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Flight Comment

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Cadet flying program at 14 Wing Greenwood.
Photo: Corporal Michel Levesque, Canadian Forces Joint Imagery Centre, Ottawa, 2002.

DIRECTORATE OF FLIGHT SAFETY

Director of Flight Safety
Colonel A.D. Hunter

Editor
Captain Rob Burt

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Send submissions to:

Editor, *Flight Comment*
Directorate of Flight Safety
NDHQ/Chief of the Air Staff
Labelle Building
4210 Labelle Street
Ottawa, Ontario Canada
K1A 0K2

Telephone: (613) 992–0198
FAX: (613) 992–5187
E–mail: Burt.RM@forces.gc.ca

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Views on

Flight Safety

Lieutenant Colonel Bourduas

FLIGHT SAFETY AND AIR CADETS

With less than two glider accidents on an average of 55,000 glider flights per year, the Air Cadet flying program has an enviable record. Cadets and instructors have long realized that safety goes hand-in-hand with flying. Air Cadets have developed trust in our program and have gained the confidence needed to become pilots. A positive culture of flight safety has been the key. Challengers anyone?

There are two flying programs available to Air Cadets:

- The Power Pilot Scholarship Program
- The Air Cadet Gliding Program

The Power Pilot Scholarship program is offered during the summer and is conducted at and by selected flying schools of the Air Transport Association of Canada (ATAC) and *l'Association québécoise des Transporteurs aériens* (AQTA). Each year, 250 cadets are selected.

The Air Cadet Gliding Program began in 1965. It was an initiative of the Air Cadet League of Canada to provide air familiarization flights for junior air cadets, at a time when the historical support by the RCAF was rapidly declining. The Air Cadet Gliding Program was seen as a solution to the problem of decreasing Air Cadet interest and its motto became "Put the Air back into Air Cadets". There are 320 cadets selected annually for the Glider Pilot Scholarship. In addition, each Air Cadet normally has the opportunity to fly in a glider once a year. The program uses 71 Schweizer gliders and 31 tow aircraft, owned by the Air Cadet League and its provincial committees.

So how do we manage such a great flight safety record? We take safety seriously — especially given that teenagers with minimal flying experience are doing much of the flying — and we reinforce the importance of safety through word and deed at every occasion.

Each summer, the cadets and staff attending the regional gliding schools are briefed by the Directorate Flight Safety (DFS). All schools have a trained flight safety officer who provides additional awareness training to staff and cadets with materials provided from DFS and other aviation-related sources. At the start of the "familiarization" season, each of the 55 gliding sites across Canada will hold training sessions for the instructors. In addition, instructors and cadets receive a briefing prior to each gliding day that includes flight safety issues. Each site has a flight safety officer assigned to it.

Regular visits to the regional gliding schools and the glider sites by the region cadet air operations staff ensures that all safety regulations are being followed. To ensure there is enough qualified staff, DFS trains ten officers as unit flight safety officers each year. Senior members of the cadet air operations staffs also attend flight safety seminars hosted by DFS each year.

During the ground school phase of training, Air Cadets on the Glider Pilot Scholarship learn about the various factors that affect flight safety, such as pilot decision-making. These air cadets are drilled on their knowledge of safety considerations and procedures.

The two organizations, through which the Power Pilot Scholarship is offered, also have active flight safety programs that are part of the training required for a cadet to obtain a private pilot licence.

A sound maintenance program is another important factor. Our aircraft are kept in superb mechanical condition by a Structural Inspection and Repair (SIRP) program conducted by the maintenance staff. They ensure all aspects of mechanical safety, and therefore flight safety, are addressed.

These efforts, combined with the work of the Standards and Evaluation Team in 1 Canadian Air Division have produced a proactive and energetic flight safety culture. The goal of "Keeping the Air in Air Cadets" is being achieved by providing challenging, well-organized and fun flying programs in a SAFE environment. To keep it safe, we continue to make flight safety a priority and in doing so, create a positive culture of flight safety. ◆

By Lieutenant Colonel Michel Bourduas, Director Cadets 2 — Coordinator and Senior Staff Officer (Air) Ottawa and Major Al Wardle Director, Cadets 4-6 National Cadet Air Operations Officer, Ottawa.

Good Show

For Excellence in Flight Safety

Cadet Marc-André Francoeur

Cadet Marc-André Francoeur was participating in the Regional Gliding School Operations as a glider pilot candidate. Candidates are required to participate in daily operations as part of the ground crew for glider launch procedures. The task assigned to Cadet Francoeur was to "hold down" the tail of the glider to facilitate the aero tow launch.

While holding down the tail in preparation for take-off he decided, on his own initiative, to inspect the 5 tail attachment points he is trained to inspect during the walkaround. He noticed that the safety pin for the bolt that attaches the elevator control arm to the elevator was missing and that the bolt was partially unscrewed. He immediately called a "STOP" and the take-off was aborted.

Investigation revealed that the Daily Inspection was performed earlier in the day and the person who inspected the aircraft was positive that the pin was in place at that time. The cadet executing flight 4, in a series of 5 flights, is also certain that the pin was in place when he performed his pre-flight walkaround. Upon inspection, the castle nut, which should have been secured by the safety pin, was unscrewed and required rotation of less than one turn before separating from the bolt.

Cadet Francoeur's diligence, attention to detail and decisive action were instrumental in identifying a hazard that could have caused the total loss of elevator control on the next flight. His proactive performance and keen attitude were key in preventing a tragic aircraft accident. ◆

At the time of this occurrence Cadet Francoeur was a glider pilot candidate at the Regional Gliding School in St. Jean.

From the
Flight Surgeon

EMERGENCY RESPONSE ISSUES

The Annual Directorate of Flight Safety (DFS) Conference ended last week and a very good topic was brought up during the open discussion period. The issue had to do with the use of the "911" system for crash response on Department of National Defence (DND) property or involving DND assets.

Unfortunately, despite great advances in the area of flight safety, mishaps still occur and will occur. On many of our Wings, crash response is being handled by local "911" agencies especially for after-hours coverage and/or for off-base mishaps. It is imperative that each Wing Flight Safety Officer (WFSO) review their Emergency Response Plan (ERP) and in particular, any response handled by "911" agencies. This plan should be reviewed by all stakeholders, particularly the Wing Surgeon and/or the local medical authorities to ensure the following:

1. The plan is sound and response capabilities acceptable.
2. Appropriate checklists and contacts are up to date.
3. The local 911 agencies are aware of their role in response to DND mishaps.
4. The local 911 agencies are aware of particular issues involving DND aircraft, i.e., composites and hazardous materiel, etc.
5. The plan is exercised regularly with all involved agencies, particularly on the civilian side.

Just in arranging a medium/large scale crash exercise will shed light on many, many things that could detrimentally impact response capabilities. Following the exercise, if there are any flaws identified in the ERP they should be sorted out well ahead of any mishap thus ensuring a smooth response to a real-time emergency. If it is felt that "911" coverage is inadequate then this must be brought, in writing, to the attention to the Wing Commander, as he would be able to engage the appropriate authorities in order to affect staffing/equipment changes.

If anyone has any suggestions for future topics or feedback, please do not hesitate in contacting me through my DND e-mail: Sardana.TM@forces.gc.ca. ◆

Major Tarek Sardana, Flight Surgeon and Human Factors Specialist, Directorate of Flight Safety (DFS 2-6), Ottawa.

NO TIME TO PANIC

Photo: Sergeant Eileen Redding, Assistant Public Affairs Officer, 19 Wing Comox, 2004.

It was a clear and windy day in mid November but after the previous month's many weather cancellations, the gliding centre was eager to fly on this last day of the flying season. The weather forecast called for strengthening wind later in the morning and it looked like the operation would be threatened by the maximum wind limitation of 25 knots, or the maximum allowable gust of 10 knots. Another consideration was the wind at 3000 feet above sea level (ASL) — approximately the standard glider release altitude — it was forecast to be 30-35 knots and perpendicular to the glider circuit pattern.

At start-up the wind was 10 knots gusting to 15 at about 40° to the runway so the operation commenced. Everything went well for about three hours and then the tail spring on one of the gliders snapped off during the take-off roll (the investigation revealed a pre-existing crack and a final overload failure

from relatively normal ground contact on initial roll). The pilot was told by radio that his tail spring was gone and to make a normal landing and keep the tail off the ground during roll out. The tail spring failure had little to do with subsequent events but it was an error by the pilot of this aircraft that caused everyone a good deal of concern during his circuit and landing.

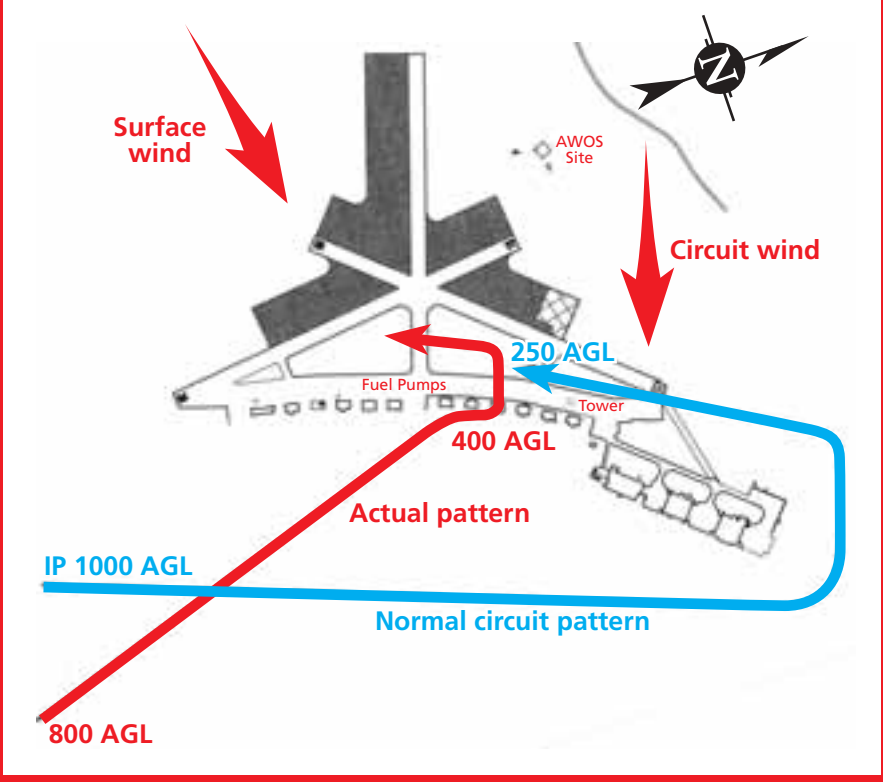
The pilot was normally very dependable and his experience level was just getting him to the stage where he could be considered for instructor training. He had acquired rear seat familiarization status and a visiting cadet was a passenger in the front seat. After a normal flight profile the glider, with the cadet flying, arrived at the Initial Point (IP) at 1400 feet above ground level (AGL). The standard circuit stipulates 1000 feet at the IP so the pilot told the cadet to do one more turn. This would get rid of some of the excess altitude but still retain a bit more than the standard requirement — a prudent decision considering the strong winds.

The pilot was then faced with one of those 50-50 decisions that seem of no consequence at the time, but when played out in the actual circumstances, takes on great significance. The glider was pointed along the downwind track and the wind was from 90° to the left at about 30 knots. The pilot advised the cadet to turn right. The cadet did not turn steeply enough and the glider immediately began to drift away from the landing area. Part way through the turn the pilot took control but by completion of the turn, the pilot found that he had gone from a position of excess altitude at the IP to much lower than desired and quite far from the desired downwind track.

The pilot immediately knew he was in trouble and set up for a straight glide back to the downwind as the altimeter unwound seemingly ever faster. He had put himself in a very small box and he knew it, but this was no time to panic. As bad as his predicament was, he was in even more danger of getting so wrapped up with his mistake that several psychological factors might have impeded his ability to get the glider back on the ground safely if he had let them.

This situation has been encountered by many other glider pilots before and it will happen many more times in the future — the pilot gets himself into trouble and then goes to pieces and forgets just about everything he ever learned at gliding school. (Glider pilots are not alone in this — a British pilot in the Falklands war stated that when he saw a real missile coming at him for the first time it was like he forgot every basic flying manoeuvre he ever knew!) The key to preventing a major error from developing into a disaster is in putting the mistake behind you and concentrating on flying as best you can from that point on.

The pilots who can't do that are the pilots who let the nose come up and bleed back the speed and further aggravate their already bad position. They are the ones who become so consumed by the self-imposed need to get back to the landing point that they fail to look for alternate landing areas. They are the pilots who leave the spoilers out and do not hear the Launch Control Officer's advice on the radio. And they are the pilots who drag a wingtip in a last desperate effort to turn to the final approach track when it is not necessary. I am sure you will recognize that all of these decisions have been prominent factors in glider accidents in the last few years.



Scenario Graphic

In this case, the pilot did not fall into that trap. The gliding centre staff had discussed the options available for a low-in-the-circuit situation many, many, times and made the point that the best course of action was to fly a downwind track that was close enough to the landing path so that a continuous turn to final could be made. In such a case, the pilot would merely have to fly along the downwind until he reached his commit altitude, i.e. the minimum altitude where he must turn to final, and then make the turn and accept a long landing. The centre had even provided a number for the latest time to initiate the turn — 300 feet AGL — that would allow the pilot to roll out on final just under 200 feet and get squared away for the landing. This pilot did almost exactly that (he just added 100 feet for the wind) and successfully landed about 600 feet long.

The Lessons:

The first lesson has to do with the critical nature of the wind. When numbers like 30-35 knots of wind are forecast for the flying area, you have to be conscious of it all the time. In one turn, this situation went from altitude surplus to grievous deficiency and the lesson is that you never, ever, turn away from a strong wind without knowing that you can afford to drift downwind. Did this pilot learn that lesson? — This is what he wrote: *"Here was my mistake: I advised the cadet to turn right, and then I took over when the turn was not steep enough, and did the full 360... In hindsight, I should have turned left, and I'd have probably realized that an S-turn at most would have been sufficient."* I will bet that this experience will not only be remembered in vivid detail, but this pilot will become extremely sensitive to wind conditions from now on.

The second lesson is that whatever major mistake you just made, at least you are still flying and in control of your aircraft. Whatever you did could not possibly be as bad as making a mess of the rest of the flight and ending up damaging the aircraft, or even worse, yourself and your passenger, in the landing. Forget the ribbing you are going to take from your peers, your task is to fly the perfect profile and get your passenger, yourself, and that glider back on the ground in one piece. You may catch heck from senior staff for the original error but if you get the glider on the ground safely there should also be a pat on the back for doing so. This is what the pilot said about his mental reaction: *"I did the downwind check, and talked intermittently to the cadet trying to make sure that he knew this was a normal flight and also to reassure myself and react normally just like every other flight... So to answer your question, yes I was pressured, but I made the effort to take a few breaths, and just pretend it was a normal flight."*

Supervisor's Actions After The Event:

So as a supervisor, what do you do with this pilot who just gave you a few anxious moments as he limped back for landing? A lot depends on his previous record and if, as it was in this case, unblemished, you should proceed carefully. So you ask him to tell you what went wrong and if he can pinpoint his mistake. This will confirm that 1) he understands what went wrong and 2) he accepts that the responsibility is his. Having established that, you should be reasonably well assured that in a similar situation the pilot will be not make the mistake again.

As for getting low in the circuit, who hasn't? Anyone can get low, so that is not the major issue — it's what you do afterwards that distinguishes between the good and not so good pilot. So as a supervisor, on the negative side of the balance sheet you have a major error committed largely through unfamiliarity with strong winds and on the plus side you have a strong performance under pressure. I think it is fair to say that the whole event provided excellent training for this particular pilot and clearly showed that the gliding centre had prepared the pilot extremely well to react to this predicament. Therefore I would suggest you be firm but forgiving of this pilot.

As for the future, the only change is that this pilot is no longer a first time offender. Having ensured that the pilot knows what went wrong and what to do about similar situations, the supervisor should just make a mental note about the event and watch for any repetition. No repetition is good news and the event just becomes the basis for an "I learned about flying from that" type of story. If there is a repeat, then you have to call a spade a spade and consider a flight restriction or performance review. ◆

At the time of this occurrence Major Ted Lee was serving with Canadian Forces Support Training Group as the Flight Safety Officer in Borden. He has since retired.

Swallow That EGO Early

Photo: Master Corporal Gary Andrews, 14 Air Maintenance Squadron Imaging Section, 14 Wing Greenwood, 2003.

As a brand new pilot fresh off glider about six years ago, I was lucky enough to learn a valuable lesson early — personal limits. With little over 3.5 hours solo and just over 50 flights off course, I was itching to build time to reach that plateau of 10 hours pilot in command (PIC) so I would be eligible for familiarization pilot status. Building time was everything on my mind.

I was lucky enough to get my auto-tow conversion relatively quickly and was doing solos. I was up to about 10 solo flights on this particular weekend, which was truly exceptional. The winds had been about 8 knots straight down the runway all day. As the end of the day approached, the wind shifted to a crosswind, and there was a notable difference from flight to flight in the amount of slip required on both takeoff and landing. The winds shifted to almost a 90-degree crosswind, but were still within the operating limitations of the glider. Much to my chagrin, I was beginning to feel uncomfortable with the conditions.

Knowing that I was now getting that ever so precious solo time, and unsure of the next time I would have the opportunity, I was faced with a seemingly difficult decision at the time. (If I recall correctly, it was only my ego that was making it a tough decision.) The conditions were still flyable by the book, but my comfort level was slim to nil. I called the site supervisor over to my glider and I told him that I would have to stop flying because I was no longer comfortable with the conditions. He surprisingly shook my hand and helped me out of the aircraft.

Continued on page 9

Photo: Sergeant Eileen Redding, Assistant Public Affairs Officer, 19 Wing Comox, 2004.

COMPLACENCY
— More Contagious Than The Flu

As members of a gliding sight staff, no matter what position you are holding you have a big responsibility — SAFETY. Everyone from the Site Supervisor to ground crew have people looking up to them. Site Supervisors and senior staff are in danger of infecting the whole crew. Remember to lead by example because your crew is always watching you. Do not get caught up in a rousing match of duelling pilot stories...not that pilots ever tell stories!

Ground crew — you have the most contact with the visiting cadets and they look up to you. If the crew is seen horsing around, the cadets will do the same. We need to have everyone in an "operational safety" mindset at all times.

It is up to all staff to ensure that no one on the airfield catches one of the most feared maladies of a flight safety team — **COMPLACENCY**. Some symptoms include, but are definitely not limited to: sitting down on the airfield, general tom-foolery, and storytelling from days gone by.

From time to time everyone on the airfield is in danger of falling prey to **COMPLACENCY** but there is a known cure — it is **situational awareness**, aided by a healthy dose of **job variety**. If anyone on the airfield becomes complacent you can be sure that those in the immediate vicinity of those afflicted are in danger. To prevent the spread of this syndrome, the source must be treated immediately.

The most effective treatment I'm aware of comes in two parts. One, a healthy reminder to each other is always a good check. Remember, within reason, everyone on the airfield should be familiar with the current location of all aircraft.

Perhaps ask them to point out the traffic. This will pull them out of the haze. Two, do a crew change. Often, the root cause of complacency is boredom. These two measures work like a temporary vaccine against complacency.

Situational awareness and concern for the safety of those around you is the only sure-fire way to fight complacency. So, if we can recognize it before it spreads, we dole out the medicine and take the upper hand in the battle. ◆

Captain Shawnessey Gallagher is the Assistant Site Supervisor at the Mirimachi Familiarization Site.

Swallow That EGO Early

Continued from page 7

Several years later, now that I am in a familiarization-site supervisory position, I realized how important that decision was for me to make. In letting my supervisor know that I knew my own limitations, he felt much more comfortable sending me up solo, and I consequently was rewarded with solo time, in exchange for the hours of excess worrying he would have had with this new pilot in the air. Since he knew that I would not let my ego get in the way of safety, he trusted me, and knew that I would not allow myself to fly outside my personal envelope. In my position today, I realize that what I need from the pilots at the sight is recognition of their own personal envelope.

A pilot should never feel ashamed of getting out of an aircraft due to conditions. They should know that their supervisor will be more than pleased to see them sitting comfortably and confident on the ground, than flying uneasy and unsafe in the air. ◆

Captain Shawnessey Gallagher is the Assistant Site Supervisor at the Mirimachi Familiarization Site.

Always Have An Out And Be Prepared To Use It.

In aviation, "having an out" refers to the idea of a backup plan. If things out of our control, such as weather or aircraft serviceability change after take-off, such that a flight is adversely affected, we should already have made some contingency plan for the event **before** going flying. In some cases we anticipate and brief our backup plan to the entire crew in the pre-flight briefing or just prior to take-off (i.e. Crew action in the event of inadvertent Instrument Meteorological Conditions (IMC)). As I found out one night, it is very important that briefing the procedure not just be "lip service" to the event.

The mission was a utility flight to the practice target area (PTA) about 65 NM southwest of Goose Bay in the CH-146 *Griffon*. At the time, our Allies were flying up to 16 hours per day and 6 days per week, for which 444 Squadron had a day and night Search and Rescue (SAR) crew on standby each day. If local jet flying was completed in sufficient time before the end of the night standby shift, the SAR standby crew at 444 Squadron would carry out utility missions to transport people or supplies between Goose Bay and the PTA. The night of our mission, it was raining steadily although the ceiling and visibility in Goose was not forecast to be below 3 000 feet and 3 statute miles (SM) — a good night for visual flight rules (VFR) flying. The mission was certainly not essential (just resupply of food and water) but the weather seemed good enough and why go home early when we could fly!

In the pre-flight brief we talked about the weather and the fact that the freezing level was sufficient for a return under instrument flight rules (IFR) if we ran into any lower than forecast weather on the way to the PTA. There were no convective clouds forecast to be present in the area. It was, however, a very dark night on night vision goggles (NVGs) with steady rain on the entire weather radar for Goose Bay. The elevation change from Goose Bay, at sea level, to the high point on the route is about 2 000 feet, so not a lot of fudge- factor even with a 3 000 foot ceiling forecast for Goose Bay. Note: there is no weather reporting for the PTA.

Photo: Sergeant Gerry Antle, Wing Chief Warrant Officer's Assistant, 5 Wing Goose Bay, 2005.

Departure went smoothly with completion of our instrument checks, which are mandatory for night flying. The NVG's were working very hard painting a grainy landscape below. The global positioning system (GPS) was showing a good figure of merit and the crew had flown the same route enough times to find our landmarks on the way out of Goose Bay (and be perhaps a bit complacent). There is no ambient lighting in Labrador and NVG flying is deceiving in poor weather since it lets you see through some moisture. We were not using any white light to see where the cloud base was either.

As we flew toward the PTA we were at about 500-700 feet above ground level (AGL) and by following along on the map our visibility gradually decreased throughout the flight to about 3 nautical miles (NM) as we approached Minipi Lake, 12 NM from the PTA. At that point, the co-pilot called "decreasing visibility" and then "lost references". I was in control and now staring into a green haze on my NVG realizing slowly that I had just flown into a cloud. I started to transition to the instruments, but a few seconds later we popped out of the cloud. I then tried to regain visual references and turn right toward a lake at our 3 o'clock. References were still not very good, however. When the flight engineer (FE) called "bank angle" I finally returned to the dials and rolled wings level. At that point we had completed a 270-degree right hand turn, but I didn't realize that until we discussed turning back to base, toward our 9 o'clock!

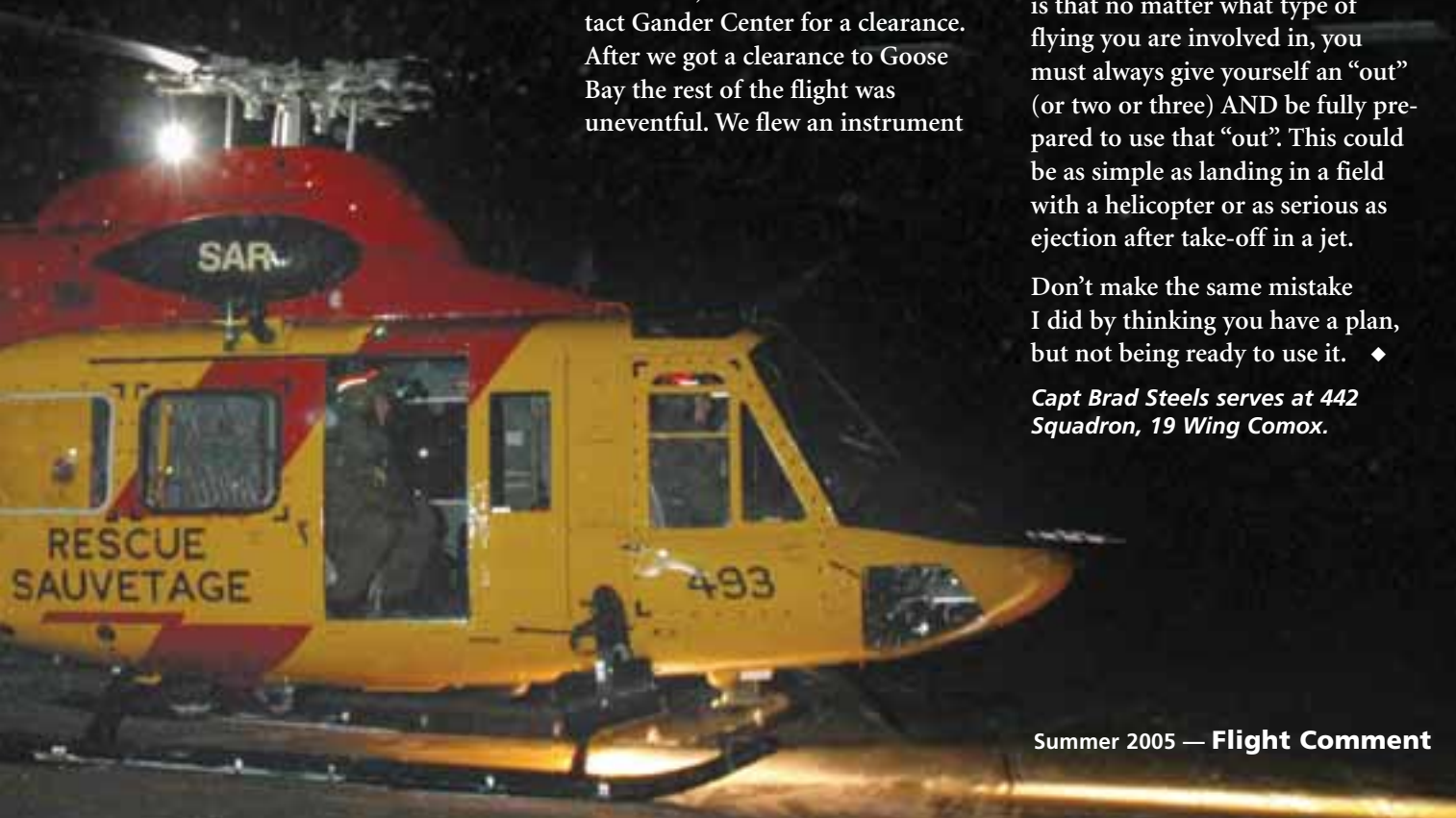
Once wings level and climbing, I transferred control to the left seat in order to get setup for an approach and obtain an IFR clearance. I was a relatively new utility aircraft commander (AC), and the whole time this was happening I was trying to figure out how to explain to air traffic control (ATC) why I needed an IFR clearance without filing an IFR flight plan. After having trouble contacting Goose Terminal, Goose Tower pointed out that they were closed (it was after 2300 local) and that I should contact Gander Center for a clearance. After we got a clearance to Goose Bay the rest of the flight was uneventful. We flew an instrument landing system (ILS) approach into Goose Bay and broke out well back from the airfield, although there was scattered cloud at the 1 500 foot level.

Despite having briefed the IFR return if weather dictated, I was not ready to use that "out". I was not prepared physically, as I had not put up my approach plates on the holder during our startup, and had to scramble for them while getting a clearance. More importantly, I was not prepared mentally to use that "out"". I had not thought about the transition to instruments in the event of IMC and made the potentially fatal error of chasing ground references. And I was worried about the implications of not being on an IFR flight plan or breaking IFR rules when I should have been worried only about flying the helicopter. As part of the briefing, we should have talked about IFR rules and when we need a clearance and from whom we would get it. There were many things to consider.

I learned a lot about flying from that night, not the least of which was better NVG technique in poor weather. But the bottom line here is that no matter what type of flying you are involved in, you must always give yourself an "out" (or two or three) AND be fully prepared to use that "out". This could be as simple as landing in a field with a helicopter or as serious as ejection after take-off in a jet.

Don't make the same mistake I did by thinking you have a plan, but not being ready to use it. ◆

Capt Brad Steels serves at 442 Squadron, 19 Wing Comox.



The Morning After — Tool Kit Verification

Presently employed as an Aviation Systems (AVN) Technician working on the mighty *Sea King* as a line servicing maintainer, the perceived pressure to get aircraft on the line can seem intense. But events took place the other day that gave me cause to pause. While working night shift, supporting an ambitious flying schedule and attempting to have three aircraft serviceable, the few technicians we had on the floor were really humming from one aircraft to another fixing multiple snags. To save time, we were using one tool kit, transferring it from aircraft to aircraft. Tool checks were carried out fairly often and our rate of work was amazing. At the end of the shift I inspected the kit and signed it off as complete. At 0800 the following morning I received a phone call at home. The voice said: "We're missing a tool out of the tool kit. Which aircraft did you use that kit on?"

My stomach did a flip! I notified the supervisor what snags we worked on from the best of my memory and heard no more. I stewed all day thinking and rethinking about the aircraft we worked on and thought, for saving no more than 5 minutes per aircraft by not registering and verifying the kit complete for every job, I had no idea what aircraft that tool could possibly be on.

It turned out that the tool was in the toolkit; it had rolled around inside the kit while being transported to another job. This time I was lucky but that tool could easily have been missing. Take time to follow procedure no matter what the schedule, the tool control policy is there for this very reason

Missing tools happen, it's a guarantee, but if you follow procedure at least you'll know where to start looking. ◆

Master Corporal Marty Underwood serves at 443 Maritime Helicopter Squadron, 12 Wing Shearwater.

Photo: Private Matthew Ernst, Canadian Forces Joint Imaging Centre, Ottawa, 2004.

The Editor's Corner

Change. Change or become obsolete. Evolve or die. This is the CF, this is the Air Force, we're used to this. As it is for the Air Force, so it is for the Directorate of Flight Safety and so it is for *Flight Comment*.

Two issues ago I said I had little intention of making any changes to the magazine because I didn't know enough to make changes. Well now I know everything so I'm changing everything! Of course that is not the case. I have learned by doing: I have made mistakes; and I have listened to the readership who have contacted me.

We've changed the appearance of the awards. We've added descriptors to each of the awards. We've changed the position and look of the GOOD SHOW award. We also secured funding for baseball hats for award winners (see photo below). If your award was presented in this **fiscal year** (appearing in the Spring 2005 magazine or later) your hat is coming. For those whose award was featured in the Winter 2005 magazine or earlier, **sorry**, you'll just have to earn another award. I've sought out and found a couple of "regular" contributors. They include QETE (to date it has been Mr. Fred Lottes who has run an excellent series of articles that included the Spring issue article on "Metal Fatigue" and should be followed by a Fall issue article on the investigation into the crash of Griffon 146420 back in July 2002) and Mr. Ken Walper from DTA who has provided some frontline reports under the "ICING" banner. I'm still looking for others who have the info that the Air Force needs to operate. If you think you're one of these organizations please get in touch with me.

Changes are also coming with our website. Most recently you will see that the CDS has put an introductory message on our website. We are in the process of changing our software and coincident with that change we are adding more features from our intranet site to our www site. Expect to see items such as *Debriefing* and reports such as the recently produced *Runway Incursion Analysis Report*.

Finally there will be a change in personnel. We are losing LCol Serge Lavalee (Ciao) who commanded the investigative side of DFS, Maj Paul Dittman, a rotary wing investigator, Maj Tarek Sardana, our Doc and HFACS expert, Maj Marc Delisle, the king of FSIS and finally, Maj Jim Armour — the one man search engine of aircraft accidents. Maj Armour has spent 11 years of his 28 year career at DFS and his contributions have been immense. Their replacements will get their due when they produce an article for the magazine.

As for this issue, summer is here and with it comes Cadet flying so there's a bit of an Air Cadet theme. There are also some excellent articles on maintenance quality management, a report on the Cormorant half hub and an article on Flight Data Management from Transport Canada. This is the first in a series of articles on the subject of utilizing flight data. Hopefully this will generate some talk about our own proposed program, Flight Operations Quality Assurance (FOQA).

Enjoy the magazine, share the lessons with friends and send me any feedback.

Fly Safe! ◆

AF9000 PLUS

Transformation Project — The Way Ahead

When facing real-world constraints including aging aircraft, spares shortfalls and declining aircraft technician experience levels, every CO wants to know he has a "Maintenance Safety Net." For the better part of the last decade, AF9000 Plus, the Air Force's Quality Management System for the Aerospace Engineering and Maintenance (AEM) community, has been promoted as just that item. As Aircraft Maintenance Inspections (AMIs) are no longer conducted, AF9000 Plus and the associated internal and external audits are intended to provide Commanders at all levels with the necessary assurances that their aircraft maintenance organizations are capable of producing the expected outputs.

Following the "Plan — Do — Check — Act" cycle, the AF9000 Plus Quality Management System outlined in C-05-005-P11/AM-001 ("the P11") adheres to the following basic code:

PLAN — *"Say what you do"*
… by documenting the processes used locally in the performance of maintenance related activities, in a Manual of Aerospace Procedures (MAP).

DO — *"Do what you say"*
… by performing maintenance related activities in accordance with the MAP and maintaining the appropriate records to prove compliance and conformance.

CHECK — *"Check it"*
… by auditing and using appropriate performance indicators to identify non-compliances, non-conformances and associated airworthiness deficiencies.

ACT — *"Act on any difference"*
… by performing root cause analysis for any identified non-compliances or non-conformances and applying corrective and preventive measures.

In recent years, external audits have revealed some sizeable holes in the AF9000 Plus safety net. While some Units have robust and healthy Quality Management Systems, others, particularly some of our Flying Units, do not. In three cases over the last 15 months, elevated risk levels have been identified due to concerns as to the quality of aircraft maintenance. Each case involved a different fleet and in each instance a dysfunctional Unit Quality Management System figured prominently.

The AF9000 Plus Transformation Project was stood up to address this situation. With A4 approval of the project charter on 24 February 2005, the 1 Canadian Air Division Head Quarters A4 Aerospace Quality Management (AQM) section was given clear direction and an aggressive timeline to resolve the problem. Our first task was to gather input from the field. Using the annual AF9000 Plus Quality Conference as our vehicle, we brought together the best and brightest from across the Air Force to help us. In a questionnaire sent out in advance of the conference, we asked Unit Quality Managers (QMs) to sit down with their COs and other senior management personnel to identify chief complaints with AF9000 Plus. Figure 1 shows the top ten responses:

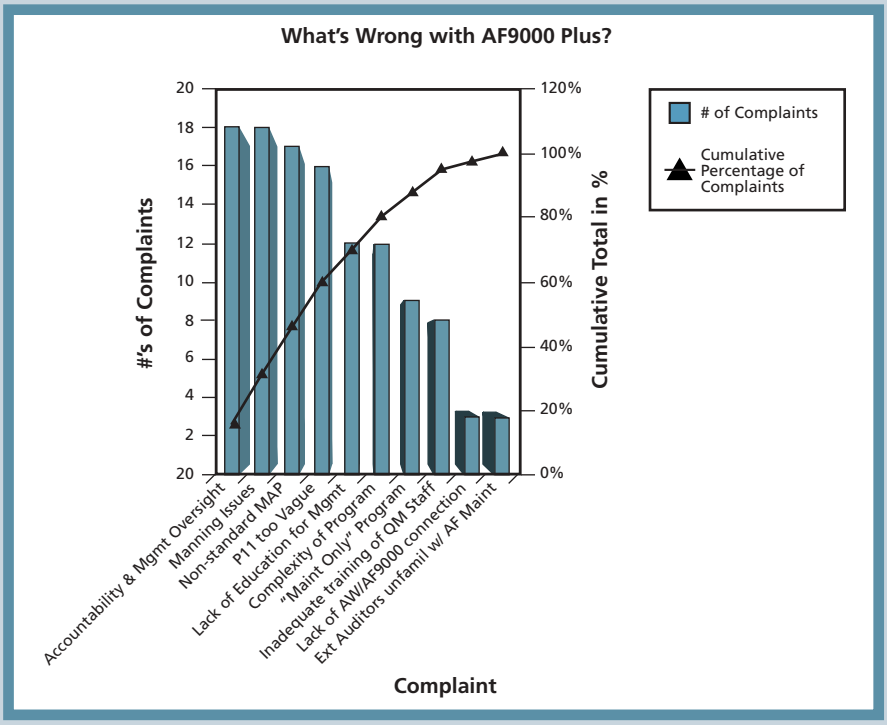


Figure 1

Based on a Pareto Analysis of the questionnaire returns it was determined that the AF9000 Plus Transformation Project needed to address:

- Accountability and management oversight;
- Personnel resources (manning);
- Standardization of Maintenance Assurance Practices (MAPs) within fleets;
- Complexity and lack of clarity of the P11 Quality Standard; and
- Senior Management awareness.

Over the course of the three-day AF9000 Plus Quality Conference, Working Groups (WGs) attacked each of the above points and in a true process improvement effort performed a *KAIZEN BLITZ*. A4 Maintenance was presented with the raw output of this brainstorming and, at a subsequent meeting in early April, reviewed the consolidated recommendations and provided additional direction.

The conference clearly reinforced our belief that **Accountability** is the linchpin to the success of the AF9000 Plus Program. To that end, the transformation team has, and will, continue to expend considerable effort to refine the three checklists (CO's Checklist, WComd's Report Card, and Comd's Measuring Stick). This will facilitate the accountability framework, thus reinforcing local ownership of the Quality System and ensuring that accountability follows the Chain of Command. Re-write of the P11 standard will further detail management responsibilities and will include a related flowchart, also produced by one of the WGs.

The second critical issue that needs to be addressed is that of Unit Quality cell **Manning levels and ranks**. A4 Maintenance fully supported the WG's recommendation that Unit AF9000 Plus positions require greater continuity. Unit QM and Lead Auditor (LA) positions will be mandated as three-year tours. In recognition of its reporting chain directly to the Unit CO, the QM position will be designated as a "succession planning" billet within the Aircraft Technician Career Development Programme. The QM position will be established at the Warrant Officer rank, the LA at the Sergeant rank (for small units, minimum ranks of Sergeant and Master Corporal respectively). A4 Maintenance staff will conduct an establishment review of all AF9000 cells and where needed, will raise Establishment Changes (ECs) to establish positions and adjust rank levels to meet the WG's recommendations. Other options to optimize QM cell organization and manning will be examined, including contracted services in support of small unit QMs, centralization of Quality Cells at large Wings, and the potential for conversion of key QM positions to the Public Service.

The third priority is **Simplifying Internal Auditing**. It is A4 Maintenance's firm belief that within the context of units holding AF9000 Plus Registration and Accredited Maintenance Organization status, the current level of internal process auditing is excessive. Coincident with our P11 rewrite, we intend to re-examine the relative merits and optimum mix of process versus compliance-based auditing.

Continued on page 17

FLIGHT DATA MONITORING

A Proactive Approach to Safety

By Howard Posluns, Transportation Development Centre (TDC), Transport Canada.

Reprinted from the "Transport Canada Aviation Safety Letter", Issue 1/2005.

Using recorded flight data to prevent accidents

While flight data recorders — such as the so-called black boxes — are regularly called on to help determine the cause of airplane accidents, the information they routinely collect can also help prevent accidents.

Flight data recording devices electronically monitor and record data from a wide variety of systems aboard an aircraft from engine start-up to engine shutdown following a flight. Analyzing the data from several flights by the same aircraft, or by the same type of aircraft, can reveal potential technical or safety problems long before they become critical. The data can also be used to improve maintenance schedules, flight crew performance and air traffic control procedures.

Confidentiality is an important issue as well, so Transport Canada is changing the *Aeronautics Act* to ensure that the recorded flight data is properly protected.

Cost-effective and safe

Flight data monitoring programs (FDMP) are widely recognized in the aviation industry as one of the most cost-effective tools for improving safety. Begun in Europe several years ago, they are now widely used in many parts of the world. In the U.S., where the program is called Flight Operational Quality Assurance (FOQA), most carriers have had programs for several years.

Transport Canada is working with Canadian airlines interested in starting voluntary monitoring programs, and most of the larger companies either have a program in place, or are in the process of implementing one. While some airlines conduct the entire monitoring program in-house, others use a third-party company to analyze the flight data. Negotiations are currently underway with other Canadian carriers to start FDMPs. The department also organizes seminars, meetings, and other opportunities to exchange information and to stay on top of developments within the industry and around the world. A recent meeting in Ottawa gave airlines considering an FDMP a chance to talk with those who already have one. They also heard representatives from the U.S., U.K. and Japanese civil aviation authorities, as well as Japan Airlines.

Learning from experience

Transport Canada's Transportation Development Centre (TDC) has been involved in the development of a variety of technologies used in

FDMPs. For example, the international flight recorder configuration standard (FRCS) was developed to standardize the information that a flight data recorder ground station needs to recover, decode and interpret the hundreds or even thousands of parameters that a flight recorder captures electronically. This standard been adopted by ARINC for industry-wide use.

TDC has also been active area of data and information sharing. Airlines from around world are now starting to share data and safety information international effort to improve safety and efficiency by learning through the experiences of others. As this type of cooperative activity expands, it is expected that already enviable safety record will be improved even more.

Transport Canada is currently encouraging Canadian air operators to implement a safety management system (SMS), this activity will be regulated the next few years. The SMS out systematic and comprehensive processes for managing safety risks, and integrates operations and technical systems financial and human resource management to achieve safe efficient operations. Where applicable, FDMPs will be considered an essential component of an airline's SMS. ◆

For more information on project, contact Howard Posluns at TDC:
Tel.: 514 283-0034
Fax: 514 283-7158
E-mail: poslunh@tc.gc.ca

For more on TDC's R&D program, visit their website: www.tc.gc.ca/tdc/menu.htm.

AF9000 PLUS

Transformation Project — The Way Ahead

Continued from page 15

We will enlist assistance and expert opinion from the Directorate of Quality Assurance (DQA), the Directorate of Technical Airworthiness (DTA) and the five core fleets in this regard, and anticipate holding a WG here in Winnipeg. A tasking message and point paper will be released prior to the WG so Unit participants can discuss the associated philosophy with their auditing staff and come armed with suggestions as to the most efficient means to ensure end product airworthiness compliance. Results of the WG will be rolled into the rewrite of the P11, discussed below.

Staffs of both A1 Aerospace Engineering Technical (AET) Training and A4 Maintenance are addressing **AF9000 Plus Training**. A4 Maintenance will seek incremental funding for suitable out-of-service training until such time as A1 AET Training staff can overhaul the current AF 9000 Plus course. In keeping with WG recommendations, AF9000 Plus training will be structured using a blended approach combining formal training for QMs and LAs, a Programmed Instructional Package and additional training at the units for both the individual process owners and their supervisors. It is essential that the latter groups have enhanced awareness of their pivotal responsibilities within the program. AQM will also pursue greater understanding and appreciation at the senior management level through injecting AF9000 Plus content to the Commander's Training Session, Flying Supervisor's Courses, the Aircraft Maintenance Engineering Officer's course, Air Officer Basic Course, Maintenance Manager courses, etc.

Simplifying the P11 is our final objective. The AF9000 Plus Transformation Team envisions a two-step process. Step One — will involve a rewrite of P11 parts 1, 2 and 3 by DTA staff. Step Two — will be accomplished by six three-person WGs, drawn from the field Units, each WG being responsible to tackle three of the 20 elements in P11 Part 4 (elements 4.17 and 4.20 will be dealt with separately). The output of both steps will be consolidated and tabled for discussion and endorsement at the next A4 Maintenance Council meeting, with the intent that a final draft of the new P11 be complete by 30 September 2005.

Although much work remains to be done on the issues above, we are confident that the AF9000 Transformation Project has the correct aim and focus to restore the "Commanders' safety net " thereby ensuring AF9000 Plus truly meets its aim of providing ongoing assurance of operational readiness and airworthiness. Further updates on progress can be viewed at our AQM intranet site:

http://winnipeg.mil.ca/a4aqm/welcome.htm ◆

Major Joern Nissen serves at A4 Policy and Standards, 1 Canadian Air Division, Winnipeg.

Cormorant Tail Rotor Half Hub Introductory Note

It is my pleasure to introduce to the readers an informative article written by Wing Commander (Wg Cdr) Ron Eckersley, a RAF exchange officer assigned to the Directorate of Technical Airworthiness (DTA) at National Defence Headquarters, on *Cormorant* Tail Rotor Half Hub (TRHH) cracking phenomenon.

Cormorant ground crews are now familiar with the need to thoroughly inspect TRHH and aircrew are particularly vigilant on the need to treat any sign of unusual vibrations occurring either in-flight or during taxi, as a serious warning. However few people know what is being done to rectify this unusual and potentially serious situation.

The Director General Aerospace Engineering Program Management (DGAEPM) is the organisation leading the investigation into TRHH cracks. They have enlisted substantial resources from Quality Engineering Test Establishment (QETE), Augusta Westland International Limited (AWIL) the Original Equipment Manufacturer (OEM), IMP the contracted organisation for *Cormorant* maintenance, and others in an effort to find the cause and identify preventative measures.

In the mean time, NDHQ and Commander 1 Canadian Air Division have implemented mitigative measures to reduce risks while maintaining the fleet airworthiness and preserving operational capability. From my perspective I can assure the readers that the whole *Cormorant* "Food Chain" is fully committed to finding the cause(s) and a solution to this problem.

Please note that despite the fact that *Cormorant* TRHH are classified as a D Category occurrence, DFS considers these occurrences as very serious. The potential and the consequences of TRHH failure undoubtedly warrant this attention.

Wg Cdr Eckersley provides an interesting insight into the cracking phenomenon and on the actions taken by the technical authority to determine the cause(s) and find a solution. Enjoy!

Major Michel Pilon is the Cormorant *Desk Officer at the Director of Flight Safety (DFS 2-4), Ottawa.*

Photo: Dennis Mah, Canadian Forces Joint Imagery Centre, Ottawa, 2003.

CORMORANT
Tail Rotor Half Hub

By Wing Commander Ron Eckersley, Director of Technical Airworthiness (DTA 5), Ottawa.

Over the last 6 months, cracking of the *Cormorant*'s tail rotor has received extensive media coverage, even making the national news. It's not surprising then that this significant airworthiness issue has been subjected to a great deal of investigative attention from the Italian and British manufacturers as well as from military specialists in UK, Italy and here in Canada. Interestingly, investigators still have not yet confirmed the underlying cause of the cracking, despite their advances in characterising the internal damage using Computer Aided Topography (CAT) scanning. This means that airworthiness specialists will be keeping a watchful eye on developments until a solution is found. To a certain extent though, all this detailed attention has made the whole issue less understandable and accessible for those not fully involved. This article aims to remedy that situation by giving a picture of where we are now and summarising how we got there.

What's a half hub?

To understand the problem properly, we need to look at how the tail rotor of the *Cormorant* is put together. Within the design are some new and novel features and these always alert certification engineers and maintenance specialists. Although the four blades of the tail rotor are fabricated from carbon and glass composite material, they are themselves fairly conventional. After all, the UK partner, Westland, in the Agusta-Westland Company (AWIL), has been making composite main rotor blades for almost 20 years. No, the novelty and the complexities occur further inboard where the blades are attached to the hub. One could fix each blade to a single-piece cruciform hub that had four spigots. However, in the *Cormorant*, the cross-shaped hub is actually formed of two pieces or "half-hubs" both mounted on the drive shaft, one behind the other and each fitted with a pair of blades. (See Figure 1 below)

Where and how often is the half hub cracking?

Ask design engineers what features to avoid introducing into a critical structure and they will instantly reply cut-outs, sharp corners and sudden changes in cross section. For aircraft designers, the square windows on the *Comet* jet aircraft were a classic learning case. Every now and again though, designers are forced into

accepting shapes that are intrinsically troublesome, and there's a cut-out in the Tail Rotor Half Hub (TRHH) that fits this criteria. The basic shape of the TRHH is an elegant flattened beam, symmetrical in all three planes but tapering away from the central hole. However, the actual tail rotor blade has to be connected so that it can still twist back and forth in pitch despite being constrained from flying off centrifugally. AWIL engineers achieved this attachment by cutting a hole through the outer arms of TRHH and inserting a solid rubber thrust cylinder that can twist easily, even when being squeezed by the centrifugal force of the rotor blade. Unfortunately, stresses from reacting to the centrifugal forces and aerodynamic bending loads on the tail rotor blades tend to concentrate around the corners of the so-called window cut-outs and this is where the TRHH cracks in service. (See Figure 2) Over many months, cracks were being found on several TRHHs, but the manufacturer always maintained these were superficial. Then, last October we got some severe cracking on *Cormorant* CH149908 that almost severed the load-bearing carbon-fibre core of the TRHH — this could not be dismissed as superficial and we started to look back at previous events.

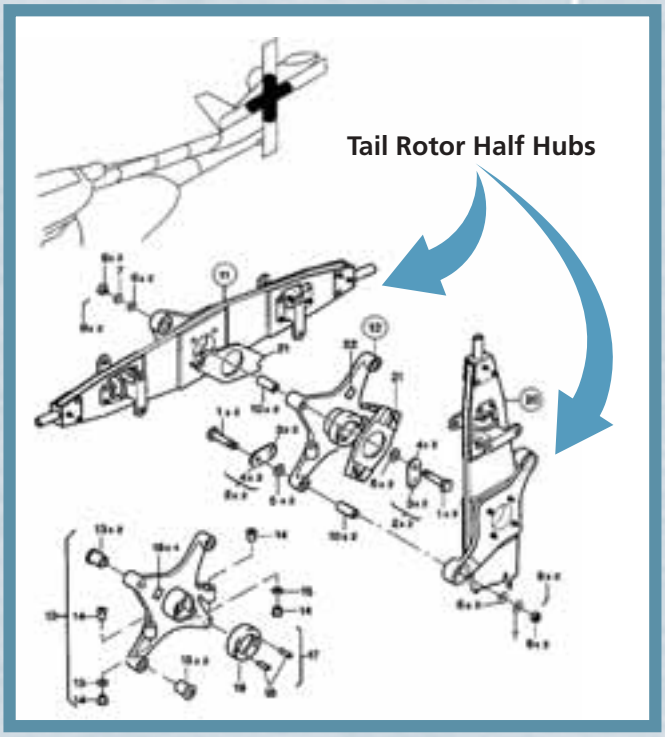


Figure 1: Tail Rotor Hub Assembly

Was this related to an accident of a Royal Navy Merlin (EH101)?

At this stage, you need to be aware of a Merlin accident on 30 March 2004 that may have a bearing on our incident. Do not make the mistake though of assuming from the start that all TRHH events have the same cause. We found it necessary to remain cautious and to keep an open mind. Unfortunately, information from this serious but non-fatal accident involving a Royal Navy EH101 (RN 39) in England has not been fully released yet. However, it is thought that one of the two TRHHs broke immediately before the crash though not where ours have cracked. What's more, the helicopter had been experiencing odd, intermittent periods of severe vibration in flights before the crash. A phenomenon coined 'cobblestoning' has been used because this vibration is likened to jarring experienced when driving over those small rounded stones used to pave old European cities. The crew of *Cormorant* 908 did not notice any vibration like this so a positive linking of British and Canadian events is only tenuous.

Why was this not found during certification testing?

Now, it would be wrong to conclude that the TRHH cracks simply because of the square corners in the cut-out window. That would be too easy an explanation as designers were aware of the expected stresses and over-designed the TRHH to compensate. For example, during certification testing, the TRHH managed to withstand 150% of limit load even after having endured a simulated lifetime of cyclic loading during which simulated in-service damage was added. This gave engineers the confidence to allot an initial life of 2000 flying hours. What's more, the stresses near the window cut-out were actually measured during the test flying of a prototype helicopter and not found to be damaging. But, prototype helicopter PP7 did experience a couple events of high vibration that retrospectively appears to have been the 'cobblestoning' phenomenon. Until very recently, no 'cobblestoning' had been experienced in Canadian aircraft.

Strange Vibrations on the taxiway

A lack of odd vibrations on our fleet was perplexing — if vibrations could give a forewarning of trouble then we would not have to inspect so frequently. AWIL had another look at the stresses on the TRHH in flight by using a civilian test aircraft that was then undergoing unrelated engine trials in California. Frustratingly, the test flying revealed nothing unexpected. But then, strange vibrations were encountered on the taxiway in

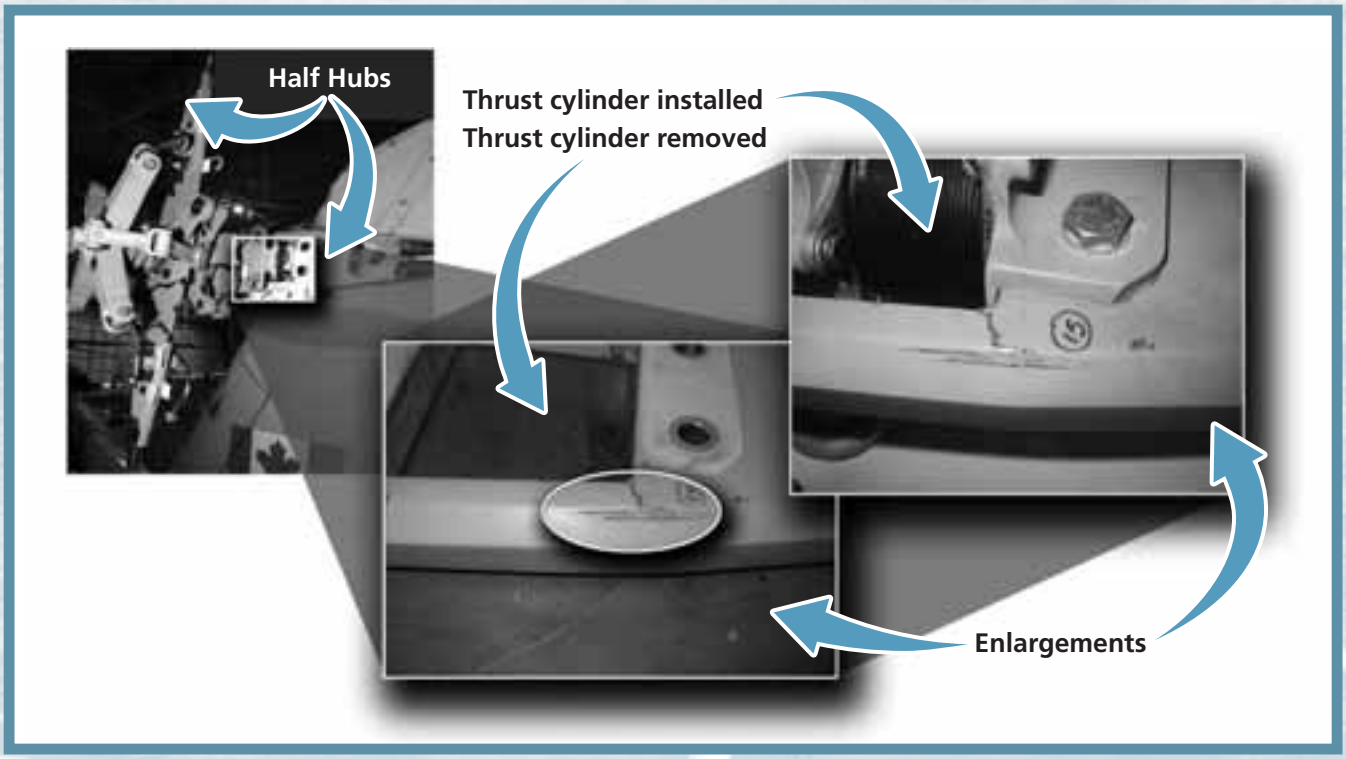


Figure 2: Location of cracks

Greenwood whilst taxiing out with a wind coming in on the left of the helicopter nose. With the help of scientists from Quality Engineering Test Establishment (QETE), AWIL and IMP engineers now went all out to reproduce and measure this phenomenon. Another *Cormorant* was found to show the same symptoms only a few days later and the Italian Navy also revealed they had a helicopter showing similar characteristics.

The chase was on to measure the extent of these vibrations to see if they could explain the nuisance cracking or even the severe cracking. To everyone's relief, the hitherto illusive vibrations could be repeated and measured during ground taxiing. The vibrations were also confirmed to be the 'cobblestoning' experienced in England. Annoyingly, actual stresses in the TRHH cannot be measured on normal service components so special equipment will have to be fitted to a subject helicopter. It is then hoped that these stresses during 'cobblestoning' will prove large enough to explain the damage.

A Solution?

While engineers have been working on determining the cause of the cracking, AWIL production staff have been developing improvements in manufacturing to alleviate some of the weak spots. With a complex component like the TRHH, the many layers of composite cloth material have to be laid up by hand. The cloth has to be folded around sharp features like the window cut-out corners and the lay up must be carefully controlled. Consequently, there were several processes that, at a price, could be even more tightly controlled. Having re-manufactured the TRHH, the designers then subjected it to the same endurance testing as before. A proven, re-manufactured TRHH was the result, but how were we to accept it into service?

Where Now?

Logic would say that the re-manufactured hub must be at least as good as the old design. The pressure is thus on the Weapon System Manager (WSM), IMP and their Directorate of Technical Airworthiness (DTA) 5 advisers to relax the restrictive, daily inspections. But we still do not know how well the re-manufactured hub will survive the unknown loading that caused the old design to crack. Only by putting the new design into service and gaining some operational experience will we be able to see if we have an improvement. Whatever the outcome, DTA5 is destined to likely remain fully involved in the airworthiness process until a solution is found. ◆

MAINTAINER'S CORNER

SUPERVISION

A PROFESSIONAL DEVELOPMENT TOOL

Various tools are available to ensure technicians are safe while doing their job, such as personal protective equipment, the Flight Safety Program and formal trade training. Furthermore, along a technician's training path, supervision plays an important role; it not only provides on-the-job expert professional advice, it also ensures new technicians will acquire safe working habits and know-how. Because supervision is a key element in developing safe technicians, it's important to understand what supervision is, who needs it and why, and what possible consequences could result from poor or no supervision. In addition, this article will touch on the supervisors' and apprentices' responsibilities regarding supervision.

The meaning of "supervision"

Before I go into what supervision means, I would like to point out that:

- giving a quick briefing on the task to be carried out to an unauthorized apprentice or journeyman, then walking away and leaving the person to do the job alone ***is not*** supervision;
- having a Performance of Maintenance (POM) authorized technician around or somewhere in the hangar while an unauthorized apprentice or journeyman is working on a job alone ***is not*** supervision;
- teaching a new technician unapproved or unauthorized servicing or maintenance procedures ***is not*** supervision;
- having to supervise several inexperienced and unauthorized apprentices or journeymen at the same time ***is not*** supervision;
- assuming that a new technician will know what to do if an unusual situation arises ***is not*** supervision;
- assuming that because everything seems to be OK, it's OK ***is not*** supervision; and
- saying: "Do what I say, not what I do" to apprentices ***is definitely not*** supervision.

I'm sure that we all have seen or experienced one or several of the previous actions, whether we were supervising or being supervised, and even if every crew member has 'supervised' or is 'supervising' in the ways described above, it still doesn't make it right. Furthermore, quality supervision is probably the only tool we have to ensure a new technician works safely. So, how do we provide quality supervision? That's easy. We ensure:

- that the supervisor is actively involved in the task carried out by the unauthorized apprentice or journeyman. This means the supervisor must be physically beside the person and, looking at what the person is doing while following CFTO procedures. Having the CFTO on site, and *using it*, is the only way to teach a new technician where to find the information they need to do the job safely and correctly. Besides, using the CFTO during aircraft maintenance is not an option (see P-05-005-P02/AM-001, Part 5, paragraph 17 for more details).
- that quality training is provided to the new apprentice or unauthorized journeyman. A supervisor overseeing the work of too many unauthorized technicians cannot possibly see everything that is going on and steps could be easily missed. As a supervisor, if you feel you have too many people to train at once, you should speak up and let your boss know that you are being put in a situation where you won't be able to give the trainees the attention they deserve.

- that no one ever assumes that an apprentice will properly react to an unusual event, regardless of the length of time that person has been on the squadron or at the unit. So, if an out-of-the-ordinary situation is starting to develop during a shift, the supervisor has to ensure that apprentices, and the entire crew for that matter, are kept informed of the situation as it unfolds, what to expect and what their actions should be.
- that apprentices and journeymen under training are often asked how they are doing. Supervisors have to get feedback in order to see whether training is progressing at the expected pace. Some people are quiet by nature, and you, as a supervisor, will never know what's going on unless you ask. I don't mean to pry into their personal life, but I think it's important to know if they feel they are learning or if the explanations are sufficiently clear and precise. More importantly, don't feel bad if you hear that your explanations are not as good as you think they are. You probably know the job inside out, and you may unintentionally leave things out because they are obvious to you. Note that your supervision methods may have to be adjusted, depending on the apprentice. One last point, apprentices cannot read your mind and they should never have to guess what you're thinking!
- that we lead by example. In other words, what you say and what you do are always the same.

The requirement to supervise

Now that I have shown what 'supervision' means, I will touch briefly on the subject of who needs supervision and why it's needed. According to the Technical Airworthiness Manual (TAM), each maintenance task must be performed by a person authorized to do so in accordance with the procedures specified by the applicable maintenance organization[1] (for military units, that is A4 Maint). Therefore, until a person is authorized, he or she *must be directly supervised* while performing maintenance. An apprentice cannot be certified POM or be assigned airworthiness function responsibilities (C-05-005-P03/AM-001, Part 1, paragraph 12a) but can, however, be authorized to perform and certify servicing and elementary work and will not require direct supervision. Journeymen who have not been POM authorized on the weapon system also require direct supervision. (This applies when a journeyman moves from a CH-124 unit to a CF-188 unit, for example.) In other words, any person not authorized to conduct maintenance on an aeronautical product will have to be directly supervised. Not sure what 'authorized' means? See the Winter 2004 number of *Flight Comment* for an article on the subject.

The consequences of poor or no supervision

You may think that it's not a big deal to let an apprentice carry out tasks unsupervised, especially during relatively simple jobs that he or she has already performed a few times. Remember, though, we all make mistakes (humanity's curse!), and, as the supervisor, *you* have to sign for the work once it's done. So, you only have one way to ensure it was done correctly: you have to personally observe the apprentice at work and check the area once the job has been completed. The following example is based on an incident report filed in August 2004 and illustrates how a simple task can turn into a lot of unplanned

1 C-05-005-001/AG-001, Part 3, Chapter 1, Section 1

work and an extra long shift. (You know this always happen on Friday night!)

> An AVN "B" check had to be carried on a helicopter. Two apprentices were tasked to verify the engine oil level while the authorized journeyman (the supervisor, in this case) checked other systems in the aircraft with another apprentice. One of the apprentices checking the engine oil level had done this work several times previously. Having noticed the #1 engine oil level was low, the apprentices informed the journeyman who told them to replenish it. The apprentices incorrectly assumed that the oil to be used was "triple nickel" (DOD-L-85734 (555)) and they didn't check the CFTO to confirm the type of oil required. One of the apprentices took a can of DOD-L-85734 (555), which is transmission oil, instead of MIL-L-23699 B (engine oil) and added it to the engine. Once the mistake was discovered, the aircraft was declared unserviceable and quarantined for flight safety reasons. The oil reservoir was drained and the proper oil was added.

In this case, the error was discovered early enough to prevent the helicopter from going flying. Had the apprentices been directly supervised by the journeyman, this incident would have probably never happened.

The supervisor — helping to develop professionals

You may wonder why I consider supervision a professional development tool for apprentices. In fact, I think supervision is probably the best tool we have to form knowledgeable, motivated and safety conscious technicians. Firstly, apprentices acquire a large part of their knowledge by watching supervisors and carrying out practical work — the best form of hands-on training but only as long as correct and approved methods are used. Secondly, apprentices will pick up on the supervisors' attitude, which will affect them to some degrees. A supervisor continually complaining about his or her work will do little to motivate apprentices into doing the best they can but a supervisor's positive attitude will go a long way in motivating people. Lastly, supervision is a great way to brief safety issues pertinent to the job to be carried out and should always be briefed first and foremost. It is extremely important that inexperienced apprentices be aware of the hazards and dangers they may have to deal with while at work. Besides, it doesn't hurt experienced and authorized personnel to also reflect on these once in a while. Developing an apprentice into a well-rounded and safe professional is, in large part, up to supervisors.

The apprentice — not without responsibilities

It's important to realize that apprentices also have responsibilities and a part to play when it comes down to supervision. First, as an apprentice, you must know that every task carried out on an aircraft has to be done in accordance with approved procedures; this means using CFTOs and other approved and authorized orders. Second, DEMAND to see the references when a supervisor shows you how to do a job. The person showing you the work may know it by heart, but it still doesn't justify not using the appropriate CFTO. Of course, there are subtle ways to ask for the reference. For example, you can say something such as: "Can you show me where I can find the written procedures so I can familiarize myself with them?" Lastly, if you have even the slightest doubt that you did not thoroughly understand the instructions for the task to be carried out, you have to speak up and let your supervisor know (he or she cannot read minds either). A good supervisor will always take the time to explain the task in a different way and show you what has to be done, using the correct procedures.

As you can see, supervision is a very important part of carrying out aircraft maintenance and it requires a physical presence from the supervisor — it cannot be done remotely. In addition, the requirement to supervise is based on orders applicable to units performing maintenance, so it's not optional. Furthermore, choosing not to supervise an apprentice or unauthorized journeyman can have negative consequences, ranging from unpleasant to downright dangerous. In addition, in supervision, the supervisor is not the only player; the apprentice also has responsibilities to ensure the training he or she receives is of the best quality possible. Finally, besides being a fantastic professional development tool for apprentices, supervision is also a means to control the quality of the work being performed on aircraft. In fact, it allows units and squadrons to maintain the highest possible standard of maintenance for CF aircraft.

Think about that the next time you observe through the maintenance office window an apprentice working alone on an aircraft. ◆

Anne Gale, Directorate of Technical Airworthiness (DTA 2/TE), Ottawa.

P.S. for supervisors: Treat the person you supervise with respect. Remember, they will be supervisors themselves one day, and what goes around, comes around!

EPILOGUE

TYPE: **CH146467 *Griffon***
LOCATION: **Thedford Mines Airport, Quebec**
DATE: **10 February 2005**

CH146467 was positioned at the Thedford Mines Airport in support of a deployed field training exercise. The crew was tasked to carry out a weather check and proceeded to the aircraft for the pre-flight check and start.

Number two engine was started first, the throttle was advanced and the generator turned ON. The crew then proceeded to start number one engine and, after approximately five seconds, number two engine began an uncommanded engine acceleration (UEA). The co-pilot immediately rolled back the throttle on number two to idle but the engine continued to accelerate. The pilot then called for a shut down. The crew noticed the maximum Rotor RPM attained at near 120 %.

The investigation revealed that, like the previous three nights, the aircraft had spent the night outside and was "cold soak". The entire area was under the influence of a "warm front" with a high level of humidity. The night before the accident, the minimum temperatures were noted at minus eight degrees Celcius (°C) with a dew point of minus nine degrees °C with a snow accumulation of five centimetres.

The crew carried out the start sequence as per checklist. Once the pilot realized the UEA on the number two engine, he ordered both engine to be shut down. After hitting the idle release switches, the co-pilot could not roll the number two throttle past idle as it was resting against the stop, on the idle plunger. He then increased the throttle slightly in order to reactivate the idle stop release and completed the shut down successfully. This resulted

in a delay in the shut down procedure of approximately two seconds. The total elapse time from start of number one engine to complete shut down was estimated by the crew at nine seconds.

CH146467 was declared unserviceable and a decision was made to recover the aircraft to the squadron hangar via ground transport after the technicians were unable to download Health Usage Monitoring System (HUMS) data in order to obtain more accurate engine and rotor exceedance information.

A successful flight data recorder (FDR) download later revealed that the rotor RPM reached a maximum value of 125.0 % and that the number two engine RPM reached 125.9 %. The engine was shipped for overhaul. The damage to the engine resulted in a "C" category air accident. The severity of the damage of this UEA occurrence is linked to the delay encountered by the crew in the shut down procedure.

This occurrence was the seventh case of UEA this winter. A cold weather start procedure previously used on the CH146 had been removed following modifications done of the Fuel Control Unit (FCU). It now appears that the modifications were ineffective in preventing UEA. The cold weather start procedure was re-instated by NDHQ on the day on this occurrence, 10 February 2005. No other UEA has been reported since. ◆

Photo: Master Corporal Paul MacGregor, Canadian Forces School of Aerospace Technology and Engineering, Image Training, 16 Wing Borden, 2003.

EPILOGUE

TYPE: BL28 Scout Tow Plane C-GXZK
LOCATION: Mountainview, Ontario
DATE: 26 March 2005

The *Bellanca Scout* towplane had just launched after a crew change in support of the annual ACGP (Air Cadet Gliding Program) familiarization flying program. The incident flight was the pilot's first flight of the day. The planned flight, conducted under day VFR rules, was to tow a glider to circuit altitude and conduct a simulated rope break. The flight proceeded normally with the glider releasing at 1000' AGL. The towplane then followed the glider with a wide circuit and normal approach and final. Upon landing, the pilot attempted to correct the ground tracking of the aircraft and in doing so, the aircraft nosed over and slid to a stop without further incidence.

The aircraft struck the left hand wingtip and came to rest on its nose, damaging various propeller components. Damage sustained in the occurrence rated this as a "D" category incident.

It was determined that the cause of this event was that thet the pilot used brake rather than rudder to correct the aircraft's directional track. Further, the pilot applied heavy braking when he felt that the aircraft was going off of the runway and in doing so, did not react quickly enough to release the brakes to prevent the from aircraft nosing over.

An important training factor was that the gliding centre commander did not ensure that the US Army L-19 video was shown to all personnel IAW the 242 ACGP manual. Although dated, this film does cover this brake usage and nose over problem. ◆

FROM THE INVESTIGATOR

TYPE: Schweizer 2-33A C-GFMC
LOCATION: Netook, Alberta
DATE: 01 May 2005

The mission was a winch launch and circuit for two qualified glider pilots. Immediately after becoming airborne, at approximately fifteen feet above ground level, the aircrew felt a loss of power from the winch. The pilot manually released the tow cable and lowered the nose of the glider in an attempt to land straight ahead.

The glider over-flew the tow-rope, and the tail-wheel of the glider became entangled in the tow-rope recovery parachute. The winch, which had suffered a momentary power loss, recovered and surged to normal power. As the winch surged it pulled on the tail-wheel, which caused the glider to rotate 360-degree about it's lateral axis. The glider impacted the ground in a flat attitude with very little forward speed. The entire sequence, from commencement of the winch launch until ground impact, lasted between 10-15 seconds. Both glider occupants were treated and released from a local hospital. ◆

For Professionalism

For Commendable Performance in Flight Safety

SERGEANT NORMAN ESPENBERG

Sea King callsign "Crosscheck 31" was conducting an operational search and surveillance mission in the Gulf of Oman. During a routine cabin check, Sergeant Espenberg observed that some floorboard screws in the aft cabin appeared to be damp and, on closer examination, smelled like fuel. The crew discussed the situation and the location of the fuel. They elected to carry on with the trip while having Sergeant Espenberg monitor the suspect area. During the subsequent hot refuel and crew change, he reported the occurrence to one of the detachments technicians. Investigation revealed that the area appeared dry and the aircraft flew a third sortie.

After flying was completed for the day, Sergeant Espenberg again discussed the occurrence with one of the technicians and brought him to the aircraft to show exactly where the fuel had been detected. Further investigation of the cabin floor revealed a minimal amount of liquid on the tops of the screws. The technician removed the floorboard and discovered that fuel was seeping up from the tank through the cover. He determined the fuel would appear when the aircraft was full and only noticeable at the beginning of a flight. It was discovered that the screws used in the "20G" floorboards modification lacked appropriate potting, creating an avenue for fuel to escape.

Sergeant Espenberg's actions reflect a superior professional attitude. He is to be commended for his tenacity in identifying and bringing to light a fuel leak that could have easily gone undetected. His persistence and professionalism saved what could have easily developed into a very serious situation within the *Sea King* cabin. ◆

Sergeant Espenberg serves with 443 Maritime Helicopter Squadron, 12 Wing Shearwater.

PRIVATE CHRIS KLOOSTERMAN

Following a flight safety incident for a prop feathering unserviceability on a CP-140 *Aurora*, a new pump housing was being installed. The pump housing has a maintenance cover to ensure no foreign objects can fall inside. After the pump housing was attached to the propeller the maintenance cover was removed. While carrying out a pre-installation inspection, Private Kloosterman noticed that a piece of the casing inside the pump housing was missing. He immediately informed his supervisors and halted the installation process.

Upon further inspection, it was noted that possibly a bolt that attaches the seal plate to the housing may have been too long and was tightened down until it went through the casing. At the time of discovery, even though the currently installed bolt was the right length, it would have allowed hydraulic fluid to leak out of the housing by the threads. Private Kloosterman was further concerned that the missing chip of the casing could be inside the housing and could cause secondary damage.

Subsequent inspection revealed that the missing chip was indeed inside the pump housing. Had this pump housing been installed and operated with this problem undetected, it could have caused catastrophic failure of the propeller pump housing.

Private Kloosterman's diligence and tenacity saved a much needed 14 Wing operational asset. ◆

Private Kloosterman serves at 14 Air Maintenance Squadron, 14 Wing Greenwood.

For Professionalism

For Commendable Performance in Flight Safety

CAPTAIN COREY KWASNY

While conducting a pre-flight inspection/walkaround in preparation for an instructional sortie at 406 Squadron in Shearwater, Captain Kwasny, the Tactical Coordinator, noted that a small piece of rubber seemed to be protruding from the leading edge of the #2 main rotor blade. He raised his concern with the pilots, both of whom were convinced that the small flap was a piece of the leading edge wear-strip. Captain Kwasny drew the pilot's attention to the fact that he was concerned the rubber could be part of the blade patch. On closer examination, this concern proved to be accurate and a technician was summoned to inspect the blade. The blade was declared unserviceable due to the advanced degradation of the blade patch. Consequent maintenance action further revealed that the blade itself was cracked.

Captain Kwasny's attention to detail and tenacity in getting to the root cause of the problem is laudable. His determination in this scenario led to the identification of a major fault with the aircraft and averted the risk of a potentially catastrophic failure. Captain Kwasny is commended for his professionalism. ◆

Captain Kwasny serves with 406 Maritime Operational Training Squadron, 12 Wing Shearwater.

CORPORAL CEDRIC BOIVIN

In April 2005, Corporal Boivin was tasked to troubleshoot a reoccurring loud grinding noise during Main Landing Gear (MLG) transition on a F-18 *Hornet*. After several days of troubleshooting, no defects could be found despite the assistance received from the appropriate Field Service Representative. It was an unusual snag and the Field Service Representative recommendation was to focus on the hydraulic system.

Unsatisfied with the recommendations offered, Corporal Boivin took it upon himself to carry out a very detailed inspection at all the joints of the MLG for security and tolerances. Using the experience he gained from two years in the periodic inspections cell (PHASE) as an apprentice, he discovered a missed bushing and teflon washer on the MLG trunnion at the attachment point for the MLG actuator. Corporal Boivin also found the retaining bolt to be only finger tight rather than the 40-foot/ pounds of torque required. Corporal Boivin's thoroughness and professionalism revealed and corrected this serious installation failure. His actions eliminated a potentially catastrophic occurrence that could have resulted in the loss of a valued aviation resource. ◆

Corporal Boivin serves with 441 Tactical Fighter Squadron, 4 Wing Cold Lake.

CORPORAL RALPH BRYDON

In July 2004, Corporal Brydon, a newly qualified technician on the CP-140 *Aurora*, was tasked with performing an after flight check ("A" check) on aircraft 113. The "A" check calls for a visual inspection. Corporal Brydon went a step beyond the visual inspection and physically checked installed components. In doing so he discovered that the right hand engine distribution harness was pulled out of the junction box. This harness holds the main wire bundle cannon plug into position. Corporal Brydon immediately informed his supervisor and the aircraft was declared unserviceable and a flight safety report was raised.

Further investigation revealed that the wall-mounted connector of the wiring harness assembly was not connected to the junction box. All four mounting bolts/nuts were pulled through the junction box wall. Had this not been discovered this could have easily resulted in an engine fire, as the fuel system components are located on the right hand side of the engine. The wiring harness and junction box were replaced and the aircraft returned to service.

The area inspected by Corporal Brydon is difficult to see at the best of times and could easily have been missed. He performed this "A" check at night, outside during inclement weather with poor ramp lighting. Due to Corporal Brydon's keen sense of duty and his attention to detail he prevented a possible engine failure and subsequent catastrophic results. ◆

Corporal Brydon serves with 14 Air Maintenance Squadron, 14 Wing Greenwood.

CORPORAL MICHEL ST-PIERRE

In October 2004, Corporal St-Pierre was tasked to conduct a quality control check following the completion of a leak repair in the number one fuel tank on *Aurora* CP140112. This visual inspection is carried out within the hazardous confines of the aircraft's fuel tanks. The inspection verifies the completion of the maintenance action and ensures that no FOD remains behind in the fuel tank. It requires specialized training and protective equipment, including full-face respirators. After completing the inspection of the work area, Corporal St-Pierre was in the process of extracting himself from the manhole access when he noticed that the fuel quantity probe appeared to be damaged. As the fuel probe was located behind structural braces at the far end of the tank, and not in the immediate area of the just completed repair, this condition could easily have gone unnoticed. Without hesitation Corporal St. Pierre re-entered the tank to investigate. He realized something was not right and proceeded to remove the probe. Upon further research, he determined that the wrong probe had been installed.

The installation of an incorrect probe has the potential to cause erroneous fuel quantity indications. This information is critical for the aircrew in calculating centre of gravity for the aircraft. The extracted probe was not in the area of the tank in which maintenance was being conducted and is not part of a system that is within Corporal St- Pierre's trade specialty. He displayed extraordinary attention to detail in discovering this error and ultimately preventing a very serious flight control problem. ◆

Corporal St-Pierre currently serves as an instructor with 14 Air Maintenance Squadron, 14 Wing Greenwood.

For Professionalism

For Commendable Performance in Flight Safety

PRIVATE JESSE BUSH

As part of her apprenticeship rotation, Private Bush was employed in the Aircraft Servicing Officer (ASO) section of 443 Maritime Helicopter Squadron. In February 2005, she was tasked to carry out an "after flight" inspection on *Sea King* 12417. In the process, Private Bush noticed that the main fire extinguisher line for the number one engine was completely disconnected at a junction in the gear-box compartment. She immediately notified her supervisor and initiated a flight safety report. Further investigation revealed that four additional lines of the aircraft's engine fire extinguisher system were loose, affecting both the number one and number two engines.

Should the engine's fire extinguisher system have been required on a subsequent flight it would have undoubtedly failed. Private Bush's superior attention to detail, while inspecting an area of the aircraft that was not easily accessible, averted what would have become a catastrophic in-flight emergency.

Private Bush is commended for her outstanding professionalism, alertness, and dedication. ◆

Private Bush serves with 443 maritime Helicopter Squadron, 12 Wing Shearwater.

CAPTAIN DAVID DRAHOVZAL

In January 2005, *Sea King* helicopter 12433 was taxiing into position for a routine rotors running refuelling and crew change. Captain David Drahovzal, the Tactical Coordinator on the oncoming crew, was crossing the ramp on his way to meet the aircraft when he noticed white smoke trailing from the general area of the aircraft's heater exhaust port. The smoke soon turned black and began to billow quite heavily from the helicopter. Since the *Sea King* heating system utilizes aircraft fuel in its operation, Captain Drahovzal suspected a malfunction and a potential fire. Captain Drahovzal was unsure as to whether or not the ground crew or aircrew had noticed the smoke so he quickly ran toward the aircraft marshaller to advise him of the situation. Upon reaching the marshaller, Captain Drahovzal signalled the aircrew of the fire condition and the crew reacted with an emergency shut down and subsequent evacuation of the helicopter.

Captain Drahovzal's swift reaction averted a potentially disastrous situation. He is commended for his professionalism and dedication towards the preservation of critical Air Force assets. ◆

At the time of the incident Captain Drahovzal served with 423 Maritime Helicopter Squadron, 12 Wing Shearwater. He now serves at the A3 Electronic Warfare Operational Support in Ottawa.

CORPORAL JOHN MEANEY

In September 2003, while using the Portable Adaptable Test Set (PATS) at 4 Wing Cold Lake, Corporal Meaney volunteered to demonstrate a "28 Flight Inspection" on a Forward Looking Infrared (FLIR) pod installed on *Hornet* CF188763. During his explanation of the procedure, Corporal Meaney moved the head of the pod and noted an unfamiliar sound. Taking the time to inspect the unusual noise through partial disassembly of the pod, he discovered that the Optical Stabilizer (OS) was installed with insufficient torque. Further investigation revealed that the dog latches attaching the Infrared Receiver (IRR) to the pod forward section were not engaged. Upon discovery of the FLIR pod deficiencies, a flight safety report was initiated and the subassemblies were secured for pod removal. Additional missions with the pod in this state would have resulted in damage to the pod and may have resulted in the OS and the IRR departing the aircraft in-flight. This would cause extensive damage to the FLIR pod and possibly impact the aircraft resulting in a further loss of assets.

Though it began as a routine demonstration, Corporal Meaney's attention to detail and vigilance detected a serious deficiency and thus prevented the loss of a limited and vital resource and potentially averted a damaging in-flight incident. ◆

Corporal Meaney serves with 1 Air Maintenance Squadron, 4 Wing Cold Lake.

CORPORAL ANDREW ELLIOTT & CORPORAL ADAM SOMMERFELD

Corporal Elliott and Corporal Sommerfeld were tasked to investigate a stiff #2 throttle on *Griffon* CH146489. They completed a detailed inspection of the N1 throttle system and noticed that the #2 throttle system had excessive binding. They isolated the problem and verified their findings with all available technical documentation. Determining that the co-pilots #2 sector gear was binding due to dirt and excessive backlash, they proceeded to clean and readjust the backlash on the throttle sector gear.

After testing the adjusted throttles to ensure that they moved smoothly, a slight binding was noticed when rolling the throttles up from the full off position. Corporal Sommerfeld insisted that they investigate this problem. While Corporal Elliot manipulated the throttle control, Corporal Sommerfeld climbed into the "hell hole" to pinpoint the source of the condition. He found the stop pin on the inner #2 throttle jackshaft had been wearing on the outer shaft causing the binding at the bottom end of the throttle travel. Once the source of the binding was confirmed, they reviewed the applicable publications and ordered the required parts to resolve this condition.

Had this condition gone uncorrected, it could have resulted in the further degradation of the system and eventually the loss of control of the #2 throttle. Had this occurred in-flight, it could have resulted in a serious in-flight emergency and possibly an aircraft accident.

Corporal Elliott's and Corporal Sommerfeld's outstanding technical skill, perseverance and attention to detail ensured that this defect was identified and correctly repaired. Corporal's Elliott and Sommerfeld are commended for their professionalism and dedication. ◆

Corporal Elliott and Corporal Sommerfield serve with 444 Combat Support Squadron, 5 Wing Goose Bay.

For Professionalism

For Commendable Performance in Flight Safety

CORPORAL BOB SCHWINDT

In March 2004, Corporal Schwindt was conducting a routine maintenance acceptance check on the contractor modified T-33 *Sliver Star* 133648. Given the contractor's good reputation and experience with the Canadair built T-33 *Silver Star*, there was no call to go beyond the routine inspections required by the applicable acceptance check criteria. However, Corporal Schwindt's meticulous nature led him to conduct a more thorough inspection. Through a conscientious effort and some minor contortions, he wriggled up through the nose wheel well and discovered a misplaced 4.5-inch jewellers common screwdriver. It was positioned between some relatively inaccessible bulkheads in the belly of the aircraft.

Corporal Schwindt's professionalism resulted in the discovery and removal of the hazard represented by the misplaced tool. His diligence and conduct prevented a potentially tragic occurrence.

Corporal Schwindt serves with the Aerospace Engineering Testing Establishment, 4 Wing Cold Lake.

CORPORAL EMMIE-ELLEN GIBBONS

On 17 March 2004, Corporal Gibbons was conducting a routine maintenance acceptance check on the contractor modified T-33 *Sliver Star* 133648. The quality work performed by the contractor to introduce an ejection test bed modification into the Canadair built *Silver Star* had notably been first-rate. There was no call to go beyond the routine inspections required by the applicable acceptance check criteria but Corporal Gibbons professionalism led her to meticulously explore every nook and cranny of the aircraft. Her perseverance in verifying a suspected anomaly of the control stick linkage assembly was rewarded through extra investigation. With some measure of contortion she found a two-inch long hex to quarter inch adapter tool partially hidden under the control stick linkage assembly.

Corporal Gibbons is commended for her professionalism as demonstrated through her diligent approach to duty. Her efforts, as exhibited in this instance, were essential in eliminating the potential for this wayward tool to become a factor in a tragic occurrence. ◆

Corporal Gibbons serves with the Aerospace Engineering Testing Establishment, 4 Wing Cold Lake.

SERGEANT DAVE RICHARDS

While deployed to 19 Wing Comox in January 2005, Sergeant Richards discovered the F119 panel of a CP-140 partially opened in the nose wheel well during the pre-flight "onboard" check. He secured the panel, completed the check and informed his Lead Airborne Electronic Sensor Operator. The mission was flown without delay. An after flight follow-up revealed that 19 Wing maintenance personnel had accidentally left this panel open after de-snagging a radar fault during the preflight phase of the mission.

The *Aurora* "onboard" check does not require this area to be checked. Sergeant Richards' professional attitude, in going beyond the required items outlined in the checklist, prevented the occurrence of a possible flight safety incident during a critical phase of flight. Separation of this particular panel from the aircraft could have resulted in damage to

the aircraft, private property, ground personnel or potential Foreign Object Damage (FOD) on a busy runway used frequently by civilian air carriers.

Sergeant Richards is commended for the exemplary conduct displayed in preventing potential damage to equipment and injury to personnel. ◆

Sergeant Richards serves with 415 Maritime Patrol Squadron, 14 Wing Greenwood.