



National  
Defence

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nationale

# Flight Comment



ISSUE 3, 2009



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Canada



# Views on Flight Safety

*By Colonel Christopher Coates, Commander 1 Wing*

From November 2008 until the end of May 2009 I had the privilege of being the first commander of the Joint Task Force Afghanistan (JTF-Afg) Air Wing, established at Kandahar Airfield. The implementation of the JTF-Afg Air Wing has been noted as the first Air Force commitment of its size and nature in a combat operation since the major Air Force deployments of WWII. As such, the JTF-Afg Air Wing was the first opportunity to incorporate Flight Safety as it currently exists as part of a formation conducting combat operations. Flight Safety was integral to the success of the stand up of the Wing and was an essential enabler to operations.

The Air Wing presented countless challenges and extraordinary risks. It incorporated already functioning capabilities (the South West Asia Tactical Airlift Unit for example), fixed wing and rotary wing operations, and UAVs. It also included capabilities that did not exist domestically and others that did, as well as commercial contractors that maintained some capabilities and operated others, and all of this in an extreme environment and with the distinct probability of contact with a determined enemy. In these challenging

circumstances there was little room for any Wing activities that did not directly contribute to operational success. Flight Safety stepped up, and time and time again its operational value was clearly proven.

To ensure that Flight Safety contributed to the mission, it was exploited in theatre as another of the risk management tools serving the Commander. It was not ever, during my period in Afghanistan, held up as a “red card” to impede, slow down or stop operations. However, Flight Safety was frequently a “yellow card” identifying legitimate risks that needed to be resolved to ensure continued maximum operational capacity. In these instances Flight Safety identified problems that had escaped other command oversight processes and that could have done far more harm in the long run had they not been detected and addressed expeditiously.

Flight Safety provided a common language and mechanisms to identify and communicate risks, and it ensured a linkage to the domestic fleets to help assess the threats observed in theatre. For the new CU170 Heron UAV operations, the in-theatre Flight Safety

program provided a strong means of dealing with industry and the contractors supporting the operation. Flight Safety afforded a mechanism for addressing common concerns with our allies and for resolving problems in one of the busiest military airfields in the world. When an incident involving the Wing’s aircraft was the result of enemy action, Flight Safety left the investigation and follow-on activities to the operational chain and supported the operational decisions. A robust Flight Safety program contributed credibility to our flying operations and provided reassurance to those within the Air Force and in the operational chain of command with respect to the correctness of our activities.

Some within the Wing as well as those outside of it were initially suspicious that the CF’s Flight Safety program would not function effectively alongside the operational imperatives of a combat mission. Through increased understanding of the Flight Safety programme and the concerted efforts of all those involved, I am confident that these concerns and doubts have been put aside and that Flight Safety has established itself as an indispensable element of operations in theatre. ♦



Cover: Private Galen Slingerland (right), 3rd Battalion, Royal Canadian Regiment and his fellow riggers for Kandahar National Support Element, attach a load to the CH147 Chinook helicopter during hoisting drills at Kandahar Airfield.

Photo: MCol Robert Bottrell



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# Flight Comment

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# Good Show

*For Excellence in Flight Safety*

## Corporal Troy Randell and Corporal Frédéric Sauvageau

**O**n 18 January 2009, Cpl Troy Randell, an aviation technician with Canadian Helicopter Force (Afghanistan), was returning from completing maintenance actions on a CH147 *Chinook* helicopter at the Kandahar Air Field (KAF), when he noticed a piece of metal on the ramp. He immediately recognized the component as a Centrifugal Droop Stop Block, a critical part of the *Chinook* aft rotor head droop stop system. Realizing that CH147204 had just taken off, he informed a fellow co-worker, Cpl Frédéric Sauvageau, of his discovery. The two technicians, under their own initiative, immediately inspected the remaining aircraft on the ramp and in the hangar to ascertain if any helicopters were missing the discovered component.



**Corporal Sauvageau (left) is currently serving with 439 Combat Support Squadron, 3 Wing Bagotville.**

**Corporal Randell (right) is currently serving with 444 Combat Support Squadron, 5 Wing Goose Bay.**

The remaining CH147s were all found to have their droop stops installed, and they concluded that the component belonged to the airborne aircraft. They immediately notified their supervisor of the discovery and actions completed. Canadian Helicopter Force (Afghanistan) Operations was notified, and immediate contact was made with the departed helicopter. CH147204 returned to KAF and landed at the Dangerous Air Cargo ramp, where the aircraft was safely downloaded of all ammunition, weapons and personnel. A deflection ramp was positioned on the port side of the fuselage and the aircraft was allowed to run out of fuel. The absence of the droop stop caused the aft rotor blade to drop lower than normal, striking the deflection ramp several times and causing very serious damage to the rotor blades and aft pylon.

The decisive actions taken by Cpl Randell and Cpl Sauvageau not only precluded the loss of a valuable aviation resource but also prevented injury to the flight crew. Had the helicopter shut down without the crew's knowledge of the missing centrifugal droop stop block, the blades would have cut through the center fuselage, resulting in the loss of the aircraft and possible serious injury or death to the crew members. The discovery of the component allowed the Canadian Helicopter Force (Afghanistan) Chain of Command to develop a viable action plan, including the use of the deflection ramp, to save the lives of the crew and to prevent the complete loss of an aviation asset. Although damage to the helicopter is significant, the aircraft is repairable and will fly again.

Cpl Randell and Cpl Sauvageau are to be commended for their exemplary level of diligence and professionalism in identifying a serious fault that posed a grave threat to the aircraft and crew. Their actions were exceptional in light of their limited experience on the CH147 helicopter, having only completed training a few months prior to the deployment. Both Cpl Randell and Cpl Sauvageau are truly deserving of the Good Show award for their outstanding diligence, well beyond the call of duty. ♦



# Good Show

*For Excellence in Flight Safety*

## Mr Oleg Redko

**O**n 21 April 2009, a Mi-8 helicopter was tasked for a re-supply mission at a Forward Operating Base (FOB) in Afghanistan. The contracted company procedures require that the loading and unloading of Mi-8 helicopters at FOB's in Afghanistan be conducted with rotors turning in order to minimize the helicopters time on the ground. Mi-8 loading and unloading operations are conducted through a set of clamshell doors below the tail boom at the rear of the helicopter fuselage. Flight Engineer Oleg Redko was overseeing unloading operations of this helicopter. This procedure is conducted with a high degree of risk and requires absolute attention in order to avoid becoming disorientated and overwhelmed by the functioning machinery and pace of activity. On the morning of the occurrence, Mr Redko saw a Canadian military member approaching the Mi-8 from the rear impervious to the extreme danger of the situation. Mr Redko attempted to signal the approaching member but his efforts went unheeded. Realizing that the individual was in immediate danger, Mr Redko rushed towards the person and physically stopped his movement approximately one metre from the spinning tail rotor. Post occurrence testimony revealed there was no doubt in the minds of witnesses that Mr Redko's decisive action clearly averted a tail rotor collision that would have resulted in a catastrophic personnel injury or death.

Flight Engineer Oleg Redko's absolute concern for the well-being of all fellow personnel played a paramount role in safeguarding a Canadian military member's life. His ability to retain absolute focus in extremely hazardous and chaotic environments enabled Mr Redko to contribute significantly to the Canadian mission in Afghanistan. Mr Redko's actions are highly commendable and he is clearly deserving of this Good Show Award. ♦



**Mr Redko works for SkyLink Aviation Inc.**



## From the Flight Surgeon

# What Happened to My Flight Surgeon?

By Lieutenant-Colonel Pierre Morissette, 1 Canadian Air Division Surgeon

What happened to my flight doc? There's a question many a Wing Commander and Squadron Commanding Officer (not to mention other aircrew) have been asking themselves in recent times. The lack of flight surgeon presence on the flight line has become so conspicuous at our various Wings and flying detachments of late as to have been repeatedly identified in Flight Safety Investigations (FSI) and Flight Safety surveys as a significant flight safety concern. By all accounts, flight surgeon interaction with aircrew is at an all time low. How could this have happened? Is it the result of progressive civilianization of our medical clinics, a chronic lack of uniformed medical officers (and therefore flight surgeons), or has there been some change in Health Services policy that has led to decreased flight surgeon presence on the flight line? Have the fundamental roles of the flight surgeon changed to reflect the reality of providing flight medicine services to a 21<sup>st</sup> century Air Force? If, like me, you're wondering what happened to your flight surgeon, then I urge you to read on and find out. The answer might surprise you. . .

Many of the FSIs and Flight Safety surveys conducted between 1999 and 2009 have cited either *lack of flight surgeon presence on the flight*

*line or lack of flight surgeon access* as a significant flight safety concern. So why is the lack of flight surgeons a concern at all? Well, aside from the obvious approach flight surgeons routinely use to prevent the potentially disastrous consequences of unrecognized or otherwise unmitigated medical illness and injury to aircrew (i.e. aircrew medicals, sick parade visits, etc.), there are a few lesser known strategies which help bridge the gap between the aircrew and flight surgeon "worlds" that, when not practiced, have the potential to seriously undermine the flight surgeon's natural role in aircraft accident prevention. More specifically, in order to be maximally effective, all flight surgeon's must: (1) develop and maintain rapport with aircrew, and (2) acquire and maintain familiarity with air operations through frequent visits to the flight line and flying on a regular basis. These two responsibilities have always presented flight surgeons with what is probably their most significant departure from their traditional role as physicians. Despite their relatively straightforward appearance, these responsibilities remain fundamental to the practice of flight medicine and are considered vital to mission success. Sadly, they are the two flight surgeon responsibilities most often ignored.

So what does it mean to develop and maintain rapport with aircrew? In plain terms, "rapport" is a "relation marked by harmony, conformity, accord, or affinity."<sup>1</sup> How often have you seen this kind of relationship between aircrew and their flight surgeons? It happens but is rare to be sure. The painful truth is that the relationship between aircrew and their flight surgeons has all too often been characterized by avoidance, suspicion, secrecy or even contempt. For example, an aircrew member may avoid his flight surgeon because of fear of being grounded. A flight surgeon may equally avoid aircrew in an attempt to evade the stresses of flying (e.g. G-forces, disorientation, motion sickness, etc.) or because there is an endless line-up of patients outside their door. An aircrew member may be suspicious that a flight surgeon will hold greater allegiance to the CF than to the member. A flight surgeon may be equally suspicious that an aircrew member is misrepresenting an illness or injury for personal gain, such as to facilitate a premature return to flying or, alternatively, to profit from compensation benefits for a disability. An aircrew member may hold back important medical information in order to avoid jeopardizing a particular flying mission, an impending promotion, or their career.





Photo: Pie Vicky Lefrançois

Finally, a flight surgeon may be considered responsible for the loss of several unit members to sick leave during a period of high operational tempo and therefore be disliked by a unit supervisor.

Have we then doomed the aircrew-flight surgeon relationship to failure from the very beginning? Not so, in my opinion, if we agree to communicate openly and honestly with each other. Frank discussion between aircrew and their flight surgeons on any of the above topics will go a long way toward bringing individual viewpoints to the fore. Some individuals may

not see eye to eye on all matters and may even have to part ways at times. Others, through their discussion, will end up building the foundation for a prolonged mutual understanding. This is the essence of rapport. Good rapport translates into aircrew seeking out their flight surgeons earlier in the disease process, leading to earlier diagnosis and treatment, shorter (if any) grounding times, and improved clinical and operational (i.e. flight safety) outcomes. In some cases, good rapport can mean a five minute phone call replaces a one hour visit to the medical clinic because a flight surgeon trusts that the information received over the phone

is accurate. Bad rapport can lead to aircrew choosing to fly with what is perceived to be a relatively minor medical condition instead of reporting the condition to the flight surgeon and receiving advice not to fly. Even something as simple as an ear block can lead to distracting ear pain, eardrum perforation, alternobaric vertigo and, as a consequence, an aborted mission or worse. What a perfect Air Force it would be if both its aircrew and flight surgeons came with rapport as a standard part of their "scales of issue".

What about flight surgeons visiting the flight line and flying on a regular basis? Well, a common understanding of the operational demands and environmental stressors under which aircrew must routinely perform is an essential characteristic that flight surgeons possess and most civilian physicians do not. In addition, speaking the same language is one of the most reliable means of ensuring effective communication between two people, including a doctor and their patient. This is yet another trait that flight surgeons and aircrew have in common. I recently heard the former Commander of 1 Canadian Air Division say, "flight surgeons need to be within sight and smell of the flight line." Why should this be necessary if not to build a better understanding of the Air Force and its mission? There is at least one other advantage to having a flight surgeon on the flight line — accessibility. Sometimes an

*"Preventive Medicine (Aerospace Medicine is actually a specialized type of Preventive Medicine), which devotes itself to the notion of keeping people out of medical clinics and hospitals by preventing illness and injury altogether"*

aeromedical briefing at the squadron, or even a passing conversation in the hallway, can avert an entire visit to the medical clinic by providing a timely answer to a nagging personal question. In my experience, education is one of the best ways to alleviate medical worries and to empower individuals to look after themselves by engaging in healthy practices. This is so important as to warrant its own medical specialty, Preventive Medicine (Aerospace Medicine is actually a specialized type of Preventive Medicine), which devotes itself to the notion of keeping people out of medical clinics and hospitals by preventing illness and injury altogether. The relatively low-tech practice of Preventive Medicine has the potential

to save federal and provincial governments millions (if not billions) in health care dollars each year. Unfortunately, low-tech usually equates to low lustre which seldom raises either public or political interest and will never draw big prime time television ratings comparable to those of "ER", "House", or even "Scrubs".

So, that brings us back to our original question, "What happened to my flight surgeon?" Is civilianization of our medical clinics to blame for the lack of flight surgeon presence on the flight line? No, it isn't. In fact, introducing civilians into our medical clinics was actually intended to allow uniformed medical officers (and flight surgeons) the opportunity to leave the clinic in order that they might engage in flight line or other operationally essential activities more easily and more often. What about the lack of medical officers? This might

be a contributing factor. . . although the future is looking brighter with the recent attainment of preferred manning levels for CF medical officers in APS 2009. This should eventually translate into more flight surgeons at Wings and flying detachments as we train more flight surgeons over the next few years. What

about new Health Services policy? No, though we like to blame Ottawa for all our woes, there is no high-level Health Services conspiracy that has been drawing flight surgeons back into CF medical clinics. After engaging a group of CF flight surgeons in frank discussion on this topic earlier this year, I think the change may actually be due to some form of corporate "amnesia" that has resulted in our organization slowly forgetting how critically important a flight surgeon's interaction with aircrew on their own home turf is to rapport-building, to learning the operational jargon and mission demands, and ultimately to flight safety itself. It doesn't appear to be flight surgeon philosophy that has changed to better serve a 21<sup>st</sup> century

Air Force, rather, it's the 21<sup>st</sup> century flight surgeon that seems to have been allowed, even encouraged in some cases, to ignore their most important responsibilities and, in essence, ignore their commitment to serve the Air Force and the aircrew that comprise it. It's time we renewed that commitment.

In the end, I can honestly say that I have gained a great deal of personal and professional satisfaction over the years from caring for aircrew. Aside from the pure pleasure I've derived from sticking other people with pointed objects, I have always appreciated the fact that most aircrew, unlike many of my other patients, actually listen to the health advice that I have to offer. This should come as no surprise since most aircrew are highly motivated to getting back to what they love, namely flying. As a flight surgeon, I advised them as best I could on how to make that happen sooner. With a unique understanding of the stresses of flight, of human factors, and of the strategies that exist to prevent illness and injury during the course of a normal working day in the Air Force, flight surgeons have the knowledge and experience required to make a tremendous impact on flight safety. Can we really do anything about the lack of flight surgeons on the flight line? Well. . . I remain optimistic that we can. For my part, I will keep pushing them out of their offices. For your part, I encourage you to keep pulling them back into your squadrons. Together, we can put flight surgeon expertise back on the flight line where it belongs and we can all help prevent aircraft accidents in so doing. ♦

## Endnotes

1. Merriam-Webster Online Dictionary. Retrieved July 23, 2009 from <http://www.merriam-webster.com/dictionary/rapport>



# Flight Comment



## Flight Comment would like to hear from you!

We know there are some great experiences out there waiting to be told, so how about writing them down. How are you accomplishing your job or mission safely? Do you have a Lessons Learned story that others may benefit from? Are you using new technology or new equipment that makes your job or workplace safer? Any other topics that will help others improve flight safety at their units would be excellent!

The Flight Comment editor can be reached at [dfs.dvs@forces.gc.ca](mailto:dfs.dvs@forces.gc.ca).

**Let's hear from you!**



Photo: MCpl Robert Bottrill

## The Editor's Corner

Here we are at the final 2009 edition of Flight Comment. It has been a very busy year for the folks here at DFS, and we hope 2010 will prove to be a successful and safe year for you and your family.

Several articles in this issue aim to highlight the operations that the Air Force has been involved with in Afghanistan and the role that Flight Safety has played. We commence with an article by Colonel Coates, the first Wing Commander of the Joint Task Force Afghanistan (JTF-Afg) Air wing. In his article, he expresses

the important role the Canadian Forces Flight Safety program played in the success of the Air Force mission in theatre. We are also proud to highlight two Flight Safety Good Show awards and one For Professionalism award that were presented to personnel for actions taken during their tour in theatre. During this past year, our Flight Safety team was called to investigate the first accident with the JTF-Afg Air wing involving fatalities. The initial findings into this investigation can be found in the 'From the Investigator' section.

From all of us at the Directorate of Flight Safety, we wish you a safe 2010, and we hope you can attend the 2010 DFS annual briefing coming to your Wing soon!! ♦

**Think Safety, Fly Safe!**

**Captain Kathy Ashton**  
Editor, *Flight Comment*



# CHECK SIX

The following poem was originally printed in the May/June 1956 issue of Flight Comment. It is a humorous anecdote regarding the role of co-pilot's as seen by the author some fifty years ago! Thankfully the role of the various aircrew members have changed over the years with the help of crew resource management training, human performance in military aviation training, and the increased knowledge of the importance of human factors. All issues of Flight Comment can be viewed on the DFS website: [www.airforce.forces.gc.ca/dfs](http://www.airforce.forces.gc.ca/dfs). ♦

**Enjoy!**





## *Co-pilot's Lament*

I'm the co-pilot, I sit on the right;  
I'm not important, just part of the flight.  
I never talk back lest I have regrets,  
But I have to remember what the pilot forgets.  
I make out the flight plans, study the weather,  
Pull up the gear and stand by to feather;  
Fill out the forms and do the reporting,  
And fly the old crate when the pilot's a-courting.  
I take the readings, adjust the power,  
Handle the flags and call the tower;  
Find out positions on the darkest of nights  
And do all the bookwork without any lights.  
I call for my pilot and buy him cokes,  
I always laugh at his corny jokes;  
And once in awhile, when landings are rusty,  
I'm right on spot with a 'Gawd but its gusty'.  
All in all I'm a general stooge  
As I sit on the right of the man I call "Scrooge".  
I guess you think that is past understanding.  
But maybe someday he'll give me a landing.

# Thinking Outside the (Black) Box

By Linda Werefelman

**This article was originally published in *AeroSafety World* August 2009. It is reproduced here with the kind permission of the Flight Safety Foundation.**

The fruitless search for the flight recorders from the Air France Airbus A330 that crashed into the Atlantic Ocean on June 1 has stirred new interest in the development of alternate methods of delivering vital black box data to accident investigators.<sup>1</sup> One alternative — the deployable flight incident recorder — has been in use for decades on military aircraft; the future of a second alternative — transmission of flight data to a ground station — is intertwined with technological advances that are improving computer data transmission between air and ground. “Both ideas have advantages and disadvantages that must be carefully evaluated,” said Sandy Angers, a spokeswoman for Boeing Commercial Airplanes. In almost all crashes, the flight data recorder (FDR) and cockpit voice recorder (CVR) are recovered without much difficulty. But on some occasions, as in the case of the Air France A330 and a Yemenia Airways A310 that crashed in the Indian Ocean on June 30, 2009,<sup>2</sup> the search has gone on for weeks or months — continuing even after the end of the 30-day period in which underwater locator beacons, or “pingers,” transmit signals to alert searchers to the location of the boxes. Historically, most accidents in which flight recorders have been pronounced

“not recoverable” have not been in water but rather in “unusually inhospitable terrain, such as mountaintops,” Angers said. Years ago, recorders sometimes were so badly damaged by post-impact fire or by water that some of their information was irretrievable. In recent years, however, as solid-state digital media have replaced tapes, this has happened less frequently, said James Cash, the U.S. National Transportation Safety Board’s (NTSB’s) chief technical adviser for recorders. “If anything, it’s fire that did the recorders in,” Cash said. “We’ve never lost one because of impact damage, but . . . older, tape-based units were more easily damaged by fire.”

## Closer Look

Current standards call for large commercial airplanes to be equipped with an FDR and a CVR installed separately — not in a single combined unit. In the aftermath of the Air France crash, however, some in the industry pressed for a closer look at other methods of collecting flight data and of recovering the information in the event of a crash. The deployable flight recorder (Figure 1) was developed in response to a suggestion made in the 1960s by the National Research Council of Canada, which expressed concerns about locating aircraft that crashed in remote areas and proposed “some form of detachable and automatically activated ELT [emergency locator transmitter] system.”<sup>3</sup> Deployable recorders were developed and have evolved into combined FDR/CVR units that incorporate an ELT. Such units have been installed for

25 years in military aircraft and in helicopters used in North Sea energy exploration. In that time, about 110 military aircraft equipped with deployable recorders have crashed, and all 110 recorders have been recovered for use by accident investigators, said Peter Connolly, vice president and general manager of DRS Technologies, which manufactures the devices. The recorders are housed in an airfoil unit that is automatically ejected when on-board sensors determine that the aircraft is crashing. “That’s the smart part — it goes away from the crash,” Connolly said. The deployable recorder’s ELT immediately transmits the aircraft identification number and its longitude and latitude to the Cospas-Sarsat Programme, the international network that coordinates the detection of distress signals. If the aircraft crashes in water, the airfoil unit floats. Connolly noted that the concept of installing deployable flight recorders in commercial aircraft had been the subject of considerable discussion after the July 16, 1996, crash of a Trans World Airlines 747 into the Atlantic



**Figure 1. A deployable flight recorder — which incorporates a flight data recorder, cockpit voice recorder and emergency locator transmitter — is automatically ejected when sensors detect that the aircraft is crashing.**



Ocean minutes after takeoff from Kennedy International Airport in New York.<sup>4</sup> Three years later, P. Robert Austin, a DRS senior systems engineer, told an international transportation recorder symposium that proposals to modify flight recorder standards by requiring the installation of dual combined recorder systems in commercial transport aircraft should include a provision that one of the systems be a deployable FDR/CVR recorder.<sup>5</sup> “The standards for the fixed and deployable components of the system should be compatible to optimize the probability of recovery of recorder information from one of the two systems under any conceivable crash scenario,” Austin said. Boeing’s experience with deployable flight recorders on military 707s identified several issues requiring further consideration, Angers said, such as how to prevent a recorder from being ejected into the ground if the airplane is in a vertical attitude, how to avoid injuring anyone on the ground when a recorder deploys and how to avoid accidental deployment. Even if deployable recorders are installed in an aircraft, Boeing’s position is that the aircraft also must

be equipped with standard, fixed recorders. Michael Poole, chairman of the International Society of Air Safety Investigators (ISASI) working group on flight recorders, agreed. Poole, a former member of the Transportation Safety Board of Canada, said that he would encourage the use of deployable recorders — but only if the deployable unit was installed in an airplane that also was equipped with a traditional fixed recorder. Poole noted the higher cost of installation and maintenance of deployable recorders, in comparison with standard, fixed recorders, and said he could foresee events — such as some types of runway overrun accidents — in which deployable recorders might fail to deploy away from the crash scene.

### Manufacturer Initiatives

Both Airbus and Boeing have been examining the use not only of deployable recorders but also of other alternative technologies for collecting flight data. Soon after the Air France crash, Airbus said it had begun a study to “reinforce flight data recovery capability,” including an

examination of the feasibility of extended data transmission.<sup>6</sup> “Various technical means for reinforcing flight data recovery and data transmission to ground centers are principally available,” said Airbus President and CEO Tom Enders. “We will now study different options for viable commercial solutions, including those where our experience with real-time data transmission from our own test aircraft could support the further development of such solutions.” Airbus said that retrieving flight recorder data after an accident is a challenge for the aviation industry, in part because the air-to-ground data links used by aircraft communications addressing and reporting systems (ACARS) to transmit maintenance data “do not offer the bandwidth that would be needed for a fully real-time transmission of all the data stored in the [digital] FDR and CVR.” Angers said that Boeing recognizes similar difficulties. “Although real-time data streaming is possible, an enormous amount of data is collected by flight data recorders,” she said. “Current regulations require FDRs to record a minimum of 88 parameter groups. To meet

*The CH149914 Cormorant helicopter crashed into the water on 13 July 2006 during an attempted go-around from an approach to a fishing vessel. The helicopter was equipped with a DRS Technologies Emergency Avionics System 3000 Flight Data Recorder and a Cockpit Voice Recorder System. Included in this system is the Beacon Airfoil Unit. In this occurrence the BAU was found still attached to the helicopter post accident and did not deploy. Fortunately all FDR and CVR data was successfully recovered by the National Research Council Centre for analysis by the Flight Safety investigators.*





this requirement, all current production airplanes record more than 1,000 individual parameters. Also, consider the fact that there are tens of thousands of commercial transport jets flying today. The current satellite system and ground architecture would be unable to support a large number of airplanes continuously streaming data." Poole added that if CVR data were transmitted along with FDR information, bandwidth requirements would be even greater. In addition, in some situations, especially those involving aircraft in unusual attitudes, it could be difficult, if not impossible, to maintain a constant link between an aircraft and a satellite, he said. Satellite transmissions also are affected by bad weather, and if a satellite went out of service for any reason, data would be lost, he added. Other issues include where data would be stored, who would have access to it, how it would be maintained and by whom, and how to protect the privacy of pilots whose communications would be included in data transmissions. "The concept sounds really elegant," Poole said. But there are a lot of impediments." Poole said that, although he does not believe the constant transmission of data from

all large commercial airplanes can replace flight recorders, he would encourage the industry to implement a system that would allow satellite transmission of data from "an airplane in distress." In these situations, data transmission might be triggered by a pilot's "mayday" call, or by some on-board conditions that indicated the airplane was experiencing difficulty — as was the case for the Air France A330 through ACARS messages — or by some other action by the crew or air traffic control. "You don't need all that bandwidth being used up with constant data transmissions, but with any airplane in distress, it's not a bad idea to send the data real-time going forward and transmit the recorded data back in time," Poole said. Nevertheless, the NTSB's Cash said that the eventual alternative to the traditional black box most likely would involve some method of real-time data transmission, perhaps an event-triggered transmission of data to a ground station. "Data link is going to get more attention," Cash said, noting the technological developments in recent years that have provided passengers with Internet access. "Airplanes already are being equipped with the hardware." ♦

## Notes

1. The second phase of the search for the A330's flight recorders ended in late August. At press time, the French Bureau d'Enquêtes et d'Analyses (BEA) was considering organizing a third search phase. The airplane crashed during a flight from Rio de Janeiro, Brazil, to Paris. All 228 passengers and crew were killed. The investigation of the accident is continuing.
2. Aviation Safety Network. Accident Description. < <http://aviation-safety.net/database/record.php?id=20090630-0>>. The Yemenia Airways A310-300 crashed off the coast of the Comoros Islands during an approach to the Mitsamiouli airport after a flight from Yemen. All but one of the 153 people in the airplane were killed. The wreckage sank in waters up to 4,000 ft deep, and at press time, news reports said that the airplane's flight recorders had been located but not recovered.
3. Austin, P. Robert. "The Use of Deployable Flight Recorders in Dual Combi Recorder Installations." Presentation to the International Symposium on Transportation Recorders, Arlington, Virginia, U.S. May 3–5, 1999.
4. The NTSB said the probable cause of the accident was "an explosion of the center wing fuel tank resulting from ignition of the flammable fuel/air mixture in the tank." The explosion probably was caused by a short circuit outside the tank that "allowed excessive voltage to enter it through electrical wiring associated with the fuel quantity indication system," the report said. The FDR and CVR were recovered one week after the crash by U.S. Navy divers.
5. Austin.
6. Airbus. Airbus Launches Initiative to Reinforce Flight Data Recovery Capability. July 2, 2009.



# Tailplane Icing—

## Survival Knowledge for Pilots

*Guidance and training vital for appropriate crew response.* By Don Van Dyke

**This article was originally published in the September 2009 edition of Professional Pilot. It is reprinted with the kind permission of the editorial staff of the Professional Pilot magazine.**

NASA's icing research aircraft is a modified de Havilland Canada DHC6 Twin Otter. Flow probes and a clear-ice simulation casting are attached to the leading edge of the left horizontal stabilizer. Pressures of modern operations, advances in technology—which often dilute airmanship skills—and improved cockpit facilities all encourage penetration into weather conditions far worse than our predecessors would have attempted.

The dangers are still there—we have just learned to navigate them differently. Icing conditions have been regarded as hazardous virtually since the beginning of flight. Ice build-up (accretion) results in degraded aircraft performance, flight characteristics and systems operation.

Interestingly, modern aircraft designs, in achieving greater efficiency, may also be better icing collectors than previous designs. Aerodynamic, stability or control events resulting from structural icing include stall, loss of control, high sink rate, loss or degradation of performance, and flight control degradation. Outcomes include ground or water collision, hard landing, inflight breakup/structural failure, landing short or precautionary landing.

The especially insidious ice-contaminated tailplane stall (ICTS) is identified as causal in at least 16 corporate and air carrier mishaps, involving 139 fatalities. Since critical icing conditions occur infrequently, crewmembers may become complacent about the potential for critical ice accretion in certain operating areas or conditions.

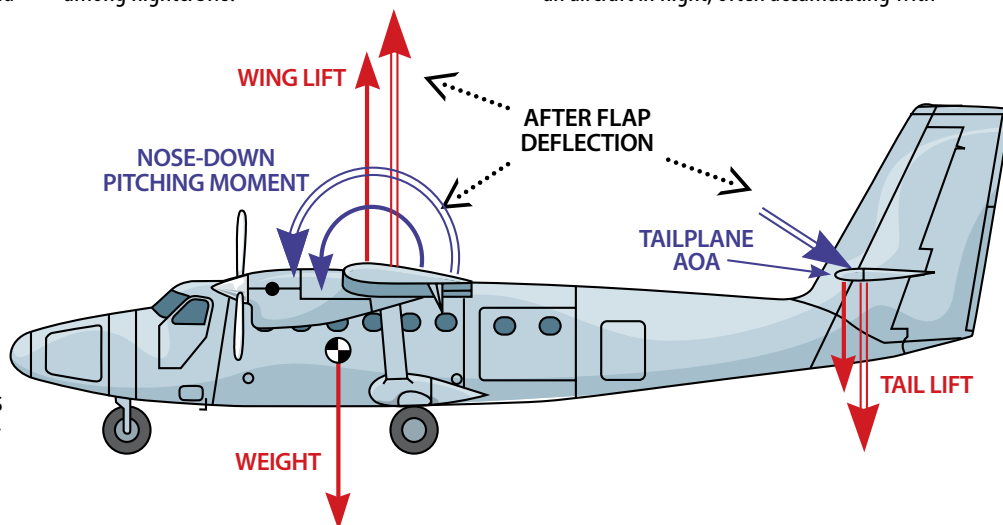
Each atmospheric icing condition is different, and flightcrews may occasionally encounter severe conditions beyond the capabilities of the aircraft protection systems. However, totally effective anti-icing systems are—and will remain—beyond economic realization for the foreseeable future, and the threat of tailplane icing will remain a major cause for concern among flightcrews.

Developed in the 1990s, the landmark NASA/FAA Tailplane Icing Program (TIP) improved understanding of tailplane (empennage) icing but yielded comparatively little in the way of assessing design susceptibility to ICTS or developing related detection or unambiguous mitigation strategies of use to corporate and regional pilots.

Regardless of the final report findings, the recent crash of a Bombardier DHC8-Q400 near BUF (Buffalo NY) renewed widespread interest in the dangers of inflight icing and, more particularly, ICTS.

### Ice accretion

Ice adheres to all forward-facing surfaces of an aircraft in flight, often accumulating with



*Tailplane counters the nose-down pitching moment caused by the center of gravity (CG) being forward of the center of pressure.*



surprising speed. The tailplane, generally having a sharper leading-edge section and shorter chord than the wings, can accrete ice before it is visible on the wing—and at a greater rate.

Pilots have reported ice accretion on the empennage 3–6 times thicker than ice on the wing and about 2–3 times thicker than on the windshield wiper arm. On turboprops, propwash cooling effect may further encourage ice formation on the tailplane.

The aerodynamic effect of a given thickness of ice on the tail will generally be more adverse than the same thickness of ice on the wing. This is due to the ratio of thickness to chord length and leading-edge radius.

In worst cases, ice allowed to accumulate will disrupt airflow over the wings and tail, causing a stall and loss of control. In some cases, only a few seconds elapse between normal flight and ground impact.

Wing stall normally results from flow separating from the top surface. This usually starts at the inboard wing trailing edge or at the wing/fuselage and wing/nacelle junctions. Stall identification is notified to the pilot either through the inherent aerodynamic characteristics of the airplane or by a stick shaker/pusher incorporated in the elevator control circuit.

A stick pusher induces an abrupt nose-down pitch change. ICTS occurs when, as with the wing, the critical angle of attack (AOA) is exceeded. Since the horizontal stabilizer acts to counter the natural nose-down tendency caused by the wing lift moment, the airplane reacts by pitching down—often abruptly—when the tailplane is stalled.

Flap extension can initiate or aggravate the stall. With flaps extended, the center of wing lift moves aft and downwash is increased, requiring the horizontal tail to provide greater downward lift.

Similarly, as the center of gravity (CG) moves forward, the tail may be near its maximum AOA, meaning that a small amount of ice contamination could cause it to stall. In either case, the result may be a rapid and unexpected loss of control with little or no margin for recovery.

A significant number of events occur during the landing phase, resulting in a hard landing. This may be associated with a loss of performance during the approach, forcing descent below the glide path.

## Recognizing ICTS

If the stabilizer is not visible from the cockpit, pilots may be unaware of ice accretion and may fail to operate deicing equipment correctly. ICTS factors are complex and exhibit symptoms unique to aircraft type and configuration.

These factors can cloud crew recognition and obscure appropriate recovery actions. It is



important that symptoms of ICTS are recognized correctly and not confused with those of the more familiar wing stall.

Perhaps the most important characteristic of a tailplane stall is the relatively high airspeed at the onset and, if it occurs, the suddenness and magnitude of the nose-down pitch with the control column moving toward the forward limit.

ICTS is more likely to occur when flaps approach full extension or during flight through wind gusts. In general, the combination of factors favoring tailplane stall is ice accretion of critical shape, roughness and location, maximum flap extension, forward center of gravity, high power and nose-down elevator control inputs.

Symptoms of ICTS include:

- Elevator control pulsing, oscillations or vibrations

- Abnormal nose-down trim change
- Other unusual or abnormal pitch anomalies (possibly resulting in pilot-induced oscillations)
- Reduction or loss of elevator effectiveness
- Sudden change in elevator force (control would move nose-down to the limit if unrestrained)
- Sudden uncommanded nose-down pitch

### Avoiding ICTS

Tailplane icing is a capricious killer, but steps can be taken to defend against its hazards, the foremost of which is to maintain vigilance and be ready to undo configuration and power changes if ICTS is suspected.

At all times, ice protection systems should be used as the Flight Manual suggests. Certification rules for aircraft operations in icing conditions

were never intended to endorse flight of unlimited duration in severe icing conditions.

The safest action is to avoid prolonged operation in moderate to severe icing conditions. Prolonged operations in altitude bands where temperatures are near freezing and heavy moisture is visible on the windscreen should be avoided. Flap extension should be limited during flight in icing.

For turboprops, the use of flaps is prohibited in icing conditions when enroute or holding. Autopilot use during flight in severe icing conditions is discouraged since (within its capabilities) it will correct anomalies and divergences that signal ICTS onset, thus almost certainly masking these symptoms by not allowing the pilot to receive tactile feedback from the controls.

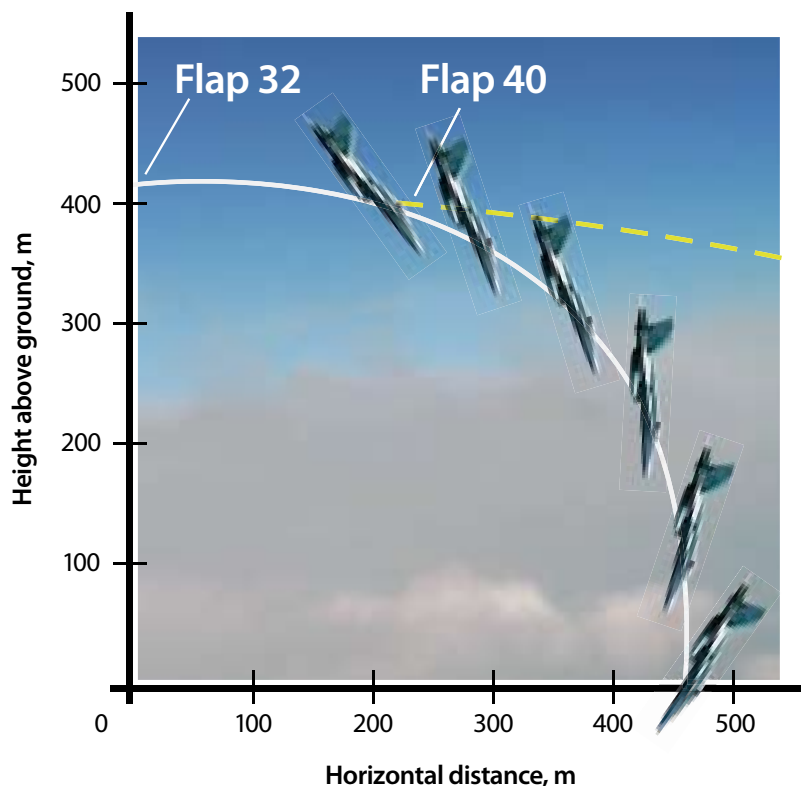
FAA advises pilots to use caution when applying flaps during an approach if tailplane icing is possible. Selecting final flap earlier in the approach should be considered to use the greater height margin in case ICTS recovery is needed.

Uncoordinated flight (side or forward slips) which can adversely affect pitch control should be avoided. Landing with reduced flap setting, accounting for the greater landing distance required, is encouraged if allowed by the Flight Manual.

Crosswind landing should be avoided, since ice accumulates not only on the horizontal stabilizer but also on the vertical stabilizer, reducing directional control effectiveness. Landing with a tailwind component should also be avoided, because of the possibility of more abrupt nose-down control inputs.

### Recovery from ICTS

Available statistics show that an ICTS rarely occurs until approach and landing. However, the odds of recovery from uncontrollable nose pitch-down in this flight regime are poor, especially if the cause is misdiagnosed,



*This diagram illustrates how severe nose-down pitch attitude and loss of control may become following tailplane stall.*

since recovery procedures for wing stall will aggravate ICTS and vice versa.

For example, adding airspeed in this case may actually reduce the margin of safety. Because of the reduced maneuvering height margin available, increased stall speed and altered stall characteristics, recovery actions must be correct, immediate and aggressive.

(One ICTS event during the NASA/FAA trials required 170 lb of elevator force to recover!) A good recovery strategy involves early detection and restoring the aircraft configuration just prior to the ICTS.

Training needs

Corporate and regional crews may not receive much unusual attitude training and rarely experience full stalls and recovery in the aircraft they are flying. Without this training, they may misdiagnose aerodynamic buffeting as due to other causes, such as ice on propeller blades.

Typically, flight crews are trained down to stick shaker and taught to power out of the stall warning with minimal altitude loss. These pilots may not recognize an ICTS that occurs before stick shaker activation and may not be sufficiently aggressive in recovery action even if they do recognize the situation.

*The likelihood of a flightcrew experiencing a full stall is much lower than the probability of a stick shaker encounter.*

A hard way forward

	WING STALL	TAIL STALL
RECOVERY ACTIONS	Full power	Immediate hard pullback
	Relax back pressure or lower nose	Retract flap to previous setting
	Actions in accordance with Flight Manuals	Apply power judiciously and maintain precise control

*Some stall symptoms may not be detected by the pilot if the autopilot is engaged.*

The likelihood of a flightcrew experiencing a full stall is much lower than the probability of a stick shaker encounter. As useful as a stick pusher is in avoiding wing stalls, it offers no comfort regarding an ICTS.

Dangers of ICTS begin with the absence of visible or tactile stall cues for which pilots are usually trained. The empennage giving rise to the ICTS event is not usually visible from the cockpit. Recovery from the event—if allowed to develop fully—is counterintuitive to conventional pilot training and may require physical strength exceeding the pilots’ capability.

The certified primary means of ice detection is visual inspection of the airframe by the flightcrew, including observation of areas such as the windshield, windshield pillars, windshield wiper bosses, wing leading edges, and propeller or engine fan spinners.

The admonition against autopilot engagement in icing conditions requires a subjective assessment of current weather conditions in which the empennage may already have been contaminated.

For pilots unfamiliar with stick pusher action beyond the classroom, it may be difficult to distinguish a valid wing stall warning from an ICTS-initiated elevator snatch. A decision to land, in which a pilot elects to divert and make an unscheduled landing due to ice accretion, is effective in fewer than 25% of cases classified as either an accident or incident.

Conclusions

More rigorous operating criteria and training requirements are needed to prevent ICTS-related accidents. Aircraft permitted flight into known and forecast icing conditions are only approved and certified for flight in super cooled water droplet conditions, as defined in FAR/CS/ JAR-25 Appendix C.

Reportedly, the current Appendix C chart and standard come from 1951–52 USAF icing research data showing that a Douglas C54 (DC4) could survive for approximately 8 min while descending 6500 ft, covering a distance of 20 statute miles at 150 mph.

It was adopted by FAA’s predecessor—the Civil Aviation Administration—in 1955 following the 1950 crash of a Northwest Airlines DC4 into Lake Michigan. This may be an appropriate time to revisit this design standard in light of technological advances and improved understanding of icing since its promulgation.

In the same way as training and recovery techniques were developed for jet upset recovery, current tailplane icing data must be distilled into a universal system for detection, avoidance and recovery.

Finally, operators are encouraged to give pilots the realistic training they need. Don’t require them to become test pilots each time they encounter ice. ♦



# It's Late Night with Ned!

*In the dark during a sandstorm, an F-16 pilot struggles with spatial disorientation while flying a combat mission over Iraq.*

by Retired Lieutenant Colonel Ned Linch, United States Air Force

**This article was originally published in the May/June 2009 issue of Torch magazine. It is reproduced here with the kind permission of the staff of the United States Air Education and Training Command.**

**T**he mission was intense. I had to fly my F-16 Fighting Falcon over Iraq at night in a sandstorm to conduct emergency close air support for troops surrounded by the enemy. Sound like a perfect setting for an in-flight catastrophe? ... It was.

While attempting to fly visually in the dark with night vision goggles and no illumination, I experienced spatial disorientation like

I've never had before in the F-16. Spatial disorientation is a dangerous condition pilots face when they don't have sufficient references to maintain proper control of the airplane. And the F-16 is an aircraft with a design that increases a pilot's susceptibility to this hazard.

Of course, the weather conditions compounded the problem. A major sandstorm had already shut down the area of responsibility for a few days. The conditions certainly weren't suitable for a tactical flight, nor for locating the troops hysterically calling for help on the radio. Because of the reduced visibility and zero illumination, it was not only hard to tactically manoeuvre, but difficult to locate the troops who could only be identified by a small, handheld imaging infrared strobe.

I had to turn off all cockpit lights except for keeping my attitude indicator dimly lit. I had my heads up display turned down to a barely readable glow of green. My wingman, in a sensor trail position became my talking altimeter.

In pilot training, nose high/low unusual attitude recoveries were beat into us for a good reason -- to mitigate a mishap from human factors and spatial disorientation. My undergraduate pilot training instructors ingrained these recovery manoeuvres in my mind to become second nature for such situations. That night over Iraq, I had to knockoff my F-16 attack and rewind back to T-37s in the middle of a combat manoeuvre ... several times.



Photo: Pie Vaughan Lightowler



The last place you want to be is at 200 knots, 70 degrees nose high in an F-16 fully loaded with bombs, fuel tanks and a targeting pod. But there I was, and the same procedures ingrained into me at pilot training work just fine in combat, despite the hair-raising circumstances.

Unusual attitudes and spatial disorientation are never planned or anticipated. But, perhaps, when we step out the door to fly, we should plan on and anticipate experiencing a date with this monster to avoid a serious cockpit error. Believe it or not, spatial disorientation is actually pilot error (perception error -- that is, you failing to react properly to the situation). It's preventable and you, the pilot, must maintain the focus and discipline to properly recover from the error.

In my case, I had to accept the risk for pilot error to help others in need, but I was prepared with options to mitigate the risk to avoid error.

There are three types of spatial disorientation. During that harrowing night over Iraq, I experienced both Type I and II spatial D, and lucked out on not experiencing Type III only because I remained focused and disciplined.

Type I is unrecognized spatial disorientation in which the pilot has no idea anything is wrong. The key to preventing a mishap in this case is an effective crosscheck as well as previous training, flight preparation and an organized cockpit. During my date with Type I spatial D, I'd look outside and try to locate the imaging infrared strobe, manoeuvre the jet, and then look back in at my instruments to verify what I had just done. I kept getting spatially disoriented and had to constantly look inside the cockpit and strain to see the dimly lit attitude indicator to stay orientated. Because of the weather, I was unable to scan quickly enough; thus, I found myself in an unusual attitude on more than one occasion.

Type II spatial D is recognized disorientation. In most cases, the pilot believes there's an instrument malfunction. The key to recovering from this type is to backup your aircraft data interface with your standby aircraft data interface or the heads up display and then believe and trust your instruments. In my case, I knew before I made an aggressive manoeuvre that I was going to experience spatial D. I anticipated it after every turn.

I had to trust my instruments and my wingman.

Type III spatial D is the worst. Many times the pilot is unable to recover from this type of spatial D because he knows something is not quite right, but he is unable to mentally and physically respond. It's like the pilot's brain is "locked up" just like your desktop computer often does. The only way to recover is either to eject in a single pilot aircraft or transfer the control to the other pilot/crewmember in a crew aircraft.



There is usually very little time to react in a Type III situation, so immediate action could save your life.

Psychologically speaking, sensory inputs to the brain arrive via two paths -- the shortest path is the emotional side that reacts prior to the reasoning side inquiring, evaluating and then making a sound decision. This is where flight discipline comes into play to block the "short circuit" to help keep the focus to prevent Type III.

What prepared me most for combating spatial D and having a successful mission were all those undergraduate pilot training T-38 backseat instrument sorties with the hood and the many night formation approaches on the wing in the weather ... especially in "pop-eye" conditions (in and out of thick weather).

Don't forget to take advantage of training opportunities because you never know when you might need those critical skills. You might be the next flight lead experiencing spatial D over hostile territory at night in bad weather with others desperately needing your help. ♦

**Retired Lieutenant Colonel Ned Linch was the chief of flight safety for the 12<sup>th</sup> Air Force and Air Forces Southern Command at Davis-Monthan Air Force Base, Arizona. A command pilot, he accumulated more than 3,000 flying hours in the F-16 and F-111, including over 150 combat hours.**

## *Proven Tips to Prevent Spatial Disorientation*

**Plan:** You need to have a basic game plan to recover the aircraft. This should have been hammered into your brain in pilot training. Effective and thorough flight planning, plus an organized cockpit, will reduce the chances of task saturation, situational awareness issues, channelized attention and mis-prioritization -- all areas that contribute to spatial disorientation. A backup plan with several options will give you the capability to always have an "out". Realize it can happen to anyone, especially if you are fatigued, regardless of your experience or proficiency. So be ready!

**Anticipate:** You need to plan on experiencing spatial D on every flight and be ready for it, especially if you're stepping out into marginal weather or you know you'll be flying close formation in weather or at night. For a night ocean crossing mission in a fighter, you'll most likely experience spatial D so be ready to be trapped over the North Atlantic with no options but to focus and recover. The more proficient you are in your aircraft with recent experience, the less likely you'll experience spatial D (if you've been out of the cockpit for more than three weeks,

your chance of spatial D increases). Take-off and landing, air refuelling and tactical operations (low altitude in hazy weather, for example) are critical areas where you will have a higher chance of experiencing spatial D, so anticipate it. Also be ready for it during dynamic and demanding phases of flight and/or when there are other preconditions. Weather, night, formation, night vision goggles, fatigue, hypoxia, G stress, emotional compartmentalization issues, to name a few, are potential areas for distractions which increase your chances for a breakdown in your crosscheck. They can all lead to spatial disorientation.

**Recognize:** If you do experience spatial D, the first step is to recognize the situation. The faster you're able to do this, the greater the survival rate for you and your aircraft.

**Confirm:** Next, you need to confirm the spatial D. Crosscheck all instruments to confirm your attitude. If you hear a lot of wind noise, you're probably headed toward dirt. If in close formation, you might be straight and level, so take a quick peek at the heads up display. It's very difficult to suppress information from unreliable sources (your vestibular system) when in formation. You just have to hang tight and concentrate on flying.

**Recover:** Execute a nose low or high unusual attitude as you were taught in pilot training. If you're in close formation, recovering might just be simply getting into the correct position. Many times you're straight and level and it just seemed you were in a turn because you were riding high or low on your flight lead.



# Things Falling Out of Aircraft (TFOA)

By Sergeant Mike Brown, Directorate of Flight Safety, Ottawa

In March 2008 a CH146 *Griffon* helicopter sustained serious C category damage when the main cargo door departed the aircraft while in-flight and caused serious damage to the main rotor blades. In 2007, there were 60 reported incidents of TFOA, and in 2008, there were 129 reported incidents. These numbers are significant and this article attempts to highlight examples of recent occurrences and suggest possible solutions that may mitigate the risk of future incidents of TFOA.

**The following are some examples of TFOA occurrences reported through the Flight Safety system:**

## CH146 Griffon

- While conducting a live Close Combat Attack (CCA) training engagement at night, a belt of 7.62 ammunition departed the aircraft.

- Cardboard box containing food departed aircraft due to cross winds and doors pinned open, resulting in FOD on the active runway.
- On short final for a tactical approach to a confined area, the Flight Engineer fell out of the aircraft with the Monkey tail attached.
- Mission equipment fell off of aircraft.

## CF188 Hornet

- Door 10R lost in flight resulting in damage to the engines first stage compressor blades.

## CC130 Hercules

- Exhaust cone assembly found missing and damage to tail pipe noted during A check.
- Aileron panel fell off of aircraft and further inspection revealed dents in left-hand horizontal stabilizer.

## CH124 Sea King

- Cargo door window departed during flight causing extensive damage to an antenna.
- Fuel cap departed aircraft during helicopter in-flight re-fuelling exercise.

## CH149 Cormorant

- Tail Rotor gearbox panel lost in flight.







**The following are possible causes to specific TFOA incidents:**

**Panel security not ensured may be due to:**

- insufficient torque, improper hardware used
- lack of hardware used, use of maintenance orders omitted
- worn out fasteners (dzus, screws)
- worn parts, normal wear and tear

**Fuel and oil cap lost may be due to:**

- improper installation / handling
- worn parts, normal wear and tear

**Cargo and stores lost may be due to:**

- inadvertent release for armament stores
- store not properly secured
- worn parts, normal wear and tear
- doors and ramps left open during flight
- aircrew miss-handling

**Here are some possible solutions to prevent future TFOA occurrences:**

- Take the time to properly assess defects that may appear benign but may result in long range implications and/or hazards associated with operation of the aircraft.

- Be meticulous when completing B and A/B checks and make sure last chance inspections are carried out.
- Ensure that all panels and doors are both latched and flush with the surrounding surface during the pre-flight inspection.
- Ensure the protective quick-release fasteners on the covers are in the positive lock position. Initiate separate 349's for every panel removed and adhere to published maintenance procedures.
- Ensure all spare equipment brought on-board the aircraft are properly secured for flight.
- Be careful of the *can do* attitude. Operational imperatives should never supersede expectations of being able to properly repair an aircraft. ♦

*"... the main cargo door departed the aircraft while in-flight and caused serious damage to the main rotor blades ..."*



Photo: WO Carole Morissette

# THE POWER OF SUGGESTION

By Captain Jerry Ravensbergen, Directorate of Flight Safety, Ottawa

There is an old and familiar saying, “fuel in the bowser is as useless as runway behind you”. So true were these words for me several years ago when I was the Aircraft Commander on board an Airbus CC150 flying a trip in support of the UN mission to Bosnia. Just prior to coasting out from Canada, enroute from Trenton to Zagreb, Croatia, I did my pre-ETOPS (Twin engine extended range operations) fuel check. You can imagine my surprise when I discovered that after only two and a half hours into the flight, my fuel indications were telling me that we were almost 10,000lbs short. What? How could this be possible? A quick check and re-check confirmed that I was indeed short 10,000lbs according to the Jetplan.

My first thought was a fuel leak. What else could it be? My First Officer, an experienced RAF exchange pilot with lots of flying time on Tri-stars, and I both checked the flight plan back in Wing Ops and agreed on the required fuel load, so that couldn't be it. As well, during our pre-flight cockpit scan we both confirmed that the requested fuel load was indeed on board. Therefore, knowing how much fuel was put on in Trenton, and subtracting the fuel used in the last two and a half hours confirmed that there was definitely no fuel leak. This left the only viable explanation of a Jetplan error that we missed during our flight planning. My co-pilot and I both went over the Jetplan line by line, looking for something that wasn't right. We were soon going to be requesting

our oceanic clearance and a decision had to be made whether we could press on or not.

After several reviews of the Jetplan the reason why we were short of fuel suddenly jumped out as if someone used a pointed neon sign saying, “LOOK HERE DUMMY”. There was no fuel leak, and there was also no Jetplan error. The only error made was the one I made several hours ago back in Wing Ops. After looking at the destination and enroute weather, which was well above required limits, I decided to round up the Jetplan fuel load by 1500lbs to an even 85,000lbs. As I suggested this to my co-pilot, he took a look at the Jetplan and concurred. This was where the power of suggestion put us in the situation we now found ourselves in. The fuel number I was looking at, and in turn caused him to look at, was not the total fuel load required, but was the projected fuel burn for the trip. Obviously, the difference in the two numbers is significant since the total fuel load takes into account the fuel burn, plus the required 5%, plus the required diversion fuel, etc. etc. So the mystery is now solved but not the problem.

After recovering from the blow to my professional ego, which was significant after having flown transport aircraft, both CC130s and the Airbus, overseas for the last 20 some odd years and never having made such a critical error, it was time to get myself out of a corner before I became boxed in. Since Zagreb was several hours flying time from the coast of

Ireland, I knew we could very easily and safely make the transatlantic crossing and land in Shannon, Ireland, which was on our route of flight, to re-fuel. This, I knew, was definitely going to cause me some toe tapping in the CO's office when I got back. A small price to pay compared to making a less than ideal situation even worse. However, I still had a way out. With the aircraft lighter than planned, I was now able to climb higher which would help to conserve fuel. My co-pilot and I took a close look at the aircraft charts, all the weather from the east coast of Canada, the west coast of Ireland, enroute weather in Europe and finally the destination and alternate weather. With all of this information, I decided to set several hard conditions that must be met over top of Shannon in order for us to press on to destination. Any one condition not met would require us to land in Shannon for fuel. The first condition was the estimated fuel remaining at destination, indicated by the flight management system (FMS), must be 500lbs above the minimum diversion fuel required. The other condition was that the actual and forecasted weather, overhead Shannon, must be above CAT 1 limits at destination and VFR at the alternate. My final condition was that the co-pilot was comfortable with the plan. Luckily for me, air traffic was fairly light on the Nat Track we were on, so we were able to climb whenever we asked for it. As well, the tailwinds were higher than forecasted on the Jetplan. Needless to say, all conditions were met overhead Shannon, so I decided to





press on to destination, relieved, believing that although I got us into this situation, I was able to manage myself out of it. In the end, after engine shutdown in Zagreb, there was just less than 200lbs of fuel above the required minimum diversion fuel remaining.

So how did this happen to two very experienced pilots and in particular to me? I am convinced that I made no error in judgement or made a bad decision. There was no intent to take-off with less fuel required just so I can practice some fuel management and make the trip more interesting than it should have been. My error was perceptual. I looked at a Jetplan, like I've done countless times before, and perceived a

fuel load that I was convinced was correct and then suggested it to my co-pilot for concurrence. Within a two man cockpit, we rely on each other for checks and balances to ensure that errors or deviations are picked up by one another and corrected. Since he readily agreed with me, my error went unnoticed. A significant error, on both our parts, that could have been more significant had the mission involved flying between airports separated by only a big body of water.

So what are the lessons learned? I know for me, ever since that day I have never read the wrong fuel load again. However, the one thing I now do differently is that I no longer "suggest" an actual fuel load to the other pilot I'm flying

with. Without providing the co-pilot with an actual amount, I will ask him how much fuel he thinks we would need after I have already decided on an amount. Good training for him, and better confirmation for me. This error on my part also, more importantly, highlighted the importance of looking very closely at what the other pilot is asking you to confirm and not just go through the motions of saying the proper response. Never make assumptions, regardless of the experience level of the other pilot. When you make a mistake, you want to make sure that the other pilot has your back and quickly points out the deviation. As more and more CF aircraft become two pilot cockpits, this has never been so critical. ♦



Photo: Cpl Kevin Sauvé

# The Swiss Cheese Effect

By Sergeant Morgan Biderman, Search and Rescue Technician, 103 Search and Rescue Squadron, 9 Wing Gander

**H**ow many times during our annual Flight Safety lectures have we discussed the insidious way in which the “Swiss Cheese Effect” crept into our operations and caused serious damage, injury or death? Everyone knows that it exists. But when staring into the hole, it can be very hard to spot the light that you do not want to see at the end of the tunnel. I have looked into that hole and didn’t see that light.

It was a beautiful, hot and sunny day in British Columbia when the Buffalo standby crew from Comox was planning for the day’s training. The weather was sunny and hot all over the province and we decided the world was our

training oyster. We eventually chose to head to the mainland interior Okanagan Valley. For those not familiar with the Okanagan it is a beautiful semi-desert, mountainous region in southern British Columbia.

Our plan for the day’s training was to conduct a streamer exercise somewhere in the mountains above Osoyoos, then carry on to the Midway airstrip to conduct live supply bundle drops and then land to recover them. After that we would proceed to Osoyoos, conduct parachute training to the airfield, and stop for lunch. The streamer exercise went as planned and our day of blissful search and rescue training was just starting. On route to Midway we



prepared the bundles for the parachute supply drop to the airstrip. As a team member starting on my journey toward becoming a team leader, my team leader asked if I wanted to call the drops. Being keen to learn this new skill, and excited to be given this opportunity, I responded with a resounding, "Absolutely!" Our plan was to drop two bundles: one regular bundle and one with timber extensions. The first bundle was the standard bundle and it made it to the intended drop zone. The second bundle with the timber extensions landed long and although it was still off the airstrip, the unicross chute and timber extension came to rest on the airstrip and caused a potential problem for landing. So, we decided that we would parachute into the field and remove the offending unicross parachute from the runway.

It was 1200 hrs with clear skies, winds 2-3 knots and a temperature of 31 degrees Celsius. Swiss cheese hole number one and hole number two. The elevation of the drop zone was 1896 feet ASL and it was understood that at this elevation we would have to flare our parachute landing higher than normal. Swiss cheese hole number three and four. We also decided that we should jump with a light load of radio and penetration medical kit. Swiss cheese hole number five.

The exit and deployment of my chute was normal and the entire flight pattern was conducted without incident. The landing however, was another story. Everything was normal until the last few feet, flared landing and tremendous impact with the ground. I immediately felt unbelievable pain and was unable to get my feet under me. I thought I would be able to get up if only given a little time and I made several attempts to do just that until my team leader ordered me to lay still. The end result was an L1 compression fracture, and a shattered L2 now fused, along with a fractured L3. For those not medically inclined, "I broke my back!"

Ten days in the spine ward at Vancouver General, and two months of lying in bed at home (with

second-to-none care by the most wonderful woman in the world), it was seven months until I could attempt a water jump into Comox Lake. It was a further three months until I could hold operational standby on the helicopter and another seven months until I could hold operational standby on my beloved Buffalo aircraft.

The resulting flight safety report found a few more factors, (holes), to add to the mix. My parachute had been modified with the brake lines about 4 inches longer than normal and with the parachute nearing the end of its life, three of the panels in my parachute skin failed their porosity readings at the Quality Engineering Test Establishment. Swiss cheese hole number six and seven. Density altitude was figured out to make the adjusted altitude approx 4200 ft ASL vice 1896 ft ASL; swiss cheese hole number eight. A history of many favourable landings on this parachute made me think I would not need to perform a parachute landing fall, swiss cheese hole number nine.

With one or more of the holes taken out of this situation, like higher winds or not carrying the additional weight of the medical equipment, this standby shift could have had a much different and more positive outcome. This incident has clearly shown me - as I hope it shows you - this insidious "Swiss Cheese Effect", is very real, alive and well, and waiting for you to stare down the hole and ignore the light. ♦



Photo: Pre Piotr Figiel



Photo: Cpl Colin Atkinson

# Don't Worry!

By Major Francois Lafond, Wing Flight Safety Officer, 3 Wing Bagotville

Throughout the years as a helicopter pilot, how many times did we hear this sentence: **Don't worry we can always land if we have a problem!** I have been flying for the Canadian Forces for over twenty five years and I always kept a series of lessons learned in my back pocket from my first mission as an aircraft commander on the CH135 *Twin Huey*.

Back in March 1985, I had received my first official tasking of my young career. The mission was to fly from Valcartier along the St-Lawrence River towards Sept-Iles all the way to Lourdes de Blanc-Sablon. It was a Canadian Forces Recruiting effort to capture any possible candidates living in those small villages along the river. We had to depart early Monday morning for a meeting with the recruiting center in Sept-Iles that evening.

After a thorough planning session the previous week, we left early on Monday morning to

arrive in time for the meeting. Everything was going as planned until the very end of our last leg. We conducted regular fuel checks along our route and had a fairly good tail wind that convinced us to proceed directly to Sept-Iles instead of stopping to refuel at Baie-Comeau.

Lesson learned: it is better to arrive a little late with extra fuel in the tank than being short of fuel a few miles away from the airport. Being an optimistic crew, we were comfortable with our calculations and decided to press on. Murphy's Law was on our side, as the weather was starting to deteriorate and our tail wind was slowly changing into a fairly strong crosswind with a slight headwind component. As we were crossing the last bay before Sept-Iles, our calculations were still indicating we had the fuel to continue to the airport but now only with the minimum fuel required. All of a sudden, one third of the way into the bay, our low fuel light appeared on the caution panel. At the time, the procedures on

the *Twin Huey* stated that we had to go with the lowest fuel indication. The caution light meant we had 15 minutes of fuel remaining instead of our fuel gauge that indicated we had 25 minutes of fuel. As we turned towards shore, the strong crosswind obviously became a strong headwind. We were heading for an empty shopping mall parking lot when I noticed a set of lights that looked like approach lights. Shortly after landing, as we were getting ready







to swallow our pride in order to call the fuel truck from Sept-Iles (25 miles away), we decided to take-off again to investigate the lights. Effectively, they turned out to be approach lights belonging to a small civilian landing strip. We noticed on short final a number of fuel drums that contained Jet Fuel on the side of the runway. Thankfully, we were able to negotiate a couple of fuel drums and we were able to continue to our destination.

The remainder of the mission to Lourdes de Blanc-Sablon went fairly well until our return on Friday. We left early Friday morning hoping to make it to Quebec City before the end of the day. The weather was going to be good all the way to Quebec City and everything went as planned until we dropped our passengers in Sept-Iles. During our last leg, the sun was setting down and as we were approaching

Tadoussac, the on-shore flow started to produce reduced visibility in moderate snow showers (not forecasted). As we were getting closer and closer to Tadoussac, it quickly became obvious that we would not be able to proceed to Quebec City. After a short discussion among the crew members, we came to the difficult decision to land and spend the night in the bush despite the winter conditions. For the next 20 to 30 minutes, we were looking very hard to find a safe landing area, to no avail. That famous saying that most helicopter pilot always say: **Don't worry we can always land if we have a problem**, was seriously put to test. We were getting really anxious to find a suitable landing area since the night was moving in quickly. Suddenly, with a bit of luck, I saw a glimpse of light coming from my left side which

came as a surprise since we were only getting 1 mile visibility on our right side. Could it be the lights from Rivière-du-Loup appearing on my left? After discussion with the crew, we came to the conclusion that it had to be it and thankfully we were able to proceed to Rivière-du-Loup under the cloud deck for a top up of fuel. From that point, the weather improved to the point where we were able to proceed to Quebec City without further problems.

The lessons learned during my first mission are fairly simple but have been relevant ever since.

- Do not accept to be tight on fuel when there is a viable alternative close by.
- Landing a helicopter is not always a viable option. I have been an instructor pilot at an Operational Training Unit for more than six years and I have been training young pilots at different units and every time I hear that famous sentence **Don't worry we can always land if we have a problem**, I make sure that this valuable lesson learned during my first mission is passed along to them. I always tell them to keep at least another option because it can always come back and haunt them as it did to me 24 years ago. ♦



# My First Flight!

By Lieutenant Jonathan Juurlink,  
12 Air Maintenance Squadron,  
12 Wing Shearwater

My first flight on a Sea King began half way through my initial aerospace engineering phase training. My mentor was surprised that after spending a month in Shearwater I had not yet flown in the helicopter. I didn't have the heart to tell him that I was actually quite content with my feet planted safely on the ground. I've never been afraid to fly but after hearing stories of new Aerospace Engineering students being dunked into the ocean like oversized tea bags during rescue hoist training, I wasn't in a rush to head up in the middle of February.

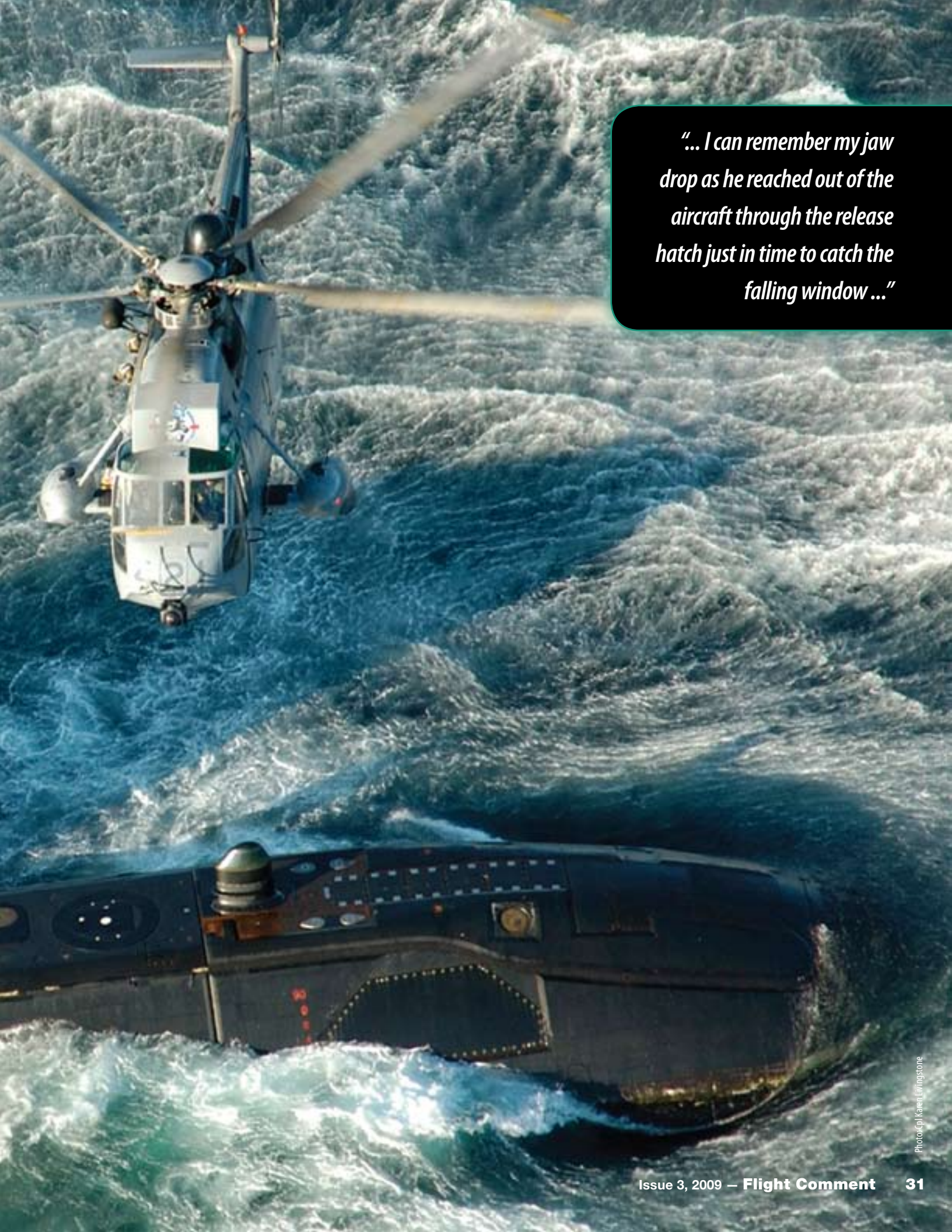
So up we went. I was relieved to learn the flight was planned to train a new American pilot through hoisting exercises on shore. Following the quick and easy hoists, we headed to Halifax International to practice autorotation maneuvers. Luckily, only a couple times going through this awkward maneuver was enough and with twenty minutes to spare, the pilot asked if there was anywhere I wanted to go. My older brother lives near Grand Lake, about a three minute flight from the airport so off we went. I was pretty stoked to be able to hang out of the door and snap a couple of aerial shots of his house. A couple of blurry pictures later, we were ready to head back. For me it wasn't a minute too soon, the combination of new pilot maneuvering and exhaust rich rotor blade wash was starting to take its toll.

As the aircraft began to turn to return to base the AESOP reached to secure the cargo door, only to mistakenly grab and pull on the emergency window release. I can remember my jaw drop as he reached out of the aircraft through the release hatch just in time to catch the falling window. Relief cast over the AESOP's face, followed by a look of despair as he wondered if he'd have to hold it in place for the rest of the flight back. Fortunately, he had it secured and locked in place fairly quickly. He joked about how I'd have to be the one to explain why we had to pull an emergency window out of my brother's roof.

I think we came out pretty lucky, as the AESOP explained how the witness wire would have to be replaced. With my feet planted securely on the ground, I experienced my first flight in a *Sea King*, complete with my first flight safety occurrence. It was a testament to the value of inherent safety, and that we all have a role to play, whether we are aircrew, engineers, or technicians. It also doesn't hurt to have quick hands! ♦







*"... I can remember my jaw drop as he reached out of the aircraft through the release hatch just in time to catch the falling window ..."*





# The **STRENGTH** of an Idea

**By Captain Byron Johnson, 442 Transport and Rescue Squadron, 19 Wing Comox**

**E**mbarking on my forth operational tour flying SAR helicopters and awaiting refresher training, I have had some time recently to think about some of the situations I have found myself in throughout my flying career. Like most involved in aviation, I have too many stories that have too much in common with the generic case studies discussed during annual Crew Resource Management (CRM) training or Human Performance in Military Aviation lectures.

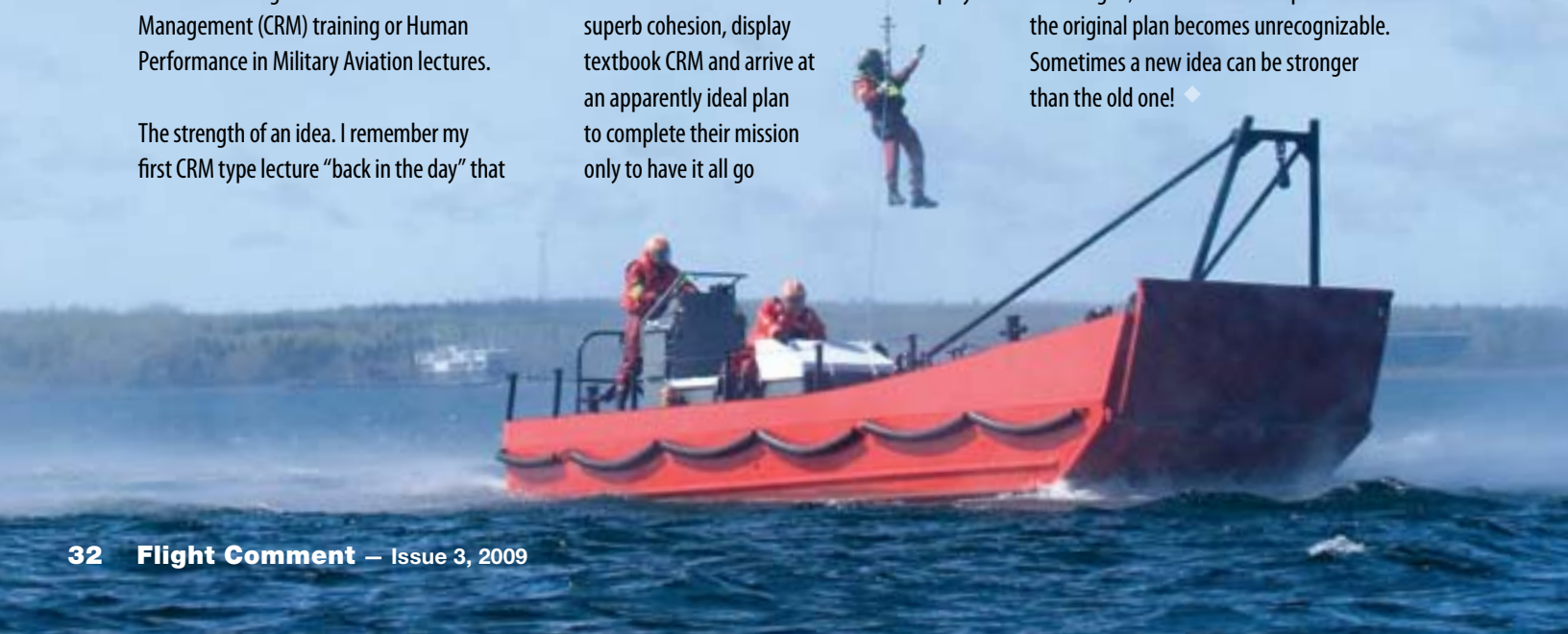
The strength of an idea. I remember my first CRM type lecture “back in the day” that

made mention of this negative psychological phenomenon. To arrive at a decision or idea then be so fixated upon its realization as to ignore obvious signs that it will, in all likelihood, fail. Interesting. . .but could it really happen?

As it turns out, the strength of an idea has proven time and again to surface at the most inopportune of times. When tasked with a Search and Rescue scenario, or any operation for that matter, crews are often called upon to think outside of the box. A crew can display superb cohesion, display textbook CRM and arrive at an apparently ideal plan to complete their mission only to have it all go

awry. The problem lies in our desire to have our plan succeed at all costs. We become so blinded by the fantasy of having everything proceed as we envisioned that we can't see the obvious variables that are constantly changing with any complex operational mission.

Deteriorating weather, further amplification of on-scene information, increased complexity of tasks, communication problems or even a subtle change in winds all require plans to be changed; sometimes to the point where the original plan becomes unrecognizable. Sometimes a new idea can be stronger than the old one! ♦





# What's a Little Sweat?

By Warrant Officer Karri Young, Aerospace Engineering Test Establishment, 4 Wing Cold Lake

It was a beautiful sunny, crisp March day in Cold Lake and I was going flying on a chase mission in a CF5 *Freedom Fighter*. As a new photo technician, I underwent extensive training and medical testing to ensure I was prepared for any aircraft emergencies. We carried out our mission of chasing another CF5 aircraft which was testing CRV 7's. After the successful shoot, I was sitting back relaxing when the pilot started to react in the front seat. He said there was smoke coming from under the console. He carried out several measures then declared the emergency. As the smoke began to thicken, my palms started to sweat and I tried to recall the egress training I had just received earlier that week. The only thing that kept coming to my mind was that it was cold out there and I wasn't wearing the proper seasonal clothing. Only hours earlier as I was preparing for the flight, I thought the winter long johns would be way too hot to be wearing all day long. As the situation escalated the pilot told me to prepare for ejection. I had been briefed that the call would be "eject, eject, eject", and if you weren't gone by the third call you could be by yourself. As I quickly placed my 11 pound camera, the Milliken, on the upper left hand side of the dash and braced for proper ejection I heard a sigh of relief from the front cockpit. The smoke had dissipated enough that we were able to return to base safely. Suffice it to say that when I got out of the aircraft I felt like kissing the ground. Since that eventful flight, I have logged over 200 hours in various aircraft and can say straight up from that time on, even though I spent some uncomfortably hot times in the shop, I wore that dreaded winter underwear. ♦



*COMPLACENCY – the result of overconfidence, repetition of action and contentment. As tasks become routine, performance becomes automatic and less attention is paid to detail.*

# *Complacency*

By Master Warrant Officer Barry Ripley,  
Deputy Wing Flight Safety Officer,  
15 Wing Moose Jaw





Photo: Pie Pamela Turney



Photo: WO Roxanne Clowe



Photo: MCpl Robert Bottrill

So there I was getting ready to carry out a functional check on a CT114 *Tutor* engine ice detector during a periodic inspection. I must have done this procedure a hundred times, how hard could it be? I had to put the jumper wire on the reverse current cut out relay (RCCO) to simulate the engine running, use the pitot-static tester to apply air pressure to the ice detector in order to simulate flying conditions, then cut off the air pressure to simulate ice blockage and check for the proper indication.

The more times I've done this functional, the less I refer to the written procedure in the maintenance orders. It's a simple procedure, what could go wrong?

So this time I don't even have the written procedure with me, as I am confident in my own abilities. I proceed with the functional check.

- Put the jumper on the RCCO — **check**
- Put the pitot tester on the ice detector probe — **check**
- Ready for electrical power

Of course being a safety conscious individual, I pause to get everyone's attention and inform them I'm about to apply electrical power. I select the electrical power switch to external power and the engine starts rotating! What the \*&^%!!

*Complacent individuals are unaware of their gradual deterioration in performance since their ability for critical self appraisal has been lost.*

I somewhat frantically hit the starter stop button and move the master electrical power switch to off and then stand there a bit dumbfounded as the turbine winds down. **What could have gone wrong?**

It was then that I thought about the written procedures. It must have been the jumper wire on the RCCO. Sure enough, after checking the maintenance orders, I discovered that I had placed the jumper wire on the wrong terminal and when external power was applied it went right to the starter.

Lesson learned: there is no such thing as a trivial task in aircraft maintenance and each one deserves the maintainer's full and careful attention. Don't let complacency creep into your work routine! ♦

*Because of past success in mastering the environment, the complacent individual becomes increasingly more likely to perform routine tasks casually, rather than planning ahead.*

# From the Investigator

TYPE: CH147 *Chinook* (147204)

LOCATION: Kandahar airfield, Afghanistan

DATE: 18 January 2009

Aircraft CH147204 was tasked on a training mission out of Kandahar airfield (KAF). No anomalies were noted by the crew during the flight. Later in the morning, while the aircraft was still on its mission, maintenance personnel found an aft rotor fixed droop stop on the ramp near where aircraft CH147204 was previously parked. The droop restraint system has no function while the aircraft is in flight and failure of the system does not impede safe flying operations. The droop restraint system supports the weight of the rotor blades on startup and shutdown to prevent them from striking the fuselage.

The maintenance personnel immediately checked all other aircraft on the ramp and determined that none of the helicopters were missing a fixed droop stop. Operations advised the occurrence crew of the situation and recalled the aircraft. Once safely in KAF, the aircraft was landed at a remote location away from personnel, buildings and other aircraft. Using a procedure borrowed from a coalition partner, a ladder/ramp was put in place to protect the fuselage from damage by the drooping blade. The crew set the parking brakes, secured the flight controls in place and exited the aircraft. The engines continued to run until the fuel supply was exhausted. After the engines stopped, the rotors began slowing down until they eventually impacted the ramp, causing damage to the rotor blade system and fuselage. There were no injuries. The investigation is focusing on aircraft pre-flight and maintenance procedures. ♦





# From the Investigator

TYPE: CH149 *Cormorant* (149910)

LOCATION: 9 Wing Gander

DATE: 28 July 2009

The occurrence aircraft, CH149910, landed in Port au Choix, Newfoundland after having flown a three-hour training flight. A significant amount of oil was discovered on the starboard side of the aircraft in the vicinity of the number three engine. After discussion between the crew and maintenance personnel, the affected area was cleaned, the number three engine was replenished with oil, and a ground run was conducted. On the return flight, oil was again seen leaking along the starboard side from the vicinity of the number three engine, which led the crew to shutdown the number three engine in flight. The aircrew conducted a two-engine running landing, taxied in and shutdown. The aircraft was put in maintenance to change the number three engine. The engine change, ground run and maintenance test flight (MTF) proceeded as planned with no abnormalities. After the MTF, upon towing the aircraft in the hangar, oil was once again noticed on the starboard side. Initial inspection revealed considerable oil in the location of the connecting intermediate transmission casing forward of the number three engine bay, between the engine input shaft and the main gear box. Further inspection revealed a crack approximately 18.5 inches in length on the intermediate case of the number three mechanical drive assembly.

The preliminary investigation has revealed that the aircraft damage was contained to the number three main gear box power train system, specifically the intermediate case of the number three mechanical drive assembly connecting the

main gear box to the number three engine. The fracture in the intermediate transmission case outboard flange of the number three mechanical drive assembly spanned more than half of the circumference of the casing. The investigation also made a collateral safety observation concerning Search and Rescue technician dry suits. The investigation revealed stains on the dry suits due to contact with possible contaminants such as oil, grease and other debris that is present during the conduct of routine flying duties.

Preventive measures taken include:

- A Special Inspection (SI) raised to inspect all installed main gear box's for cracking of the main gear box number three mechanical drive assembly. The SI was carried out on all CH149s before next flight.
- An on-going inspection of this area has been added to the Daily Inspection.

Preventive measures recommended / Other Safety Concerns:

- That the Directorate of Technical Airworthiness and Engineering Support



identify inspection procedures for Search and Rescue technician dry suits to include inspection criteria, inspection cycles, documentation, as well as qualifications and training for personnel conducting inspections.

- The investigation will focus on the engineering aspects, specifically design, manufacturing and loading of the number three mechanical drive assembly. ♦

# From the Investigator

TYPE: CH146 *Griffon* (146434)

LOCATION: Forward Operating Base (FOB) Afghanistan

DATE: 06 July 2009

The accident involved a CH146 *Griffon* helicopter deployed in Afghanistan as part of the Joint Task Force (Afghanistan) Air Wing. The crew consisted of two pilots, one Flight Engineer (FE), and one Door Gunner (DG). Two passengers were also onboard; one Canadian and one coalition soldier. The mission was to bring four passengers to a Forward Operating Base (FOB) in Afghanistan. Two CH146 *Griffons* were tasked, carrying two passengers each for insertion in the morning and again for extraction in the afternoon. The morning portion of the mission was conducted without incident. The accident occurred during the afternoon extraction.

*“... the aircraft rotated approximately 90 degrees counter-clockwise and rolled onto its right side, catching fire almost immediately ...”*

The accident aircraft was the second aircraft in the formation. The lead aircraft was the first to land and pick-up its two passengers. On take-off the lead aircraft cleared the HESCO barrier on departure by approximately ten feet, and informed the other crew that maximum power available would be required. A HESCO barrier is a fabric-lined metal mesh structure filled with sand and gravel. The second aircraft conducted the landing successfully and picked up the two remaining passengers.

In consideration of the information passed by the lead aircraft, the occurrence crew developed their take-off plan. The take-off would be executed in two phases: a max performance take-off to maximize vertical obstacle clearance followed by an Instrument Take-off (ITO) once visual ground references were lost. The Flying Pilot (FP) pulled collective to 95% mast torque for the max performance take-off. Conscious of the high temperature of the day, just above 40°C, the FP gave a quick crosscheck to the InterTurbine Temperature (ITT) gauge and noted a reading of 840-850°C. At that moment the Non-Flying Pilot (NFP) looking at the visual ground references, called “Drifting Right”. The FP’s attention was immediately redirected outside to reacquire visual ground references, but a dust ball had obscured all visual cues, so the FP transitioned to instrument references to fly the helicopter.

The NFP made a second “Drifting Right” call, but just as the word “Right” was spoken, the aircraft hit the HESCO barrier.

The aircraft hit the barrier at the one to two o’clock position (relative to the aircraft), breaking the right-hand pilot’s windscreen. The impact point was between the aircraft nose and forward of the right pilot door. On impact, the tail pitched up and simultaneously the aircraft rotated approximately 90 degrees counter-clockwise and rolled onto its right side, catching fire almost immediately. One pilot was uninjured and the other suffered only minor injuries, so they were able to evacuate the aircraft through the shattered windscreen. The Canadian passenger, despite serious injuries, followed the pilots out. The two pilots attempted to provide assistance to the personnel still inside the helicopter, but the post-crash fire precluded them from rendering assistance. The coalition soldier, the FE, and the DG perished in the accident.



A number of preventive measures have been recommended and are in the process of being implemented, including:

- Improved procedures for Operations in Brown-out
- More detailed instructions for pre-flight calculations
- Technical evaluation of aircraft performance charts for pre-flight planning
- Evaluation of seating requirements for various mission profiles, and
- Evaluation of the descriptions given in the Standard Manoeuvre Manual for Max-Performance and Instrument take-off Procedures.

No pertinent technical deficiencies have been discovered to date. The investigation is focusing on Human Factors, Desert Operations, and obscuring phenomena. Rear cabin evacuation and survivability are also under investigation. ♦



# For Professionalism

For commendable performance in flight safety

## Captain Kevin Coulombe

In January 2009, Capt Kevin Coulombe was employed as an Aerial Vehicle Operator (AVO) for the Canadian *Heron* Unmanned Aerial Vehicle (UAV) unit in Kandahar, Afghanistan. While off-duty and observing the completion of a test flight of a *Heron* UAV by another AVO, he was required to take immediate action in order to prevent the potential loss of this extremely valuable flying asset. The controlling AVO had an indication of an "Internal Navigation System (INS) Sensor Failure" accompanied by a "Sensor Monitor Warning" status message. Capt Coulombe noticed that the controlling AVO was going to execute a 'Sensor Reset' to clear the "INS Sensor Failure". This unintentional operational deviation is contrary to the UAV flight manual and possessed a high potential for the vehicle to depart from controlled flight with catastrophic results. Capt Coulombe immediately insisted that the AVO refer to his

emergency check list. After all steps of the emergency response were completed, the INS system responded correctly and no erratic behaviour was observed. The UAV returned to base without further difficulty. Capt Coulombe's superior knowledge of the Canadian *Heron* UAV operation played a pivotal role in averting the loss of a critical in-theatre asset that is of paramount importance to the safety of our operational personnel. Capt Coulombe's very quick action demonstrates his professionalism, his understanding of Flight Safety and exemplifies his notable high level of training. Capt Coulombe's complete concern for both human and mechanical resources clearly makes him deserving of this For Professionalism award. ♦



**Captain Coulombe is currently serving with 424 Transport and Rescue Squadron, 8 Wing Trenton.**

## Corporal Steven Cummings

On 8 May 2009, Cpl Cummings, an Aviation technician, discovered a crack in the lower rudder viscous damper support bracket of a CP140 *Aurora* aircraft while training a subordinate technician on corrosion control inspection techniques. Cpl Cummings immediately informed his supervisors and initiated an informal survey of the remaining nearby aircraft. The survey revealed that two additional aircraft were also affected which led to the initiation of a fleet-wide Special Inspection (SI). Although the initial cracks were found on the lower damper support brackets, Cpl Cummings

insisted that the upper brackets should also be included in the inspection. During the SI, a crack was found in the upper viscous damper of a deployed aircraft. This crack was found due to Cpl Cummings insistence that the upper mount be included as part of the inspection. The rudder viscous damper is a critical component used to protect the flight controls from aerodynamic flutter. If this damper fails in-flight, a rudder control surface could get jammed with potentially catastrophic consequences. Cpl Cummings commitment to pursuing a corrective action to this previously undetected condition makes him very deserving of this For Professionalism award. ♦



**Corporal Cummings is currently serving with 14 Air Maintenance Squadron, 14 Wing Greenwood.**



## Corporal Fraser Munro

**O**n 19 May 2009, while replacing the left brake assembly on a CT114 *Tutor* aircraft, Cpl Munro observed what appeared to be an improper bearing installed in the main wheel assembly. He noted that the bearing appeared to have a looser than normal fit, which prompted him to further scrutinize the installation. Cpl Munro removed the bearing's roller assembly from the incident wheel and compared it with the bearings installed in the spare main wheels from the serviceable wheel rack. It was immediately evident that there were physical differences between the bearing removed from the incident wheel and those found on the spare wheels. A follow-up check of the applicable maintenance orders confirmed that the part number was not correct.

Cpl Munro recalled a previous similar incident and immediately reported the discrepancy to his supervisor and then continued to investigate possible factors associated with the erroneous installation. Noting that the NATO stock numbers on both the correct and incorrect bearings were very similar, and that both bearings were used for similar applications on different aircraft, Cpl Munro recommended that all spare stock of CT114 *Tutor* bearings be inspected and verified. With the assistance of his supervisors, he confirmed that incorrect bearings had been misidentified for use on the *Tutor* aircraft. This prompted immediate supply action to purge the incorrect bearings from the system.

Cpl Munro's attention to detail avoided a potential bearing failure (the incident bearing had already



begun to exhibit signs of distress) and subsequent wheel failure. His prompt action to press forward with the investigation is admirable and makes him deserving of this For Professionalism award. ♦

**Corporal Munro is currently serving with Aerospace Engineering Test Establishment at 4 Wing Cold Lake.**

## Sergeant Christopher Schofield

**D**uring weekly maintenance of the Precision Approach Radar (PAR) at 8 Wing Trenton, Sgt Schofield discovered that the elevation antenna was out of tolerance thus rendering the PAR unserviceable. Sgt Schofield ordered a new antenna and requested a flight check to verify that, once the antenna was installed, it was within parameters. The antenna was installed and when the flight check failed for no apparent reason, Sgt Schofield analyzed the situation to determine a possible cause for the unsuccessful flight check. After carefully examining all of the variables in the system, he theorized that the permanent runway markings on runway 24 used to position the

test equipment were improperly located on the runway surface. After consultation with the Life Cycle Material Manager, additional investigation by Wing Construction Engineering revealed that the locations marked as the threshold point on the airfield were indeed incorrect. As all measurements used to locate the aircraft touchdown point are measured from this threshold, this indicated that these inaccuracies dated back to a runway resurfacing project in 2000. This extra level of attention to detail and tremendous level of dedication combined with his extensive knowledge and experience corrected a long standing inaccuracy in the runway survey where the marker was about 200 feet short ahead on the runway. Sgt Schofield's determination and



stalwart actions to correct this situation were instrumental towards improving flight safety at 8 Wing Trenton, and he is very deserving of this For Professionalism award. ♦

**Sergeant Schofield is currently serving with Canadian Forces Station Leitrim.**

# Epilogue

**TYPE:** Schweizer 2-33A *Glider* (C-FDXP)

**LOCATION:** Picton Airport, Ontario

**DATE:** 09 August 2008



**T**he accident occurred during the Air Cadet Glider Pilot course in Picton, Ontario.

The flight involved a student glider pilot who was conducting a first solo flight on that course. The pilot stated that the air tow launch from runway 35 was normal in all aspects until the glider was approximately 1/2 nautical mile (NM) from the launch point and at 60 ft above ground level (AGL). At this point, the pilot heard a “ping” (sound) from the forward area of the fuselage and observed the tow rope separate and “shoot forward” from the glider. The pilot immediately established a glide speed of 50 miles per hour and carried out the emergency procedure for a tow rope break (premature release) below 200 ft AGL. The landing areas available from this altitude were extremely limited and the option of returning to the runway was not possible. The pilot levelled the wings in accordance with the emergency procedure and landed straight ahead in a field approximately 3/4 NM from the launch point. The glider impacted several trees and came to rest, upright, approximately 45 ft from the initial impact point. The pilot sustained minor injuries and the glider damage level was assessed as very serious.

The investigation determined that the tow rope release was uncommanded and therefore centered on the tow hook and release mechanism installed on the glider. Inspection of the release mechanism revealed that a small “ledge” existed in the tow hook securing slot in the release arm. The ledge was formed due to the reinforcing slug being mounted slightly higher than the bottom surface of the tow hook securing slot. Due to the presence of this ledge, it was possible to insert the tow hook into the release arm just far enough to rest on the ledge and to achieve a “false” hook-up. The hook-up person most likely conducted a cursory inspection of the release mechanism from a position forward of the release mechanism. This was not sufficient to detect the false hook-up condition, which could “pass” a cursory visual inspection if viewed from a forward angle and even pass the tactile “tug” check. It was determined that the false hook-up could hold sufficient strain to allow the glider to become airborne but would release, without command, once the glider was airborne and the geometry of the rope position altered. Examination of procedures revealed that there

is insufficient emphasis or direction as to what constitutes a proper “checking of the attached rope for security” in the A-CR-CCP-242/PT-005, ACGP Manual. Following the discovery of the anomaly in the release arm, the Directorate of Flight Safety (DFS) released a Safety Flash to alert other operators of the Schweizer 2-33A to the anomaly found and the suspected role this may have played in this occurrence. Importantly, the Safety Flash highlighted that a visual check from an angle close to 90 degrees relative to the glider longitudinal axis would immediately reveal that the tow hook was not fully seated in the release arm and recommended that all personnel assigned to hook-up duties be briefed on the anomaly found and on the need for a visual inspection from 90 degrees. The National Technical Authority – Air Cadet Gliding Program (ACGP) ensured all release arms within the ACGP glider fleet were examined; the release arms displaying the noted anomaly were either removed from service or reworked before being returned to service. It was further recommended that the salient points found in the DFS Safety Flash be published in the A-CR-CCP-242/PT-005, ACGP Manual. ♦

