National Defence
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# Flight Comment

ISSUE 1, 2015

## LESSONS LEARNED
Are You Ready?

## DOSSIER
Cockpit Authority Gradiant

## FROM THE FLIGHT SURGEON
Lasting Impairment

Canada

Cover – A CF-188 *Hornet* from the Canadian Air Task Force Lithuania flies above a Portuguese F16 *Flying Falcon* over Lithuania on September 15, 2014 for the NATO Baltic Air Policing Block 36 during Operation REASSURANCE.

Photo: Cpl Gabrielle Desrochers











# Flight Comment

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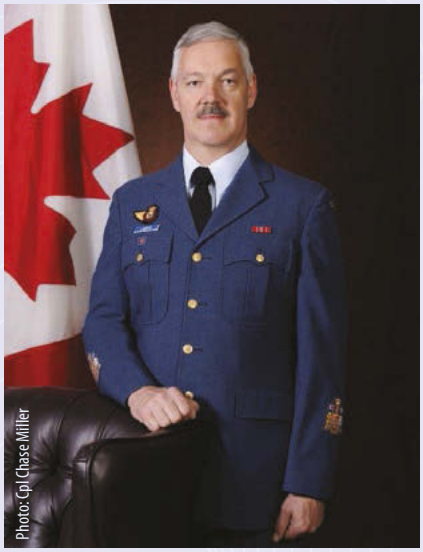

Photo: Cpl Chase Miller

# Views on Flight Safety

**by Chief Warrant Officer René Labrie, DFS CWO**

Since taking the position of the DFS CWO in July 2013, I had the opportunity to visit all the Wings, first to pass on our message by conducting the annual Flight Safety briefing and more importantly to talk with people. There is no better way to get first-hand information about our Flight Safety program than to talk with the technicians on the floor. I was glad to observe that the Flight Safety program is well established everywhere and that people believe that it is an essential tool in order to conduct safe operations and maintenance. However, nothing is perfect. That is why it is important to regularly refresh its principles.

I'd like to focus on the maintenance principles based on the philosophy that aircraft are designed, built and maintained to accepted standards; by approved organisations and by trained, qualified & authorized personnel. Aircraft maintenance has to be carried out in accordance with the applicable technical publication. It seems a simple process but the number of Flight Safety occurrences related to "maintenance" is on the rise and the main cause is Human Factors. Why is that? The Royal Canadian Air Force (RCAF) has been extremely active over the past decade and this resulted in different pressures being applied at different levels. For the maintenance organization, it is to have enough aircraft ready for the mission.

For the technician on the floor it means to fix as many aircraft as possible within a determined timeline. Here comes the problem: the willingness to achieve. One of the main tenets of Flight Safety and Airworthiness is that shortcuts are not acceptable. Procedures must be followed. During our Flight Safety investigations the following questions come often; How could a technician carry out a task without using the books? Why is the paperwork not done? Why would a technician sign for work he is not authorized? They all know better and we are wondering what went wrong. Why did the technician choose the actions that he did? How much operational pressure are the communities under right now? Would it be safe to say that any technician taking "shortcuts" is focused on the mission, pressed for time and thinking he is doing it for the good of the organization? In his mind he was, otherwise he would not have done it. We need to look at the entire system to address this problem.

Pressure, operational or perceived, is our worst enemy. Supervisors at all levels have to be conscious of the pressures they put on their personnel. Something I have seen on occasion in my career is that the simple wish of a senior officer gets translated, as it goes down the ranks, as a very important tasking almost equivalent to a no-fail. The commanders are not asking anyone to take shortcuts. They would much rather see a mission delayed than have an aircraft crash because of inadequate maintenance action.

In closing, after 34 years in the RCAF I believe that I may be able to leave you with a wise comment. "If you ever feel that you need to rush, slow down!" There is only one way that our aircraft will be safe to fly and it is by doing all maintenance actions in accordance with the accepted procedures. In the long run you will be saving time by taking the time to do the job right the first time, but more importantly you will prevent the loss of lives.

Ask any aircrew if he'd like his aircraft fixed quickly or fixed properly.

*Flight Safety: A Mission Enabler*

# The Editor's Corner

Welcome to the first edition of Flight Comment (FC) for 2015!

I would like to take the opportunity to introduce myself as the newly appointed deputy of DFS 3, Promotions and Information and editor of this issue of FC magazine. Having completed two lengthy flying tours in the maritime rotary and training communities, I'm finding the change of scenery quite fascinating and rewarding even if the job is just as busy. The learning curve so far has been steep, considering I have never performed in a flight safety capacity during my 17 years of service nor have I ever published a periodical! That said, my experience as a helicopter crew commander, qualified flight instructor and flight commander has provided positive input in one form or another to the workings of the department and I am slowly finding my way around the intricacies of editing a magazine. I look forward to the new challenge.

On another note, I would like to bring to light that there were two *Flashes* released since the last issue of the FC. The first dealt with CF188 *Hornet* tow bars and the improper embodiment of a modification; the second, with an improper routing of the Moving Map Display crayon on the CH146 *Griffon*. If you have not seen these, please contact your Flight Safety Officer or visit the DFS website. Furthermore, two Epilogues were released and are included in this issue.

Lastly, I would like to thank the contributors of this edition. It is your continued support and ideas that keeps this publication genuine. Whether it is your home-grown stories of what not to do to the insightful précises from the Division Instrument Check Pilot School, every submission provides us with another tool within the construct of the magazine to advance the flight safety cause. One of my goals onwards is to push those 'artistes' that exist amongst you to submit your work to FC magazine. These can be a cartoon or perhaps something large enough that could result in a poster. There are only so many pictures or reprints that can convey a certain idea and I believe nothing can deliver a message so succinctly summed up in one illustration than a clever drawing or sketch. Bruce Mackinnon's drawing of the unknown soldier rushing to Corporal Cirillo's aid printed in the aftermath of that fateful day in October immediately comes to mind. So please, get out your 4B pencils and show us your talent!

**Major Peter Butzphal**

# Good Show

*For Excellence in Flight Safety*

## Major Brad Steels

While at the controls of a familiarization flight in a CH146 *Griffon* helicopter, Maj Brad Steels of the Aerospace Engineering Test Establishment experienced a flight control malfunction during the final approach to land.

Descending through 30 feet above the ground, Maj Steels noted that as he started to increase the collective in order to arrest the rate of descent, the anti-torque pedals became stuck, preventing him from applying a left pedal input to counteract the yaw of the aircraft to the right. He immediately recognized this condition and as the only qualified pilot onboard, he made the split-second decision to decrease the collective and accept a higher than normal rate of descent in order to keep the nose of the aircraft aligned with his flight path. Although the aircraft landed short on the grass and at a higher rate of descent, the nose was safely aligned and it skidded forward onto the ramp. The Flight Safety investigation revealed that the anti-torque force gradient assembly that is located under the right pilot's seat had somehow become disconnected. This assembly is connected to the anti-torque pedals of the CH146 and is designed to trim out any control forces; however, part of the tube assembly that was attached to the force gradient somehow became lodged in the surrounding structure preventing the application of left pedal inputs.

In arresting the yaw rate of the aircraft prior to landing with the collective inputs only and making sure that the skids were properly aligned with his flight path, he prevented a potential roll-over situation upon touchdown. Maj Steels' timely action during a critical phase of flight prevented potential serious injury to personnel and damage to the aircraft. Maj Steels is truly deserving of a Good Show award.

Photo: Pte Sumit Sanghera

# Good Show

*For Excellence in Flight Safety*

## Sergeants Chad Ingram and Alain Plourde

On 14 May 2014 Sgt Chad Ingram, the Instructor Loadmaster, and Sgt Alain Plourde, the Instructor Flight Engineer, were crew members onboard a CC130H *Hercules* conducting a routine training mission.

After conducting a planned missed approach from the Peterborough airport, Sgt Ingram who was located at the rear of the aircraft cabin, noticed an unusual change in cabin sound pressure and airflow despite being unpressurized. After promptly alerting the crew of the anomaly and requesting the assistance of Sgt Plourde, he scanned the cargo compartment and discovered the left-hand (L/H) emergency exit door had not only become dislodged, but was nearly fully exposed to the external slipstream. The L/H emergency exit door was aligned upwind to the propeller of the #2 engine and held in the aircraft only by virtue of becoming entangled with the cargo compartment seat-netting straps. Sgts Ingram and Plourde quickly donned their restraint harnesses and, at risk of significant injury, reached out into the 170 knot slipstream and retrieved the emergency exit door back into the aircraft. The door was then secured to the floor with a cargo strap.

Given the proximity of the emergency exit door to the #2 engine and propeller assembly, it is clear that the swift and courageous actions taken by Sgts Ingram and Plourde prevented catastrophic damage to the No. 2 power-plant, aircraft fuselage, as well as the potential for serious damage to the persons and property below the aircraft's flight path in the Peterborough area. Their high degree of situational awareness and clear communicative skills was pivotal in safely securing a potentially catastrophic emergency situation.

Sgts Ingram and Plourde exemplify the qualities and abilities required of instructors and are most deserving of this Good Show award.

Photo: Cpl Rod Doucet

# Good Show

*For Excellence in Flight Safety*

## Master Corporal Greg Clarke and Corporal Nathan Rice

MCpl Clarke and Cpl Rice, aviation technicians from 405 Long Range Patrol Squadron, were tasked to perform an inspection on the rudder-trim system on a CP140 *Aurora* in an effort to fix a reoccurring snag on the aircraft. The snag in question was described as a grinding sensation felt in the trim wheel when actuating the rudder trim during flight. In accordance with (IAW) Canadian Forces Technical Orders (CFTO), MCpl Clarke and Cpl Rice carried out a detailed investigation and a complete functional of the rudder-trim system with no faults found. Initial indications showed all rigging and control operation was serviceable IAW the appropriate CFTO. In fact, previous trouble-shooting attempts equally revealed results that were within allowable tolerances. Although the system behaved properly when functioned (i.e. full rudder control), MCpl Clarke and Cpl Rice were not satisfied with the sensation felt through the controls which was indicative of cables rubbing despite previous investigations that revealed nothing. They decided to conduct a more thorough investigation by removing all rudder trim access panels which included removing panels on the left and right side of the rudder to visually inspect the trim cables. The visual inspection proved to be extremely challenging as access was restricted due to multiple layers of lightening holes within the system.

Persisting through a difficult area to inspect, they were able to visually determine wear and tear on the lightening holes. In addition, they observed what appeared to be crossed cables. In order to verify their diagnosis, they went a step further and performed a meticulous digital boroscope inspection. The inspection confirmed that theses cables were crossed not only once but twice. A further investigation of the aircraft Maintenance Record Set showed the issue had plagued this aircraft for years with the root cause going undetected. This snag was first recorded as such in 2011 but may have existed longer under a different description and it is underdetermined if the cable system was actually serviced since aircraft production.

The dedication and professionalism displayed by MCpl Clarke and Cpl Rice in their pursuit to locate this fault is impressive and went beyond the normal troubleshooting process. The results of a rudder-trim cable failure in-flight could be catastophic as both sides of the rudder-trim cable would lose tension, fall under gravity and be left to interfere with other flight control systems. Their persistence and tireless approach is laudable and their actions prevented an eventual failure of the rudder-trim system.

MCpl Clarke and Cpl Rice's actions serve as an outstanding example and epitomize the spirit of what flight safety is all about. They are truly deserving of a Good Show award.

MCpl Clarke

Cpl Rice

# Good Show

*For Excellence in Flight Safety*

## Corporal Cody Parker

On 1 May 2013, Cpl Cody Parker, an aviation technician with 423 Maritime Helicopter Squadron of 12 Wing Shearwater, was refilling an engine oil cart borrowed from the engine bay which contained MIL-L-23659 oil. Upon completion of the task and emptying the oil containers in the waste oil can drain tub, he noticed on the tub tray nine empty cans of 1010 jet lubricating engine oil. Demonstrating exceptional situational awareness, he quickly deduced that that such a large amount of 1010 oil would never be used for preservation of the engine and suspected that someone may have mistakenly used the wrong oil to fill one or more engine oil refill carts. Cpl Parker began questioning the maintenance technicians. After thorough research he was able to confirm that six cans of the wrong oil had been added to one of the engine oil carts on 29 April 2013. Upon further investigation, an additional 15 empty 1010 cans were also found outside awaiting disposal.

Photo: DND

Cpl Parker's proactive and expeditious investigation allowed his chain of command to act quickly. All 423 Squadron aircraft were immediately grounded and aircraft inflight were recalled to determine if they had been topped-up with engine preservation oil. Gas chromatograph analysis revealed that six of the eight 423 Squadron aircraft as well as both in-service oil fill carts were contaminated. When 1010 oil is introduced to the lube system of a running engine, the Zinc component can adhere to the rolling elements (bearings) and cause pits and spalls resulting in abnormal wear which is both progressive and irreversible. Once bearing spall occurs it is only a matter of time until the bearings fail.

Cpl Parker's intuition and great attention to detail averted potential engine damage to multiple aircraft which could have led to the loss of crucial resources. Cpl Parker is most deserving of a Good Show award.

# For Professionalism

For commendable performance in flight safety

## John Hoover

John Hoover, a civilian working for L3 Military Aviation Services (MAS) as a Structures Air Maintenance Engineer was in the process of carrying out an inspection on a line clamping arrangement on a CC150 *Polaris* aircraft in accordance with a Fleet Service Bulletin. As he was completing the final review of his work area, repair work that had been carried out previously in a different area of the aircraft caught his attention. While inspecting the repair technique, he noticed that a bracket in the floor structure was cracked. Being new to the CC150, Mr. Hoover immediately consulted with the L3 MAS Lead Hand for the appropriate course of action. Determining that this may not be an isolated occurrence, he then engaged his supervisor who initiated a check of the remaining local aircraft, all of which were found in the same condition.

Photo: DND

The detection of the damage mentioned was above and beyond Mr. Hoover's task at hand and found in an area not directly related to his assignment. If this problem had been left unattended it may have led to a complete failure of the aircraft floor structure.

Mr. Hoover's dedication and attention to detail make him a deserving recipient of a For Professionalism award.

## Corporal Mikael Charbonneau-Lemaire

While conducting a visual inspection of an elevator booster mechanism as part of a C Check on a CC130J *Hercules*, Cpl Charbonneau-Lemaire, an aviation (AVN) technician with Air Maintenance Squadron of 8 Wing Trenton, discovered a series of cracked locking nuts on the boost valve viscous damper assembly.

Of his own initiative, Cpl Charbonneau-Lemaire carried out an in-depth inspection of the rudder and aileron booster mechanisms which house identical assemblies and once he determined that these units were unaffected, he immediately reported his findings to his superiors and flight safety. After obtaining permission via a Lockheed Martin engineering response, he proceeded to replace the defective nuts and found the majority were tightened well above the specified torque with a few crumbling under the stress of removal. This observation led to a fleet-wide inspection where this same

*Continued on next page*

Photo: Cpl Adam Baraniuk

## Corporal Rémi Mailhot

While performing Air Traffic Service duties at the Military Flight Advisory Unit at 12 Wing Shearwater, Cpl Rémi Mailhot, an Aeronautical Control Operator, went above and beyond the normal scope of his duties.

Upon completion of a crew training mission, a CH124 *Sea King* helicopter contacted Shearwater Tower that it was on the harbour approach inbound, returning to base and reported point Zulu for landing. The Flight Advisor provided the winds and requested that the aircraft report that the gear was down and locked for landing. The pilot responded that the gear was down and locked for landing. As the aircraft was turning into wind on short final, Cpl Mailhot, a newly qualified ground controller, observed that the helicopter did not have its gear down. Cpl Mailhot queried the Flight Advisor who immediately contacted the pilot to check the gear. The pilot selected and then confirmed the gear was down, and the helicopter recovered without incident.

Cpl Mailhot's quick reaction prevented to a situation that could have led to a severe incident/accident the dedication, professionalism and attention to detail of this individual are to be commended as his actions and is most deserving of this For Professionalism award.

Photo: Cpl Nedia Countinho

### *Corporal Mikael Charbonneau-Lemaire ...Continued*

cracking was detected on several other elevator boost mechanisms in which some of those also experienced crumbling hardware during replacement.

Cpl Charbonneau-Lemaire's outstanding attention to detail prevented a possible failure of the viscous damper assembly, which would have resulted in the aircraft experiencing excessive movement in the elevator, a critical flight control and would have created an extremely harrowing situation for flight crew particularly while performing low level tactical maneuvers. His astute application of job knowledge coupled with consummate professionalism make him truly deserving of this For Professionalism award.

From the Flight Surgeon

# When Zero Isn't Really *Zero*

**By Major Tyler Brooks, Medical Advisor, Directorate of Flight Safety, Ottawa**

Zero. It seems like a pretty straightforward number. It's how much alcohol you are allowed to have in your system at work. It's how much cannabis you are ever allowed to use while serving in uniform. Zero.

It's a number that should make things simple. But it isn't simple. Zero isn't always zero.

Have you ever known a co-worker who "drank on the weather?" This happens when a weather forecast looks like it might cancel flying, and then crewmembers go on a carefully calculated night of drinking alcohol. Everyone technically respects the '12 hours bottle to throttle' or no alcohol 8 hours before reporting for duty rules, but sometimes people push the boundaries of moderation. Most of us have seen this, and felt it could be a Flight Safety problem.

Have you ever known a co-worker who smokes cannabis? It's taboo to talk about openly, because it's illegal. But we aren't discussing the legalities today, because we are only concerned about the Flight Safety impact. The point is this: we know it is happening.

So what is the big deal if someone reports for duty, and enough time has passed that we think there should be no traces of alcohol or cannabis left in their system? They should be safe. Zero is zero, right? Not exactly.

## Alcohol

Believe it or not, after drinking alcohol, you still might be impaired even if your Blood Alcohol Concentration (BAC) is zero.

No, this isn't just about the obvious effects of the dreaded hangover, with the distracting headache and fatigue (though these pose problems, too).

> ***"Believe it or not, after drinking alcohol, you still might be impaired even if your Blood Alcohol Concentration (BAC) is zero."***

It has been known for many years that alcohol can have lingering effects, even after it can no longer be measured in the blood.

For instance, uncontrollable eye movements can occur for up to 34 hours after consuming just three drinks! For aircrew "pulling G", this effect can occur up to 48 hours later.[1] It is believed that alcohol thins the fluid of the inner ear (known as endolymph), resulting in faulty signals to the brain that create abnormal eye movements. These eye movements can cause disorientation or vision problems. This is a Flight Safety concern, whether you are flying an aircraft or driving a ramp vehicle. This effect continues long after the BAC reaches zero.[2]

Many scientific studies also show that it is more difficult to perform mental tasks after consuming alcohol, even when the BAC has returned to zero. This is called "post-alcohol impairment." The impairment seems to be worse with complicated tasks, like driving or flying. In fact, a recent study suggested that driving with post-alcohol impairment could be just as dangerous as drunk-driving![3]

The reason for this impairment is unclear, but it is thought that alcohol interferes with oxygen use in the cells. Again, this effect continues even with a BAC of zero.[4]

Obviously, these post-alcohol effects could affect anyone involved in flying operations – aircrew and ground crew, alike – with serious Flight Safety consequences.

So, with alcohol, zero isn't zero after all.


Photo: Sgt Matthew McGregor

## Cannabis

After alcohol and tobacco, cannabis is the third most popular recreational drug. The 2012 Health Canada survey showed that 10.2% of Canadians aged 15 years and older had used cannabis in the past year.[5] The 2008 Blind Drug Testing of the Canadian Armed Forces showed 3.7% of personnel tested positive for recent use of cannabis. In other words, even in our "zero tolerance" military, on any given day, we could expect almost 4 personnel out of 100 to have recently used cannabis. But is "recent use" really a problem? Well, the trouble with cannabis is that it is difficult to know when the impairment goes away.

The main intoxicating chemical in cannabis is called tetrahydrocannabinol (THC). THC is absorbed into the body at dramatically different rates, depending on whether it is smoked or eaten. Through the lungs, THC is absorbed within seconds to minutes. Through the stomach and intestines, THC can be absorbed for up to 12 hours, significantly lengthening the period of impairment.

Whether smoked or eaten, THC is stored in body fat and is released slowly over 4 to 5 days. Because THC is then released directly into the brain (which contains a lot of fat), intoxication and impairment can continue even when THC is not detectable in the blood.

The breakdown of THC in the body takes a long time, and the chemical by-products of this process can be detected by testing for up to 30 days! Even some of the breakdown by-products of THC can continue to cause impairment.

*Continued on next page*

# Continued...

Studies have shown impairment of attention, memory, hand-eye coordination, and complex mental tasks for up to 24 hours after a single dose of cannabis! These effects still occur even when blood levels of THC have reached zero.[6]

So, with cannabis as well, zero isn't really zero.

## Flight Safety Hazards

The bottom line is this: alcohol and cannabis can continue to cause impairment long after the blood levels have reached zero. In the flying world, any impairment of air or ground crewmembers is a serious Flight Safety hazard.

> ***"In other words, even in our 'zero tolerance' military, on any given day, we could expect almost 4 personnel out of 100 to have recently used cannabis."***

## What's the answer?

**If you drink alcohol, just be moderate.** The Flight Operations Manual directs that any alcohol consumption in the 24-hour period before flying "shall be of a moderate amount."[7]

**If you use cannabis, just don't.** It's not worth your life, or worse, someone else's. If you need help to stop using cannabis (or other drugs, for that matter), please talk to a medical professional at your local Health Services Centre.

Remember: if you drink alcohol or use cannabis, zero isn't really zero.

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Photo: Cpl Manuela Berger

Photo: Lt J F Carpentier

Maintenance IN FOCUS

# SERVICEABLE ENOUGH?

By Master Warrant Officer Gary Lacoursière, Directorate of Flight Safety 2-5-2, Ottawa

Is it serviceable, or is it unserviceable? Are the lines sometimes blurry? Have you ever looked at a piece of kit and were unsure of its serviceability status? At a glance, this would seem to be a fairly straightforward determination. How do you decide if it's serviceable?

Part of my job is to visit various maintenance contractors to take the pulse of their Flight Safety culture. In the course of doing so, I recently encountered a couple of instances of CF and contractor technicians apparently assessing equipment as 'serviceable enough'.

At one contractor facility, an Aircraft Maintenance Support Equipment (AMSE) technician noted that since they had stopped doing random inspections, fewer pieces of equipment were coming into the shop for repair. When an informal survey of equipment was done, many items were found to be in poor condition, some beyond acceptable limits. It seems that AMSE inspectors were more likely to tag an item as unserviceable as were the ac technicians, who would continue to use an item until it no longer functioned. Apparently, the items were 'serviceable enough'.

Yeah, but that's only AMSE, you say. Nobody would ever do that with an aircraft! Would they?

Photo: Cpl Pierre Létourneau

*"A military crewmember ... handed the civilian technician a list of snags written on a napkin."*

At another facility, a military crewmember delivering an aircraft to a third line contractor for overhaul, handed the civilian technician a list of snags written on a napkin! Now, as a maintenance supervisor, don't even let me get started on the napkin. Let's talk about what was written on it.

If these items need repair, why weren't the deficiencies written up when they were discovered? Did they need the aircraft for a mission? Was it operational or was it training? Were they Minimum Equipment List items? Does it matter? Was it 'serviceable enough' to do the job?

> *"At what point does an aircraft system cease to be 'serviceable enough'?"*

Many aircraft systems aren't like a light bulb, whereby it either works or it doesn't. Many systems slowly degrade over time, to the point that they no longer serve their intended function. At what point should a technician or aircrew declare the aircraft is unserviceable and in need of maintenance? At what point does an aircraft system cease to be 'serviceable enough'?

The answer is glaringly obvious: go to the book. The flight publications and maintenance manuals clearly state what the aircraft and component acceptable limits are. If an item falls outside these limits, the aircraft is unserviceable. Write it up. If by chance you have misinterpreted the limits, the entry can always be cleared by following proper procedures. At least you will not have an aircraft flying around with its maintenance requirements masquerading as a kleenex.

After all, would you like to go flying in an aircraft that is 'serviceable enough'?

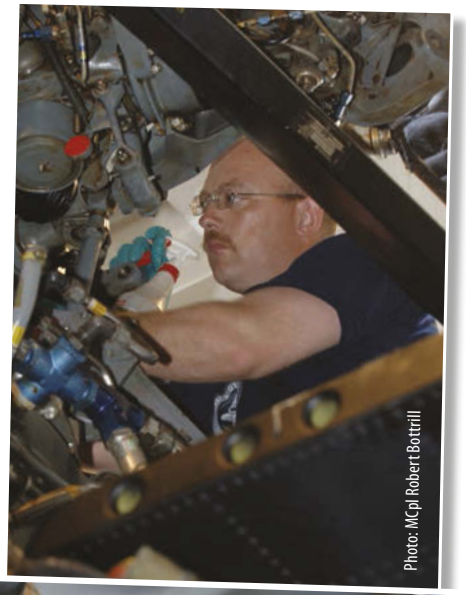


Photo: MCpl Robert Bottrill

Photo: Cpl Jackson Yees

# PIPELINER

By Lieutenant-Colonel F.R. Sutherland, CD
Originally published in Flight Comment Issue 2, 1978

As I returned to Europe in the 707, I had an opportunity to ruminate about the conference which had just taken place in Winnipeg. The conference, for Commanding Officers (CO) of Canadian Forces (CF) Flying Squadrons, had been organized by AirCom and had proven to be a most beneficial and edifying experience. In Addition to briefing presented by senior AirCom personnel on the organization, responsibilities, and operation of that Headquarters, we were given an opportunity for a face to face session with the Commander. During this session he expounded candidly on his views on a number of items of interest to each of us including LRPA, NFA, other capital and personnel programs, chain of command and Flight Safety. Additionally we were able to air (no pun intended) issues of concern to us as COs and to solicit support at the highest levels.

A special session was also devoted to Flight Safety, including a review of accidents, trend analysis, and considerable discussion on all aspects of this most important area. One of the constant threads throughout the discussion was the subject of supervision and the supervisory roles of the Squadron CO. From this discussion, and from the revelation during the conference that we could expect to see an increasing proportion of pipeliners to experienced personnel in operational squadrons, this article found its genesis.

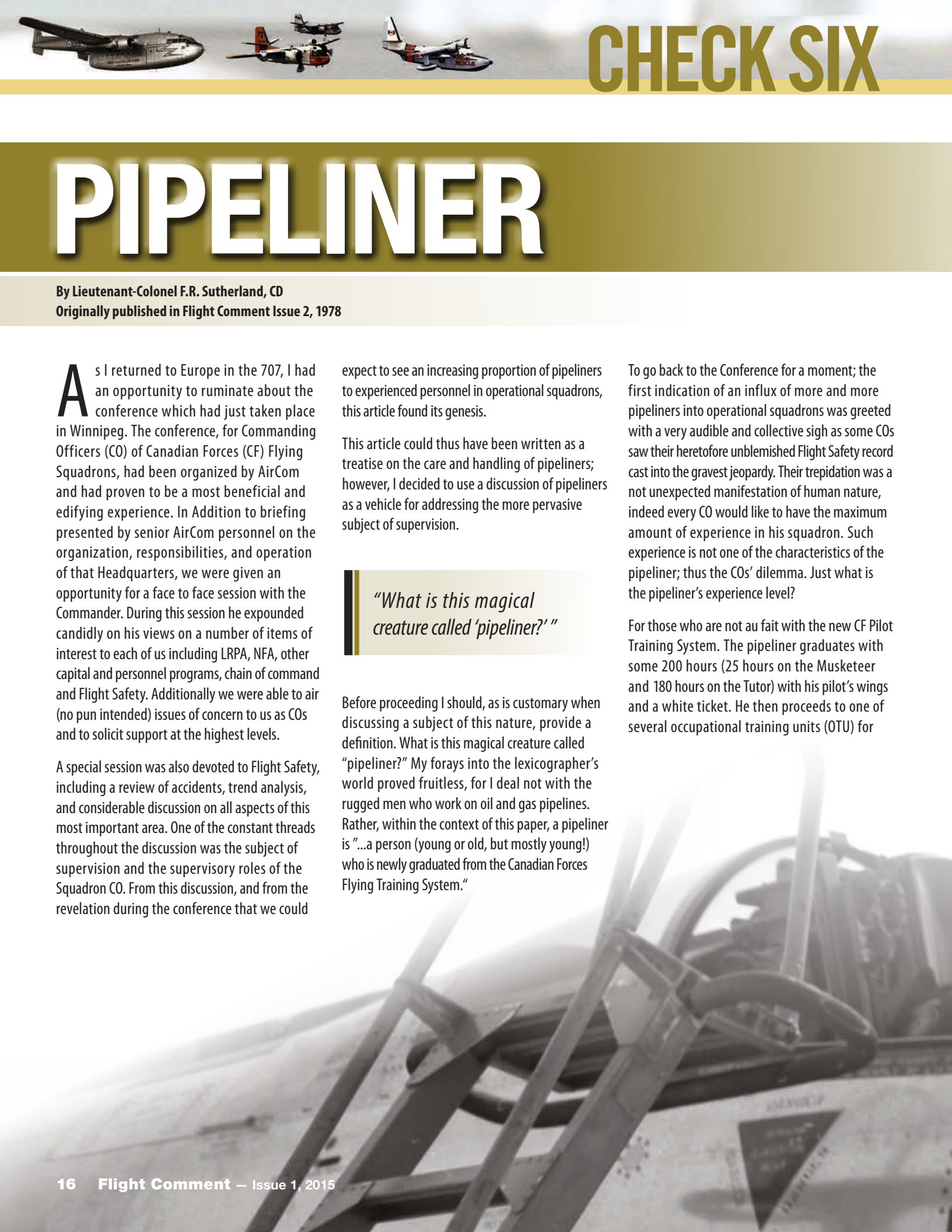
This article could thus have been written as a treatise on the care and handling of pipeliners; however, I decided to use a discussion of pipeliners as a vehicle for addressing the more pervasive subject of supervision.

> *"What is this magical creature called 'pipeliner?' "*

Before proceeding I should, as is customary when discussing a subject of this nature, provide a definition. What is this magical creature called "pipeliner?" My forays into the lexicographer's world proved fruitless, for I deal not with the rugged men who work on oil and gas pipelines. Rather, within the context of this paper, a pipeliner is "...a person (young or old, but mostly young!) who is newly graduated from the Canadian Forces Flying Training System."

To go back to the Conference for a moment; the first indication of an influx of more and more pipeliners into operational squadrons was greeted with a very audible and collective sigh as some COs saw their heretofore unblemished Flight Safety record cast into the gravest jeopardy. Their trepidation was a not unexpected manifestation of human nature, indeed every CO would like to have the maximum amount of experience in his squadron. Such experience is not one of the characteristics of the pipeliner; thus the COs' dilemma. Just what is the pipeliner's experience level?

For those who are not au fait with the new CF Pilot Training System. The pipeliner graduates with some 200 hours (25 hours on the Musketeer and 180 hours on the Tutor) with his pilot's wings and a white ticket. He then proceeds to one of several occupational training units (OTU) for



conversion to assigned aircraft type and for more advanced training. Depending on the training stream he has followed, he arrives on squadron with anywhere from 300 to 400 hours.

How is he perceived? Probably he is viewed as a cherubic faced youth with a large question mark over his head and, as was mentioned earlier, a potential threat to the unit's enviable flight safety record. He is also viewed in some eyes as one who appears to be pre-occupied with retirement plans and investment portfolios, rather than those things which ought to occupy a pilot's non-flying thoughts! On the other end of the spectrum is his perception of himself, probably as a young tiger who will show everyone that his selection to an operational tour was the soundest of decisions by PCO pilots.

What normally turns out to be, as those of you who have worked with pipeliners will know, is somewhere between these two roles, and amazingly consistent with what you would expect a person of his situation and experience to be. He is first of all, of course, apprehensive and perhaps a bit overwhelmed at the magnitude of the challenge facing him. He also probably displays one, some, or all of the following characteristics:

- A high degree of motivation;
- Tremendous enthusiasm, manifesting itself in an eagerness to listen and to learn;
- A healthy inquisitiveness (some have even had the temerity to ask the whys and wherefores of long established, and heretofore sacrosanct, policies and procedures);
- High expectation; and
- Timorousness (this is often camouflaged behind a veneer of bravado by playing a role consistent with his image of what he should be, and is a particular occupational hazard of a fighter pilot).

There are of course a myriad of other characteristics; however, those cited above represent a reasonable cross-section.

Well, now that we have the pipeliner on board and we have some insight into his experience and characteristics, what then do we do with him?

With the indulgence of the reader, I will delineate the program utilized in 1 CAG, the program with which I am most familiar. I would be remiss, however, if I did not, as a precursor to that description, allude to the program required by other formations to bring pipeliners "up to speed" in their respective operation. There are tremendous differences in the training program required for pipeliners in a single seat fighter squadron from that required for his colleague posted to Transport, Maritime, SAR, or other type flying. Items such as crew cooperation, PMAs and responsibility for large numbers of people (passengers and/or crew) are not part of our requirements. Thus I readily acknowledge that there is no simplistic approach to "indoctrination training." Yet establishment of such training, consistent with user requirements and cognizant of pipeliner experience (or better, perhaps, lack of experience), is of cardinal importance.

Let us look then at the 1 CAG program. First of all, formal requirements are laid down in the Attack Training Directives, a document which covers each of the three facets of training: orientation, indoctrination and continuation. After arriving in Europe, the first task facing the new pilots is to complete orientation training, consisting of a T33 checkout in European instrument procedures

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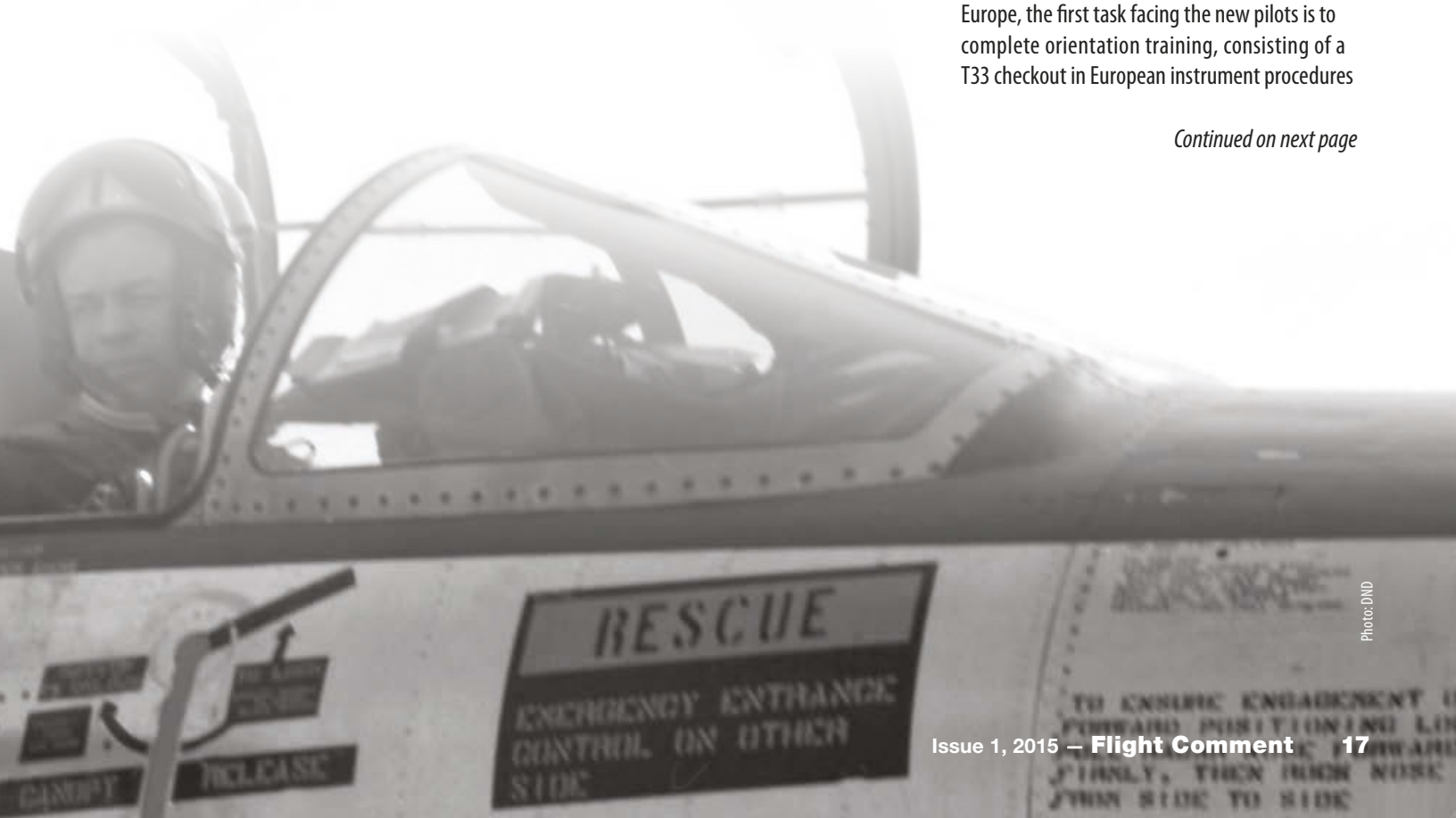


Photo: DND

## Continued...

and local area familiarization. The five T33 aircraft allocated to the Group Transient and Training Flight (GTTF) provide 1 CAG pilots with a cost-effective means of maintaining instrument flying proficiency. After two weeks flying with GTTF he begins formal CF104 indoctrination training. Flying under the supervision of a highly experienced squadron monitor pilot. He requires approximately 2-3 months to become familiar with low level navigation in Europe and to complete a checkout on the three primary weapons ranges on which he will operate while in Europe. Once the upgrading program is completed the pilot is tested by Group Tactical Evaluation Personnel. Successful completion of written exam and a special mission results in the pilot being awarded combat ready status.

Being combat ready qualifies the pilot to fly as number two or number four in a CF104 attack formation. After approximately 8 to 12 months as a wingman the pilot goes through another upgrading process to qualify him to become lead of a two plane formation or to act as number three of a four plane formation. The final step in the upgrading process is to qualify to lead the basic four plane formation.

Throughout the upgrading process the ground school training program is designed to add to and improve the pilot's knowledge of the enemy's defences and his equipment capabilities, the best utilization of the weapons available to the CF104, and the more sophisticated offensive and defensive tactics employed in 1 CAG.

However completion of the formal training requirements is not an end in itself - the so-called putting the "X on the board". Adherence to the program does not necessarily constitute effective discharge of the supervisor's responsibility. Let us look at our newly arrived pipeliner again. For reasons delineated earlier, pipeliners come in all shapes and sizes and, more importantly, they come with different personalities and abilities (which makes them remarkably like all other pilots!!). The following quote describes the situation fairly succinctly:

> "A particularly vulnerable phase in a pilot's career comes in the early stages of his first squadron tour when he is being trained to become a productive operational pilot. Individuals, even of apparent equal ability, progress at different rates; inexperienced pilots generally do not admit to their limitations, even if they know them, and some will have had difficulty making the grade or will have exhibited potentially dangerous traits in their first months in the squadron. Crews need very close supervision if their self-confidence and skills are to be developed without, at the same time, over taxing their ability and confirming bad habits. It is tragic that this care and protection all too frequently are found missing."[1]

***"The creation within a squadron of an atmosphere in which pride does not prevent open and frank discussion and, in which, different abilities can be recognized without fear of diminishing confidence, will help increase operational effectiveness as well as promote safety".***

Thus, the formal training requirements must be adapted to the varying abilities and capabilities of the new pilot, and it becomes the supervisor's two fold responsibility to:

- be aware of his fledgling pilot's personality, ability, problems, etc.; and
- make sure that the new arrival's training is consistent with these factors.

Some might say that such a program is tantamount to nurse-maiding and that we can't afford to carry people. Of course we can't; we all know the tragic consequences which almost inevitably obtain from carrying people who "can't hack the program". We must, however, expect our pipeliner to make mistakes which, once again, makes him remarkably like the rest of us! He must learn from these mistakes and continue to progress; if he does, he is well on his way to becoming an operational pilot, ready to assume increasing responsibilities. The supervisor's role in this area of early training is perhaps best summed up in the findings of an accident board convened a few years ago in the UK:

> "The creation within a squadron of an atmosphere in which pride does not prevent open and frank discussion and, in which, different abilities can be recognized without fear of diminishing confidence, will help increase operational effectiveness as well as promote safety".

In summary, the pipeliner possesses many of the same characteristics of his older and more experienced colleagues. He does, of course, lack experience. It is the supervisor's responsibility to know him, to have a training program for him, and to ensure that, within reason, the training program is flexible enough to adjust for differing personalities strengths and weaknesses.

To look at it another way, that fledgling aviator standing in front of you might well have the potential to be one of our senior airmen in 20 or 30 years. We owe it to him and to the brotherhood of Airmen to challenge him, to stimulate him, and to help him develop professionally in other words, to get him off to a good start both as an officer and as a pilot.

P.S. The program described above is discussed within the context of training the pipeliner. The principles apply equally to training every new member of the squadron.

### Reference

1. « Control and Supervision of Flying », *Aerospace Safety,* Aug 1976, p. 19-21.

Photo: DND


Photo: DND

# ON TRACK

## Proceeding Enroute Following a Missed Approach

**This article is the next instalment of a continuous Flight Comment contribution from the Royal Canadian Air Force (RCAF) Instrument Check Pilot (ICP) School. With each "On Track" article, an ICP School instructor will reply to a question that the school received from students or from other aviation professionals in the RCAF. If you would like your question featured in a future "On Track" article, please contact the ICP School at: +AF_Stds_APF@AFStds@Winnipeg. This article will address the question of when to proceed enroute on a missed approach.**

**The answer comes from Captain Greg Boyd, ICP Instructor.**

When are you to proceed enroute following a missed approach? First let's divide this question into two scenarios.

1. The unanticipated missed approach that occurs when unable to land at destination.
2. The anticipated missed approach that is frequently encountered on an Instrument Flight Rules (IFR) round robin for the purposes of training or evaluation.

The first situation is the *raison d'être* for missed approach procedures and is covered by GPH204A, Article 840:

*"To ensure obstacle and terrain clearance in event of a missed approach, the pilot is to carry out the published missed approach* ***until at an appropriate minimum IFR altitude****, prior to complying with further instructions or clearances issued by ATC…"*

Published missed approach procedures in Canada are designed to get you safely to a hold. From this point the pilot may elect to attempt another approach or request clearance to an alternate. Of course for an RCAF pilot, nothing should be unanticipated, and we are encouraged to plan for this in accordance with GPH204A, Article 807: Advance Notice of Intent in Minimum Weather Conditions.

*"On receipt of approach clearance, when the ceiling and visibility reported at the destination airport is such that a missed approach is probable, the pilot should advise the controller as follows:*

*IN THE EVENT OF MISSED APPROACH REQUEST (altitude or level) VIA (route) TO (airport)"*

The unanticipated missed approach at destination is relatively black-and-white and does not seem to generate many discussions at the water cooler.

The second scenario of an enroute approach and missed approach is greyer and more often discussed.

GPH 204A Article 840 quoted above always applies which often results in the following question:

## Do we need to follow the entire published missed approach procedure?

The key is the first sentence in the GPH204A, Article 840. The published missed approach is only required "until at an appropriate minimum IFR altitude". This could be Minimum Safe Altitude (MSA), Emergency Safe Altitude (ESA), Minimum Enroute Altitude (MEA), Minimum Obstacle Clearance Altitude (MOCA), Area Minimum Altitude (AMA) or a published transition altitude such as an arc. If positively radar identified and under vectors, this could be Minimum Radar Vector Altitude (MRVA). GPH204A, Article 843 provides further guidance with:

*"The purpose of the missed approach is to enable safe transition from the **missed approach point to an IFR altitude** that will enable safe maneuvering for a subsequent phase of flight specified by further clearance and/or instructions."*

This could be a separate article but always remember that any additional instructions given by Air Traffic Controllers (ATC) are not required to be assessed for obstacle and terrain clearance. The pilot is always responsible for obstacle clearance if he chooses to follow alternate missed approach instructions [Articles 840, 842, 843].

If we consult Rules of the Air and Air Traffic Services (RAC) in the Transport Canada Aeronautical Information Manual. There is specific guidance on what is expected in the case of an enroute missed approach.

### RAC 9.26

*"If a clearance to another destination has been received, the pilot **shall**, in the absence of other instructions, carry out the published missed approach instructions until at an altitude which will ensure adequate obstacle clearance before proceeding on course."*

Enough with the references, let's have an example!

Our pilot is on an IFR round robin Comox – Powell River – Comox (CYQQ QQ A16 YPW A16 QQ CYQQ) and was cleared to destination as filed prior to departure. He filed 5,000' going east to Powell River and 4,000' going west to Comox.

Our aviator is cleared full procedure Non-Directional Beacon/Distance measuring Equipment (NDB/DME) Runway 09. Comox terminal should have given missed approach instructions [Art 413, Para 2c] but in accordance with Murphy's Law, the controller forgot and our pilot did not notice! After the low approach to "nothing seen" the pilot begins the published missed approach procedure.

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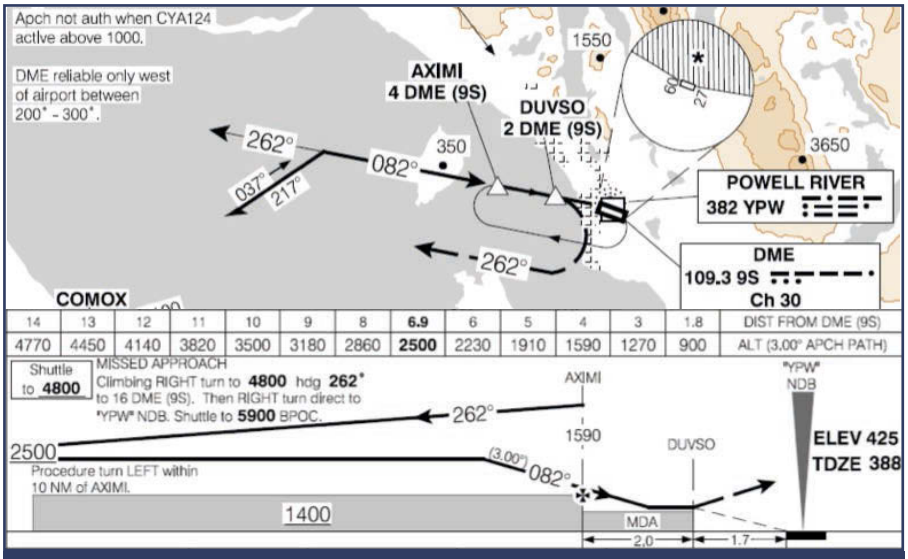


**Figure 1 - Powell River, BC**

Should the climb be terminated at 4,000', 4,800', or 5,900'? (Querying is always a good answer, but that will just bring up the dreaded lost comms scenario by your ICP).

Once again Art 840 says to fly the published missed until at an appropriate IFR altitude. Airway A16 has a MEA of 4,000' and a MEA is certainly an appropriate minimum altitude. Therefore, if our pilot is positively on the A16 during the missed approach, he would be safe at 4,000'. However, he would have to ensure that any course reversal does not exit the airway [Art 304 definition: 4.34 nm from centreline].

The published missed approach procedure was designed to allow for a safe transition from the missed approach point to either hold or proceed to anywhere else. The designer does not need to include every exception (ie, "in event of nearby alternate away from the big mountain, please do not unnecessarily climb"). His goal is to publish a procedure that will get the pilot to a location where an enroute climb of 200'/nm will ensure obstacle clearance in all scenarios. In this case, he determined that point is the YPW @ 5,900'. Since our pilot was cleared flight plan route (4,000' westbound) and never received a new clearance, a climb to 4,800' or 5,900' will result in an unwelcome ATC call and a possible CADORS coming across the desk of your friendly Division ICP.

## SUM UP!

In conclusion, fly the published missed approach procedure **until** safe. Sometimes this means that flying the complete procedure is not required, expected or even allowed. And of course, always query ATC if there is any doubt!

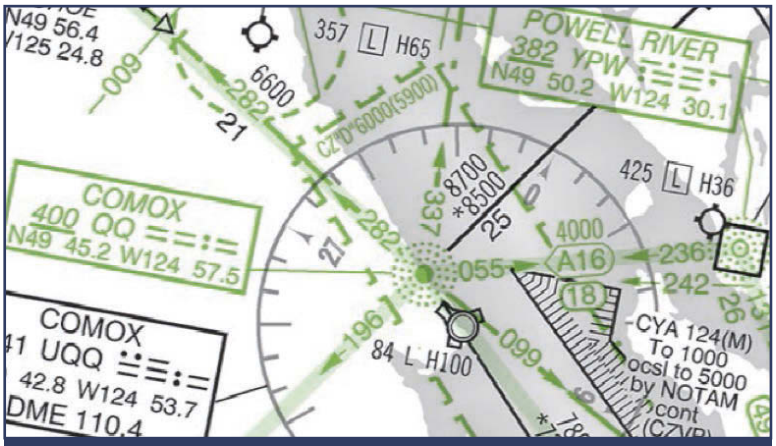


Figure 2 - Comox, BC

DOSSIER

# Cockpit Authority Gradient

Photo: Cpl Chris Boudrais

**By Major Andy Haddow, Directorate of Flight Safety 2-4, Ottawa**

Can you remember being a pipe liner, just out of the occupational training unit and being put on the flying schedule with the Squadron Commanding Officer or the Wing Commander? Or after years of flying, going on another flight with a close friend? How was the crew interaction in the cockpit or between aircraft? Did you come away with a sense of cooperation or just a number for the weight and balance? Your experience may have been a result of the cockpit authority gradient.

The cockpit authority gradient is the type of interaction between the crew or possibly between aircraft. Basically there are three gradients. A steep gradient occurs when you have a commander such as the Aircraft Captain (AC), who is high in rank or experience, and exerts command in an extremely authoritative manner. He makes all the decisions without considering input from the crew. This leads to a breakdown in cockpit communication where the crew may not speak up when they need to, as they may believe that the AC will not listen anyways. A steep gradient is generally considered the most dangerous of the three gradients. It used to be common in commercial airlines, but accidents such as the Tenerife disaster where two 747s collided on the runway, led to development of Crew Resource Management and better communication between the crew. Senior aircrew should always be thinking about developing their crew, and a steep gradient environment will not be conducive to that development. A command presence in the cockpit is a must, but not one that precludes input from the other crew members.

A flat gradient, where the crew members are usually equal in rank, proficiency, and experience, may lead to complacency between the crew. It may be because one crew member may not want to offend the other, or assumes that the other will correct the problem or complete the check. In this way, a flat gradient crew will accept more risk than in a positive gradient environment. I can remember the stage in my flying career where the pilots of my vintage all started upgrading to AC at approximately the same time. It was a great time as we were able to sign for the aircraft, make more decisions, and also start flying with friends. Looking back, I can remember flying with those friends and kidding with them by being overly critical: "You're five feet high…heading is off by two degrees…", but this soon gave way to being more lenient with them, as opposed to co-pilots or higher ranking crew. I was definitely more complacent flying with them than others. As I became a more seasoned AC, I was able to communicate more clearly with my peers and accept their input when required.

An inverse gradient is where the AC does not have an active role in the decision making process in the aircraft. The crew makes the decision without monitoring by the AC, and usually the AC will have a lack of situational awareness. This is not to be confused with an AC not making decisions for other reasons. For instance, while training a co-pilot or junior member of the crew, it is beneficial to let them make decisions, and let them run their course, even if their decision is not the ideal. The 'light bulb coming on' after they realize the consequences of their decision is a big step in their development.

The ideal cockpit has a positive gradient where there is effective communication between the crew, and there is an open environment to monitor and challenge, while respecting the hierarchy of the command structure. So next time you are flying, ask yourself "Do we have the appropriate authority gradient in this cockpit?"

# Willing and Able – But Are You Prepared?

**By Major Peter Butzphal, D/DFS 3, Directorate of Flight Safety, Ottawa**

It was early February in the Baltic Sea and my crew in our CH124 *Sea King* helicopter were finishing up a routine combined air and sea exercise as part of Standard NATO Maritime Group 1. We contacted our mother ship indicating our intentions to recover. The ship borne air controller (SAC) requested if we could modify our recovery time to fit in a short but simple task. A part located on an American warship within the task force needed to be picked up and brought back. With the other ship in close proximity and ample fuel remaining we were keen to make it happen. Besides, it gave us an additional opportunity to exercise our approach and landing proficiency to a foreign ship. It would take no more than an extra ten to fifteen minutes. "Wilco" we replied.

We were handed over to that ship's SAC and as the non-flying pilot I requested approach clearance. The sun was beginning to set and a light fog was slowly forming. We re-confirmed their location and attempted to visually acquire the ship. Since there were only five vessels in our task force at the time, it was the only vessel of that class with its distinct shape and therefore could easily be identified. By this time, the visibility had dropped to no more than two nautical miles, so outer ships in the formation vanished. Luckily I had spotted the vessel as it was the one closest to us. As we approached a mile, I noticed that its approach and deck lighting were not lit. I queried the SAC to which he replied that they were on. By this time, their ship's helicopter, which was also airborne at the time, fired off a quick call on the channel stating that the ship was "in front". "Yes, it's in front of me, I can see it, thanks," I mused. Still concerned about the lighting I asked for full intensity to which the SAC replied once more that they were.

> *"First, when faced with a change to the original mission, no matter how menial, re-group/re-fuel then re-attack; even if it means a quick five minute orbit to organize your thoughts and your crew."*

Now thinking that the lights were stuck on a low intensity, I figured I'd let that concern go. Besides, even though it was dusk, there was still enough ambient light available that we didn't need lighting. I focussed on monitoring the final portion of the visual approach. I requested a 'Green Deck' for landing and received it. The other helicopter came back on the radio, this time a little more insistent in tone however; the connotation was still somewhat hazy. "The ship is second in line…" "Yes he's behind someone, thanks," I thought.

Approaching the flight deck, something seemed odd. First, we could clearly see the lights were not on at all and surprisingly, there were people hanging out atop the hangar. During flight ops, the whole rear of a ship is normally cleared of personnel – at least in our military. I remember thinking this is how they must do business. The deck was clear so we slid over and now under the conning of the crew member at the rear door, the flying pilot was having a difficult time maintaining station safely. We kept getting commands to move forward yet we [pilots] were closer to the hangar than we wanted to be. Why was this so difficult to carry out given the fact we previously landed on this ship just days earlier? Rather than land, we opted to lower a weighted bag via the hoist so the article could be placed in it then recovered. A flight deck crew member came onto the deck, took the mail bag and disappeared into the hangar. After waiting what seemed an inordinate amount of time for a simple part to be placed in a bag, our crew member then noticed something strange about the markings on the flight deck. They did not form part of the ship's name (often the

first and last letter). “I don’t think this is the right ship” he commented. “What?” In an instant, the situation became clear and an eerie silence fell upon the whole crew, only to be broken by the crackle on the radio of our ship immediately calling for us to recover. What the heck happened? Calmly, we made the quick jaunt over to our ship and landed without incident. We regrouped and debriefed the events leading up to the last fifteen minutes of our mission whereby we made an approach and almost carried out a landing to an incorrect vessel. As we were current and proficient in carrying out such a task, in fact we as a crew were not exactly prepared for it.

In the end, the ship in question was part of the task force (TF). It arrived on station while we were airborne. We knew from briefings earlier that week that this vessel was to join the TF; however, up until take off, there was no clear indication as to when. Second, the vessel itself added to the confusion. It was an identical class of ship to the American one we had already in formation but with one major albeit imperceptible difference: it was a ‘short-hull’ model and was a meagre 8 feet shorter in length. That 8 foot difference however made it uncertified for landing operations for aircraft of our size. These two factors, in addition to the misinterpreted hints from the other helicopter crew combined to create what would normally be considered a simple task to a potentially dangerous situation had we opted to land on that flight deck. The lesson to be had in this incident is three-fold: First, when faced with a change to the original mission, no matter how menial, re-group/re-fuel then re-attack; even if it means a quick five minute orbit to organize your thoughts and your crew. Secondly, take heed of the abnormal and trust your instincts. Let your concerns be known so that others might contribute in order to clarify any uncertainty. Finally, pride has no place in the aircraft. Be clear, regardless whether you are the one giving assistance or you are the one receiving it. Had a crash occurred, there would have been a lot more to save than just our face.

Photo: Sdt Dan Bard

# Deer-*miss*

**By Captain Jason Munn, Flight Safety Officer, 12 Wing Shearwater**

While driving on highways throughout the vast wilderness, that is our wonderful country, we are often presented with road-side warnings to beware of wildlife which could jump out in front of us at any given time. One of my favourites is the sign showing the giant moose next to the small car:


Not too long ago, I was in the circuit with a student as dusk approached. It was a nice summer evening, the student seemed to have his gyros caged, and I was looking forward to a steak dinner at home. I set the helicopter on the button and asked the student to show me a power-limited rolling takeoff. We were on the roll with the wheels still on the ground when out of the corner of my eye I saw movement where there shouldn't be movement. Once my mind registered the deer on the grass at the edge of the runway I valiantly verbalized "DEER!", then quickly followed up with "I HAVE CONTROL!" and hauled the mighty CH124 *Sea King* into the air as the deer passed uncomfortably close under our wheels.

As we joined cross-wind we informed Advisory of the situation and on downwind they informed us of several more deer also crossing the active runway. We acquired the animals visually and proceeded to use our machine to motivate them away from the active runway.

I hauled in a number of important learning points from my "Deer-miss". Specifically:

- Our airfield Wildlife Control Officer (WCO) is only on site for a normal working day and, as such, when the WCO is away, the animals will play!;
- As any hunter can attest, deer are more active around dusk and dawn than any other time of day; and
- Deer are pack animals. Where there is one, more are sure to follow.

That evening I reflected on these lessons over a very tasty non-deer steak!

Photo: DND

# Look Out the Window!

**By Corporal Martin Freeman, Air Traffic Control, 19 Wing Comox**

The Control Tower is the nerve center of Air Traffic Control; this is where a handful of us work at 19 Wing Comox. Some of us are ground controllers some of us tower controllers, either way, we all have one job to do: manage the safe, orderly and expeditious flow of air traffic. Now how do we do this? It is quite simple really, send your request via the assigned radio frequency and we will do our best to get you where you need to go. Ok, maybe it is not that simple.

When controlling ground traffic you not only need to know who you are talking to, but where they are on the airfield, this is where those windows come into play. A quiet shift in Comox consists of 10-15 arriving and departing aircraft. I know that doesn't sound like a lot, you might be surprised! Even just 5 aircraft and vehicles can be very busy. Now let's add some airfield maintenance. This is always a joy for the ground controller.

Picture this: seven vehicles located on the main runway, all at one of the arrestor cables, all with very similar call signs, and all with the same restrictions on the airfield that is, to hold-short of runway 18/36. At this point you are probably thinking that doesn't seem too difficult. In a sense you are right. But let's look at what made this challenging. During any period of work on the aerodrome, there is a lot of close communication in the tower cab and on the aerodrome with vehicles and aircraft. Sometimes there is a lot of information being passed to vehicle traffic, such as inbound and outbound aircraft, to keep them 'in the picture'. All of a sudden, a vehicle crosses runway 18/36 with no authorization from you. This is a very dangerous thing to do. Luckily, there was no traffic landing on the runway and the ground controller had control of the surface; the driver of the vehicle realised what he had done and stopped immediately after clearing the runway and contacted the ground controller on the radio.

Looking out of the windows and watching your traffic is an important part of the job. You can't see into the future and know what is going to happen you need to watch your traffic and constantly adjust your plans to meet the current situation. At the end of the day, always look out of the window; they were not just put there to look good!

Photo: MCpl Marc-Andre Gaudreault

# Aviation and Artillery: A Three-Dimensional Problem

By Captain Jamie E. Hill, Troop Commander, Royal Canadian Horse Artillery, Canadian Forces Base Petawawa

As an artillery officer, my experience with aircraft has been quite limited up to this point. However, upon completion my Surveillance and Target Acquisition Officer's Course I was assigned as the new Mini Unmanned Aerial System Troop Commander (MUAS TC). Although I have yet to have any significant experience with aircraft in my new position that will include me being the Flight Safety Officer for both the Second Regiment Royal Canadian Horse Artillery (2 RCHA) and the Royal Canadian Dragoons, which is the reason I've been put on the Flight Safety Course, I have had some safety related experiences with aircraft in the past.

In the contemporary operating environment, airspace deconfliction between artillery and aircraft has been a concern for all involved. However, throughout my employment in 2 RCHA, I have seen aircraft fly into unsafe areas and in front of live guns despite ranges being booked and all other safe requirements having been met. In my first year as a troop commander we were deployed at Centre Lake in Petawawa with a Battery of M777 Howitzers. Part way through the day, during a fire mission, two CH146 *Griffon* helicopters flew directly through our gun target line about 2kms to our front, which not only put them at risk of being hit when we fired, but also put them at risk when the rounds impacted. Due to the fact that safety is paramount, the guns were placed in check firing immediately when the *Griffons* came into our forward arc and not taken out of check firing until they were well clear. The concern being, that this could have taken place at night or another time when we may not have seen them, which could have had grave results.

This experience has afforded me the opportunity to see the difficulties that operating in the air present when there are artillery units operating in close proximity. Furthermore, I will be able to apply these lessons when working as a MUAS TC in the future. This will be a critical concern when we start using the Raven B for UAS fire missions because maintaining the safety of the aircraft will be vital.

Photo: MCpl Robert Bottrill

# Latent Conditions

**Warrant Officer Deanna Murray, Directorate of Flight Safety 2-5-2, Ottawa**

While carrying out airworthiness audits during my time working at A4 Maintenance, 1 Canadian Air Division, I was frankly quite stunned to see some blatant 'working environment attitudes' in disregard to policies and technical orders. In the old days it fell under "this is always how we did it." These factors are known as Latent Conditions in the Flight Safety world. Latent conditions "covers underlying conditions that influenced or predisposed the Unsafe Acts to take place during a Flight Safety occurrence". These conditions may be in place with the individual implicated in the occurrence or located at any level of the supervisory or organizational chain of command.

While auditing the new CC130 *Hercules* Squadron an airplane was observed up on jacks with no signage anywhere notifying personnel of the danger. When the training desk was approached, they stated it had been handed over to the servicing desk. When it was brought to the servicing desk's notice they stated it had just been handed over to them at the first of the week and it was now Thursday. Upon debriefing to the Squadron Aircraft Maintenance Engineering Officer, it was stated that they have been short of signs for quite some time and should order some.

Another situation of latent conditions was observed while visiting one of the CH146 *Griffon* units carrying out an inspection on the petroleum, oils, and lubricants locker. It was found that numerous cans of oil and hydraulic fluid was time expired. When questioned why it was being retained as it was forbidden to use on aircraft. The answer given was that it was still good to use in other equipment and they've never had a problem.

Latent conditions may lie dormant or undetected for hours, days weeks, or longer until one day an "unsafe act" occurs. Latent conditions can and must be recognized as an unsafe condition before it becomes an unsafe act!

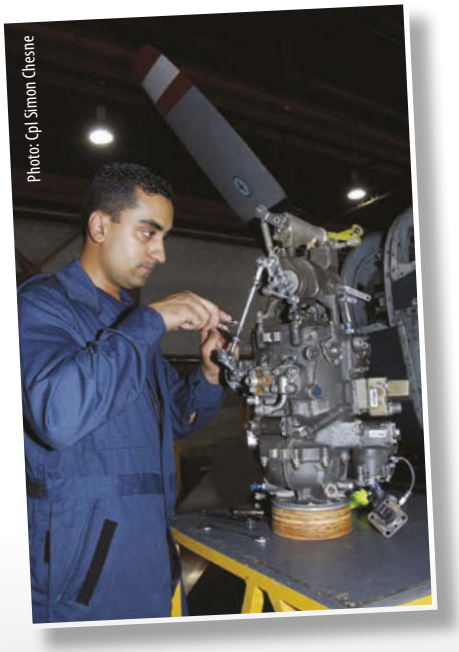
Photo: Cpl Simon Chesne


Photo: Pte Isabel Lavelle-Raby


Photo: Cpl Frieda VanPutten

# Questioning Impossibility

**By Captain Marlon Taylor, 2 Canadian Forces Flight Training School, 15 Wing Moose Jaw**

As a qualified flying instructor from 15 Wing Moose Jaw, I am often relying on referencing my experiences and training. This is a short story of how something that seemed to be impossible was in actuality probable and dangerous.

Almost all Royal Canadian Air Force pilots are familiar with the CT156 *Harvard II* aircraft, having logged many hours in it. We all know that its propulsion comes from a nearly 8 foot diameter propeller, but not many pilots have considered how much air is separating that propeller from the very solid ground they taxi on.

On a recent flying proficiency mission to Winnipeg International Airport, a fellow flying instructor and I were confronted with the dilemma of evaluating factuality with potential. Shortly after starting up the PT-6A turboprop and commencing our taxi clearance for a runway 31 departure, we experienced what both of us considered to be a dip in the apron followed by a 'thump'. Neither of us considered this to be anything more than the front landing gear oleo extension bottoming out. We proceeded.

A short time later, while transiting westbound for Moose Jaw in the flight levels, we were relayed a message by Winnipeg center, to this affect. "*This is a strange request*", he stated with some hesitation, "Someone on the ramp said they think your propeller may have struck the ground while you were taxiing."

> ***"Someone on the ramp said they think your propeller may have struck the ground while you were taxiing."***

There was a short silence in our cockpit while we pondered the validity of what we just heard. After a quick but thorough evaluation we decided to cautiously press on to our destination.

Upon landing at 15 Wing Moose Jaw our questions were answered by the image of four propeller blades slightly shorter than they were when the ground crew saw them last.

To conclude this little tale of what could have been; we had over 1,000 hours of experience in the Harvard II and neither of us believed that the potential for a propeller touchdown in this scenario was possible. We were fortunate enough to have learned a valuable lesson on potential. So next time you are unsure, please remember that anything can happen in the world of aviation.

Photo: DND

# From the Investigator

**TYPE:** CH12424 *Sea King*
**LOCATION:** CYA 102, South of Victoria, BC.
**DATE:** 2 December 2014

The crew was conducting an Operational Training Unit (OTU) pilot tactical instructional trip off Vancouver Island when the occurrence took place. The crew was conducting a free stream manoeuvre, which requires the helicopter to climb vertically from the hover, in order to lift the sonar cable and transducer from the water without the transducer being dragged. As the occurrence aircraft was a CH124B model, it was not equipped with a sonar, so the sonar procedures were simulated.

The free stream was conducted by the student pilot under a blind flying hood with the flight control auxiliary hydraulic system selected off. As the helicopter climbed through 300 feet, pitch attitude increased and the helicopter started to drift backwards and downwards. The instructor pilot took control and attempted to stabilize the aircraft and descent rate. However, instead of stabilizing, the descent rate increased significantly and an attempt was made to fly out of the descent. With insufficient altitude, the instructor pilot levelled the aircraft and cushioned the landing on the water.

After an assessment of the aircraft condition, the crew lifted off from the water and returned to Victoria International Airport.

The preliminary investigation has indicated that the helicopter was serviceable at the time of the incident. The investigation will focus on human factors as well as supervision during deployment planning.

On note, this occurrence is classified as a Class II investigation based on the Safety of Flight Compromise Level (SFCL) of HIGH. There were no injuries to personnel. Damage to the aircraft is being assessed.

Photo: DND

# Epilogue

**TYPE:** CH149910 *Cormorant*
**LOCATION:** Greenwood, Nova Scotia
**DATE:** 16 November 2012

A technician was carrying out a torque check and nut replacement of the bolted connection between the CH149 *Cormorant* helicopter main gearbox (MGB) upper case and the main case when a lock-ring stud failed in overload. Additionally, several other lock-ring studs at the bolted connection were overtorqued and, consequently, the MGB was declared unserviceable and returned to the Original Equipment Manufacturer (OEM) for strip-down inspection and repair. The torque check was part of an on-going recurring inspection, detailed in an OEM-issued Mandatory Service Bulletin (CSH-A63-206), and was being conducted during a 300 hour periodic inspection.

The extent of the damage and the complexity of the ground accident circumstances required the Directorate of Flight Safety to investigate. The investigation determined that the lock-ring stud failed in overload due to application of excessive torque. A number of errors contributed to the overload failure, including misidentification of the MGB main case, inadvertent confusion between metric and imperial torque units, and inappropriate technique. The investigation also determined that the torque check procedure had created a significant maintenance burden and was poorly understood by technicians, resulting in numerous routine short-cuts and unauthorized deviations to the procedure, and that similar errors had occurred on other MGBs. A number of collateral observations were also made, including lack of feedback of data to the OEM, the determination of the approved parts list for the CH149 MGB, and unit quarantine procedures.

Preventive measures included improvements to the torque check procedure, upgrading of the MGB studs, converting to metric for maintenance activities, and improving OEM processes and interaction with the CH149 In-Service Support Contractor.

Photo: DND

Photo: DND

# Epilogue

**TYPE:** CT155201 *Hawk*
**LOCATION:** Cold Lake, Alberta
**DATE:** 10 June 2011

A crew of two qualified instructor pilots were conducting an instructor upgrade sortie, including a wingman syllabus mission, in a British Aerospace Systems Hawk aircraft when they heard a loud bang and noticed an increasing turbine gas temperature. They then discontinued their training, analysed the aircraft systems, and turned the aircraft towards the Cold Lake airport.

The pilots set a medium engine power setting and commenced a shallow climb above 12,000' above mean sea level. After receiving their wingman's report of smoke emanating from their aircraft and after noticing an increase in engine vibrations, the pilots shut down the engine. Shortly thereafter, after determining that insufficient altitude remained to glide to the Cold Lake airport, they attempted to restart the engine. During the restart, the wingman reported flames coming from the lead aircraft, after which the pilots then discontinued the restart and resumed their glide.

Unable to reach a runway, they carried out a controlled low level ejection. The pilots parachuted in to a shallow swamp, receiving minor injuries, while the aircraft crashed and was destroyed.

The investigation concluded that the *CT155 Hawk* Adour Engine low pressure turbine (LPT) blade, which had a history of fatigue cracking at the trailing edge rear acute corner, failed prior to reaching its design life.

Four preventative measures were implemented to address LPT blade fatigue cracking, failing and liberation. Additionally, the LPT blade design life was reduced to from 2,000 to 500 hours; it is expected that a new certification will return the design life to 2,000 hours by 1 March 2016.

Additional significant recommendations addressed pilot emergency handling procedures, forced landing glide profile determination, aircrew life support equipment, and amending *CT155 Hawk* pilot manuals and checklists.


Photo: DND


Photo: DND

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