amount of priming time recommended was not clearly defined in the SOP's other than to say that, if you over-primed, you may damage the engine on start or, if you under-primed, the engine may not start, and the starter may be damaged by over-cranking.

We were lucky with the #3 & #4 starts, but when we got to #2, our luck ran out and we had a severe backfire on startup, thus making the engine totally unserviceable.

After unloading our passengers and advising them that, if they wished to put on another show for the base personnel that afternoon or evening, there would be no problem as far as our crew was concerned, and that we would advise them later in the day as to what the plan would be going ahead. We immediately advised ATCHQ as to our problems, and were advised a few hours later that another North Star with a replacement engine was being dispatched that afternoon, and would be expected in the early evening. The plan was that the engine change would take place overnight, and that our crew would carry on the next day using the replacement aircraft and complete the Mid Canada Line tour.

Sure enough, about 1800Hrs local time North Star #17512 landed at Knob Lake with a few extra technicians to assist with the engine change. The next 6 to 7

hours were probably one of the most challenging that our flight engineers had ever faced. With a minus 43C temperature, no hangar facility, and virtually no support equipment, other than a 6,000 lb. forklift, these professionals, with some assistance from the rest of our two crews, carried out the miracle of a complete engine change, and the loading of the damaged engine onto #17502. They also started the replacement engine and carried out an oil dilution on the new engine, so as to be safe for an overnight stay.

The reason for our crew and passengers not carrying on with #17502 was the requirement to "air test" the aircraft after an engine replacement. This air test could not be done with passengers on board. The crew returning 17502 to Trenton with the unserviceable engine on board carried out the required "air test" enroute.

#### **Day 4, 11 Jan 1960, North Star #17512**

The 2:50 Hr. flight from Knob Lake to Great Whale River was uneventful. The passengers survived the 50 min. warm up and boil off period prior to takeoff with admirable patience. On arrival at Great Whale, the temperature of minus 29C mandated another oil dilution prior to shut-down and deplaning.

#### **Day 5, 12 Jan 1960, North Star #17512**

A short hop from Great Whale to Winisk of 1 hour flight time was logged as 1:50 Hrs. "engines on" to "shutdown". By this time our passengers had fully accepted the necessity of the extra wait on the aircraft. The flight was uneventful.

#### **Day 6, 13 Jan 1960, North Star #17512**

When the crew appeared at the mess hall for breakfast, we were handed a very brief "Confidential" message from ATCHQ advising us to advance our planned departure as much as possible, proceed to Churchill, deplane our passengers, refuel and proceed immediately to Winnipeg where we would be given further instructions.

Following a 2:20 hour flight to Churchill we advised our passengers that we had to proceed to Winnipeg immediately, but would be back to pick them up and return them home in three days. The 3:10 hour flight to Winnipeg was uneventful, with arrival being after dark. The aircraft was immediately towed into a hanger with the instructions that we could refuel in the morning when we had been fully briefed on our future mission.

As the crew deplaned we were met by an army major and taken to a briefing room, where we were told the "Confidential" details of our diversion. The

following is a short synopsis of that briefing. We were to get a good night's sleep, and first thing in the morning we would be given a full briefing on the perils and extreme hazards that a 15 drum load of "specially denatured alcohol 3C, 200 proof" would create on an "emergency flight" to CFB Alert the next morning.

The planned route was Winnipeg to Churchill, Resolute Bay and Alert, unload, and on to USAF base Thule in Greenland for a crew rest. It was agreed that Nav. F/O Fridel was well enough versed in grid navigation to eliminate the requirement for a second navigation officer. We were advised that sufficient food would be provided to see us through to Thule, and that both Churchill and Resolute would be alerted as to the urgency of our mission, and would give us all the required assistance for quick turn-around at those bases.

#### **Day 7, 14 Jan 1960, North Star #17512**

After a hearty breakfast, our crew was driven to an army site a short distance from the airport. There we received an extensive talk on the hazards of denatured alcohol. They dealt with the fact that it was among the most hazardous of products that could be permitted on an aircraft, also that its toxicity was extremely high, and that we were not to risk exposure to it. We were fitted and provided with full facial gas masks and advised that we must have them within arms' reach of us throughout the flight. We were told to remove the over-wing emergency hatches for the duration of the flight, and even during the leg from Alert to Thule, to ensure that all possible residual fumes had been evacuated from the aircraft. If there was the slightest hint of fumes within the crew compartment, we were immediately to shut down the nose heater, and eliminate any possible source of a spark within that area. Last, but absolutely not least, we were told that all the airport emergency forces along our route would be alerted as to the extreme nature of our cargo.

Upon our return to the airport we noted that army personnel were already in the process of loading the aircraft. By the time that we had completed and filed our flight plan, the army personnel had finished, and we boarded, checked the security of our load, and proceeded with the rest of our pre-start check.

The takeoff for Churchill was normal in all respects, apart from the fact that the huge array of crash trucks and flashing lights did make us wonder as to exactly how hazardous our load was. The enroute weather to Churchill was forecast to be good, with a high thin overcast, thus we opted to cruise at 8,000 ft. On reaching cruising altitude LAC Hall went into the main cabin for a load check. Within

seconds he returned to the cockpit and grabbed a gas mask as he advised us that we had at least two leaky drums in the cargo area. Immediately we shut down the nose heater, advised Winnipeg of our situation and commenced a return to the airport. The whole crew donned the supplied gas masks. This significantly hampered our ability to communicate, both among the crew and with Winnipeg tower. The tower gave immediate clearance for a straight-in approach from the north. The approach and landing were uneventful, other than the discomfort of the gas masks. The aircraft was surrounded by a sea of flashing red lights as we cleared the runway and taxied to the RCAF side of the airport.

The Army was there immediately to inspect the drums and found the two defective ones. There was no evidence of any of the others being problematic. A quick decision was made to remove the two drums and not replace them, thus reducing the load to 13 drums. This whole process consumed valuable crew time, which put us in the position whereby, if we to proceed, we would be well in excess of the normal maximum of 18 hours from briefing to the final engines off time for the day. We decided to take a 12 hr. break and tackle it again first thing in the morning.

#### Day 8 & 9, 15–16 Jan 1960, North Star #17512:

Following a good crew rest and another hearty breakfast, we immediately proceeded to flight planning. The aircraft was kept in a hanger by itself overnight, with just enough heat to eliminate any dilution or burn-off requirements. The take-off, climb-out and cruise to Churchill all went well. The one issue that we had was the heat comfort level in the cockpit. We found that with the escape hatches open, any heat generated by the cockpit heater was quickly sucked out through the missing main cabin hatches, in spite of the cabin door being firmly closed. Landing in Churchill was uneventful. We immediately briefed for Resolute with an outlook for Alert. The forecast for Resolute was anything but promising with strong crosswinds and blowing snow. We did not consider this to be a major problem, as both Hank Zbesheski and I had landed in Resolute a number of times during the previous 12 months, many of those being in rather adverse conditions. The flight plan was filed using Frobisher Bay as an alternate.

The flight to Resolute Bay was as good as could be expected under the circumstances, with everyone in the cockpit wearing gloves or mitts to keep our hands warm. The approach into Resolute was turbulent with the crosswinds blowing from the west at 25 to 30 Knots. Hank executed a perfect landing on a snow-packed runway in spite of the problems of getting the nose-wheel to steer on the slippery surface.

The real challenge, was to refuel and restart the engines as quickly as possible so as to avoid the requirement to oil dilute. We succeeded to start within less than 40 minutes, thanks to our flight engineers, both of whom worked on the over-wing refueling process together.

The runway at Resolute Bay is almost true north and south. The buildings were at the time located to the west of the runway with the bulk of them being located about halfway along the runway and not less than 50 yards from the side of the runway. We decided to execute the takeoff to the south, since the windsock appeared to give us a slight headwind in that direction.

Standard takeoff procedure in a strong crosswind required that the pilot in the right-hand seat would handle the control column and ensure that there was good nose-wheel contact as well as maintain lateral stability on the into-wind wing. The pilot in the left-hand seat would handle the throttles up to take-off power, hand them off to the flight engineer, and at the same time control the directional stability of the aircraft with a combination of the nose-wheel steering and rudder. At the appropriate moment he would take over the control column and execute the take-off.

The first half of the take-off run went well. As we approached takeoff speed we encountered the full force of the crosswind and I found it extremely difficult to maintain direction with the nose-wheel and opted to ease it off the runway at about the same time as a heavy gust lifted us into the air. The gust immediately subsided and we hit back onto the runway rather heavily on the starboard landing gear. We once again hit a gust and this time I was able to cleanly pull the aircraft into the air. The landing gear retracted without problem, and we climbed away toward Alert without further incident or thoughts of the critical issues of the take-off.

The flight to Alert was uneventful in spite of the fact that we lost all radio contact with Resolute within 10 minutes after take-off. (This was not an unusual circumstance in these latitudes). The arrival at Alert was in dead calm winds and absolutely clear. The ground temperature was minus 43 C. and our plan was to unload as quickly as possible, do an external walk around, and depart as quickly as possible. The base personnel at Alert obliged and had us offloaded within 30 minutes of engine shutdown. It was agreed that one of our F/E's would do the external. Shortly after he went down the ladder, he was back up and asking the two pilots to return down the ladder with him.

We witnessed a rather large pool of red hydraulic fluid under the starboard undercarriage leg and noted that the normal 6" to 8" of leg extension was not there. There appeared to be no other dam-

age to the undercarriage or any other visible issues that would hinder us from flying. We immediately advised the ground personnel of our intent to depart with haste, so that we could do a much more thorough inspection at the USAF base at Thule, Greenland where they had hangars that would give us some relief from the extreme cold.

The start-up, takeoff and flight to Thule, 2:10 hours due south of Alert, was uneventful, with Hank executing a perfect landing on the long smooth runway. After clearing the runway we were immediately marshalled directly into a well-lit empty hangar, without shutting down until fully inside the hangar.

Once settled inside the hangar we were in a better position to assess the condition of the aircraft. The first obvious issue was that of the starboard landing gear assembly. There was no visible damage to the assembly, other than the fact that we had lost all the oleo leg fluid and that the seals had probably failed as well. It would be a major undertaking to replace the seals. A second issue was observed by our engineers, which may have proved to be more threatening than the landing gear. There were significant ripples on the aluminum upper wing surface skin on the starboard wing. This condition seemed to be much more prevalent on the starboard wing than on the port wing. The conversation was joined by two USAF airframe technicians and after a long discussion, the consensus was that the starboard main spar may have been damaged. If that was in fact the case, the aircraft was no longer flyable. Fortunately the communications via a secure phone line routed through Washington to Trenton were excellent and we were able to relay all the information to ATCHQ. We were told to get to bed and that we would receive advice the following day. It had indeed been a long day.

#### **Days 10 to 13, 17/18/19/20 Jan 1960, Thule, Greenland:**

By noon on the 17th we received a message from ATCHQ advising us that a North Star would be leaving Trenton on the 18th and routing via Winnipeg, Churchill, and Resolute Bay to Thule. The load would include a crew of 6 airframe technicians and a complete new main landing gear leg assembly. The aircraft, #17514, captained by F/L Jock Hutchinson, arrived late afternoon 19 Jan, offloaded the spare parts and repair crew and proceeded on to Alert with

additional supplies the following day.

The Technical crew got to work immediately and carried out a full non-dynamic inspection of the wing and main spar structure. They found the wing to be fully sound and the dimensional check to be fully within limits. With a huge sigh of relief from all concerned, they then proceeded to replace the starboard landing gear strut assembly. Within 48 hours the repair crew had put the aircraft back in fully serviceable shape. Quite a feat when you consider the circumstances and lack of main base support that they had. It was thought that the excessive ripple effect that had been witnessed on our arrival at Thule was caused by a combination of the rapid heating of the upper wing skin surface, primarily because of the type of heaters in the hanger, versus the extremely cold soaked spar and interior structural frame of the wing. By the time the aircraft had been in the hanger for 3 days the temperature of the complete structure had equalized and thus the ripples had all but disappeared.

#### **Days 14 & 15, 21/22 Jan 1960, North Star #17512:**

By late afternoon we had fueled, flight planned, and were ready to depart on an 8:05 hour flight to Sept Isles PQ. This would be our closest point for clearing Canadian Customs and Immigration, as required by regulations. The landing at Sept Isles was carried out in moderate snow, which did not hinder our arrival. The Customs Officer was perturbed because of the late hour (after midnight local time) and the fact that he had to climb the ladder to access the cabin of the aircraft. His inspection totally disregarded the personal baggage on board, and was focused only on the large crate that contained the undercarriage leg. We almost had to uncrate the leg before he would accept the fact as to what the crate contained. After refueling and sweeping the accumulated snow off the wings, we were able to restart all engines and proceed on our 3:15 hour flight to Trenton. The flight and arrival at Trenton was uneventful.

During a rehash of the journey a few days later, it was disclosed to us that a short time prior to our arrival at Alert, the base had resolved the problems that required the denatured alcohol, but felt that they would like to have the product in case of future issues. We never did find out how our entertainment troupe made the return trip from Churchill to Montreal.

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# The Civil Merlin

Dr. Jakob Whitfield

*The following article is an extract from a larger piece which appeared in the July 2017 edition of Aeroplane magazine under the heading "Rolls-Royce Merlin." We wish to thank Allan Bowes for bringing it to our attention. This article is republished with the kind permission of the publishers of the magazine and the author Dr. Jakob Whitfield.*

The earliest Merlins to operate in a civil mode were the Merlin T24 series, developed in 1944. These were single-stage twin-speed units similar to the Merlin 24s fitted to the RAF's Lancasters, but were modified to improve service life, and were fitted to Transport Command's Avro Yorks. Long-range transport operation entailed running at relatively low cruise powers for long periods. Under these conditions the lower cylinder head temperatures caused deposits of lead oxide from the fuel, resulting in excessive spark plug fouling. To counter this, the Merlin T24/4 incorporated a charge heater to increase the inlet temperature. Post-war, the Merlin 500 series essentially comprised civil and export versions of the T24, incorporating its modifications, though only the Merlin 501 included a charge heater.

The 600 and 700-series engines were two-speed two-stage engines, based on the military 100-series. They were fitted with the so-called 'transport heads and banks', strengthened for greater reliability. Most marks had some form of variable intercooling to allow for charge heating to reduce plug fouling under cruise conditions. Initially the system was plagued by coolant leaks, but as experience showed that zero intercooling at cruise allowed enough charge heating to reduce leading, a simple stop valve was fitted to the system. This allowed full intercooling for take-off

and climb, which could then be turned off for cruise.

Civil Merlins were fitted to Avro Lancastrians, Yorks and Tudors, but their flagship role was on the Canadair DC-4M North Star, a Douglas DC-4-derived design intended for Trans-Canada Air Lines (TCA). The North Stars used a modified Universal Power Plant installation, as the DC-4's nacelle bulkheads were slightly larger than the SBAC standard. In practice it turned out the Merlins were not ideally suited for use in civil operations: though the North Stars flew higher and faster than DC-4s, their time between engine overhauls was around 850 hours, roughly a third of that of commercial US radial engines. The engines also produced a lot of cabin noise, though this was alleviated somewhat by revised 'cross-over' exhausts that ducted the cabin-side stacks outboard, developed first by TCA and then by Rolls-Royce themselves.

The extra running costs were mostly borne by Rolls-Royce. When TCA's managing director expressed dissatisfaction with the Merlin's commercial performance, Hives asked what a reasonable level of maintenance cost would be. Being told \$4 per engine hour, he agreed to service the fleet's engines for this amount. This early form of 'power by the hour' was initially expensive for Rolls-Royce, but by the end of the Merlin's life the company had learned enough to supposedly make a small profit at this level.

What was undoubtedly true was that Rolls-Royce learned a great deal about the harsh realities of commercial operation in a short time. Hives is supposed to have said to TCA, "We didn't know the Merlin until you started operating it!" In the longer term, this paid off, TCA—later Air Canada—selecting Rolls-Royce engines for its future fleet: Darts in Viscounts, Tynes in Vanguards, Conways in DC-8s, and RB211s in TriStars.

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# A Personal Journey in Support of Homeless Veterans in Canada

*Neil Raynor*

Veterans' House: the Andy Carswell Building is Canada's first "Housing First" community built for homeless Veterans. This pioneering project specifically targets the needs of the rising number of Veterans who are "living rough" in Canada and combines safe housing with essential on-site rehabilitation and wrap around support services.

Who knew? How could we? Surely if we knew we'd have done something about it?

Fact: every night in Ottawa between 50 and 85 Veterans are sleeping on the streets, in the parks or under bridges in Ottawa. How could that be happening in the 21st Century in a G7 capital?

Seven years ago a group of people came together within the Multifaith Housing Initiative (MHI) to do something about that stat. MHI is a federally registered charity based in Ottawa which provides affordable housing; currently it has about 140 units with 400 residents scattered across the city. What started as a desire to provide affordable housing has morphed into an ethos to build communities. Veterans' House is the latest iteration of that approach.

What MHI and its volunteer members did was: articulate the need to address the issue of homelessness among Veterans; identify the need for support for these Veterans that went beyond just housing; and together with its partners develop a solution that wraps it all within a military community initiative.

The physical manifestation of MHI's work is the structure being raised on the former CFB Rockcliffe airbase called Veterans' House: the Andy Carswell Building, a 40-unit community apartment building named for a retired WWII RCAF Lancaster pilot who was shot down over Germany in 1943 and who remained a POW until liberated by allied troops in 1945.

Uniquely, this "Housing First" initiative will include provision for a range of on-site support services focused on the individual needs of the residents and provided by MHI's partner organizations who are professionals in their fields of work. And being "Housing First" means that residents can remain in Veterans' House for an indeterminate period and focus on recovery from the underlying issues that contributed to their homelessness, be they economic, health, mental health or addiction related issues. Moreover, in line with best practices in pro-

viding affordable housing to this at-risk group, all the ground floor bachelor apartments in Veterans' House will be fully wheelchair accessible. Again, with a community spirit in mind, the site will also include a gym, gardens, service-dog park, and communal kitchen and BBQ area for when residents want to share meals together.

Together with our partners – many of them with direct connections to the military and Veterans – Veterans' House: the Andy Carswell Building will provide a "military-family" structure to residents which they will recognize and which research has shown many homeless Veterans miss and which contributes to their slide into homelessness. A full list of our partners, progress to date and lots of other information is on the MHI Veterans' House website at <https://www.multifaithhousing.ca/veterans-house>

The physical structure is rising from the ground this spring. We broke ground on September 5th, 2019 and 96-year old Squadron Leader (retd) Andy Carswell laid the cornerstone on September 16th. As at February 1st, 2020 we are up to the second floor with completion planned for November 2020. There's lots to do but to date we are pretty much on schedule despite building through the winter months.

The total cost of the initiative is about \$15.4 million, including \$3 million for the land which was transferred from the federal government as part of its contribution. There is a balance of \$2.3 million still left to raise and we are in full fund-raising mode. If you are willing and able there are a number of ways you can help financially: you can send a cash or stock-transfer donations to Veterans' House through MHI; organize a fund-raising event within your community; or leave a bequest in your Will. All donations are gratefully received and will be put to good use where they will make a difference.

While Veterans' House: the Andy Carswell Building is the first of its kind our plan is to create a robust model that can be replicated across Canada to address the national issue of homeless Veterans.

For more general info about Multifaith Housing or to make a donation go to: [www.multifaithhousing.ca](http://www.multifaithhousing.ca) You'll find more information there including a recently released report on a 2019 Survey of homeless Veterans in the National Capital Region.

To volunteer you can apply online. Go to: <https://www.multifaithhousing.ca/volunteer>

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# North Star wall and floor panel photographs

Here are three photos of recent work on the wall and floor panels. All the wall panels needed to be replaced. We are able to save some of the floor panels, but not the one in front of the cargo door as it was so heavily damaged by cargo and exposure to the weather. The fourth photo is the rotating beacon on the top of the fuselage. It was removed for restoration and to stop a persistent leak.



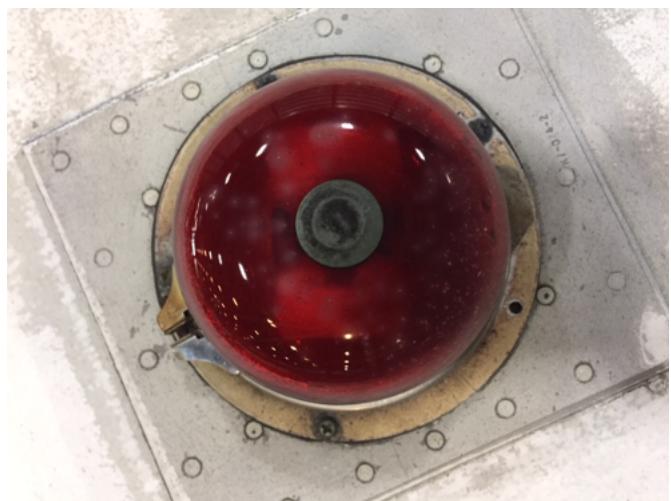
Old wall and floor panel



Laying out new floor panel



Fitting new wall panel.



Rotating Navigation Beacon.

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# Calendar of Events

Saturday and Sunday, June 6, 7, 2020	Doors Open Ottawa
Sunday, June 20, 2020	Annual General Meeting
Wednesday, July 1, 2020	Canada Day

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