



National
Defence

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ISSUE 2, 2019

Flight Comment

CHECK SIX

"A lonely impulse of delight..."

DOSSIER

Waking up with a Fresh Perspective

VIEWS ON FLIGHT SAFETY

MGen Pelletier, Comd 1 Cdn Air Div

Canada

Cover – A CF-188 Hornet aircraft
at Mihail Kogalniceanu Air Base
in Romania during Operation
REASSURANCE, September 1, 2018.

Photo: Cpl Dominic Duchesne-Beaulieu

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Flight Comment



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Views on Flight Safety

by MGen J.P.A Pelletier, Commander of 1 Canadian Air Division

Throughout the first three months of my Command, CWO Parent and I have had the chance to visit some of our Wings and witness Air Power execution through NORAD, domestic and international Operations. All along, we have been impressed by the keen dedication and exemplary execution demonstrated by RCAF personnel across our squadrons, units and Task Forces to ensure we can optimize the Air Power delivery at an acceptable level of risk. At the center of today's RCAF mission success is our historically low accident rate which, without a doubt, relies on our collective commitment to the flight safety program; a program that continues to be a reference for our allied Air Forces.

Our safety culture relies on our duty to report, our ability to learn from previous mistakes and our collective ownership of RCAF maintenance activities and operations. Our safety (ourselves, our team partners, and our assets) must rely on more than just willingness in order to avoid the potential loss of life, limb or resources; hence the duty to report.

In the conduct of RCAF operations I expect that when someone sees something wrong, they will not be afraid to take either immediate action when required or to speak out while seeking solutions. Bottom line is that safety is not a supervisor's business but everyone's business. My own experience in the Fighter Force has been one whereby no matter the rank of any members in the formation, every member was allowed to question a tactical action that may have had an impact on safety or mission success. The same approach is expected of members

involved in RCAF operations; everybody should feel encouraged to report and share lessons learned to help all of us understand the deeper cause(s) of an error and enable ways to prevent reoccurrence.

Now the difficult question: What comes first? Flight safety or mission accomplishment? Well, I believe both are integral in the planning of every mission we are tasked for. An important element to be considered is the level of acceptable risk for each mission, a variable that is well captured in our Mission Acceptance and Launch Authority (MALA) tool which involves a detailed leadership assessment along with authorities linked to specific mission. But the MALA neither covers every contingency, nor every phase of maintenance actions leading up to an asset being available for the mission; hence, proper management and control of operating procedures as well as operational pressures remains necessary.

Today's flying environment is becoming more complex. The danger of mid-air collision is accentuated by an increasingly busy airspace compounded by the proliferation of drones in urban area. Aircraft systems are also more complex leading to increased system management and a tendency for less eyes out of the cockpit. In addition, the experience level within flying units has decreased over the last few years resulting in the right level of supervisors and experience mentors not being always available. The Ops tempo has remained high both at home and abroad while today's family environment may require greater involvement of the RCAF member on the home front; these are all elements that unit leaders

and supervisors, along with their integrated team of flight safety experts need to keep in their daily cross-check.

The Wing and Unit Flight Safety Officers and their team of dedicated professionals use their privileged positions to influence positive changes from the floor up as well as to provide trusted advice to the leadership. Their constant involvement and initiatives contribute directly to the good health and promotion of the FS Program and relies heavily on leadership commitment and engagement to flight safety principles and practices.

So what remains to be done? We need to mentor our people to better understand the higher intent and to be confident in their ability to operate safely. Air mindedness needs to constantly be associated with a culture of professionalism and collaboration at all levels. Moreover every leader, from 1 Canadian Air Division HQ to the tactical unit, needs to ensure clear communication of the acceptable risk, while ensuring that all associated risks are understood and accepted at the right level. Loss of life and limb in peace time along with mission failure should never be an option!

It has been said that: ***A great safety culture is defined by always doing the right thing when no one is watching.*** This can only happen when people feel safety is important; feel that they have an important role to play in it; and, feel that their safety attitude is well appreciated. ✈

The Editor's Corner



How does one start an investigation? It often begins with a phone call. In our job as accident investigators with the Directorate of Flight Safety (DFS) you'd think we'd be used to receiving calls involving bad news. The reality is that these calls are always received unexpectedly. Armed with our safety statistics and our risk analysis we sometimes anticipate a call will come in from a certain community but normally we are broadsided with the news. Spring loaded to respond, the call is always followed by a period of intense activity as a team is sent out to investigate the cause of the accident. That activity marks the beginning of a process where we have an active role in answering questions. In short, we can help.

On 29 April 2019, a call came in to DFS that was different. We received the awful news that Jim Armour, one of our colleagues, had passed away the previous day as a result of a canoeing accident.

This was not our accident to investigate. We, like so many others normally are, were simply the recipients of the news. We did not have our normal outlet of activity nor access to the investigation process. We were not in a position to help. Jim's loss was staggeringly personal.

DFS is a small, close knit, unit. Many of us have had multiple tours of duty at DFS. Initially attracted to flight safety for multiple reasons, many of us have returned because of the professionally fulfilling work and because of the friendships that have developed through shared purpose. Jim was a backbone of DFS. He was a wealth of information, extremely experienced and mentored many of us both junior and senior alike. Having been involved in at least 50 accident investigations and a fundamental contributor to the development of Canada's Aeronautics Act, Jim was often the face of flight safety. Acting as the liaison officer

for many families whose loved one had been involved in an accident, Jim was often the connection between a family and the Royal Canadian Air Force flight safety process. Comfort was often provided because families knew that Jim was tenaciously in pursuit of determining the cause of the accident so that effective preventive measures could be implemented. The loss of their loved one would not be in vain... Jim would not let it be so.

Jim's sudden unexpected departure has left us a bit unbalanced. For several days after the news we would walk by his cubicle and see his stained coffee mug, his kicked off shoes and the myriad of projects he had piled on his desk. Jim's empty chair reminded us that his mentorship had come to an end, the flight safety torch had been passed and we needed to take on his teachings and projects and advance them along. His shoes are so very big to fill.

Jim's love of family extended to his love for canoeing and travelling and he was always telling tales of his latest adventure. Safety first of course! His zest for life and his pursuit of doing the things he loved, surrounded by the people that mattered to him most, serve as a reminder that one must live life to the fullest. Like Jim's unfinished projects, we cannot always be prepared for the realities of life. In our quest to make our aviation world safer, we know that some things just cannot be anticipated.

So, like our friend Jim, make flight safety a passion, but when your work day is done, put down your pens. Shut off your computers. Drive home safely. Put on your walking shoes, your travelling hat, or your hockey gear, ... whatever item that matters to you and gather your friends and family for a shared adventure. When you finally "slip the surly bonds of earth"¹, know that you have made a difference.

In memoriam,
Jim (James) Robert Armour
28 May 1953 – 28 April 2019

Jim Armour joined the Canadian Armed Forces in 1977 as a pilot and completed flying tours on the Sea King, Tutor, Silver Star and Aurora aircraft. His first direct role with Flight Safety was as a backup Unit Flight Safety Officer in Moose Jaw, Saskatchewan. He subsequently completed five tours with DFS as an accident investigator, which included responsibilities in nearly every aircraft cell in the directorate. He became the first Senior Investigator with DFS in 1999 and was involved in more than 50 field investigations. These investigations notably included Labrador 305 (FSIMS 79005), Griffon 420 (FSIMS 109081), numerous CF188 Hornet crashes in the 1990s and multiple Snowbird mid-air collisions including Toronto 1989 (FSIMS 26343), London ON (FSIMS 104593) and Moose Jaw (FSIMS 119527).

Jim was the author of the first version of CF HFACS and was the RCAF expert for the Aeronautics Act amendment introduced in Parliament. He was instrumental to the development of the Airworthiness Program and created the initial, followed by subsequent editions, of the Airworthiness Investigative Manual for the CAF.

In 2006, Jim was presented with the Order of Military Merit by Canada's Governor General for his work related to safety. He also received two Commander's Commendations for duties rendered in his military career. After retiring from the CAF, Jim rejoined DFS in May 2011 for his third time as the Senior Investigator but this time as a civilian. 🕯

**Claire Maxwell, Major, DFS 3-3,
Flight Comment Editor**

¹ From the poem "High Flight" written by John Gillespie Magee Jr in 1941.

Good Show

For Excellence in Flight Safety

Lieutenant (Navy) Melanie Aqiqi



On 14 September 2018, while deployed on Op PRESENCE in Gao, Mali, as the Task Force Public Affairs Officer (PAO), Lieutenant (Navy) Melanie Aqiqi was hosting a media visit by a national agency tasked with conducting interviews and gathering images. While attempting to film a CH146 Griffon helicopter crew conducting their final pre-start checks in preparation for a mission, Lt(N) Aqiqi noticed that the media crew were inside the main rotor blade hazard area. The Griffon flight engineer did not see the media because he was conducting his engine start duties on the opposite side of the helicopter. As the aircrew signaled for the engine start, Lt(N) Aqiqi recognized the dangerous situation and immediately attempted to get the media crew's attention to have them step away from the aircraft. Focused on their work, the media did not notice Lt(N) Aqiqi's gestures until the rotors had begun to turn. Lacking awareness of helicopter danger areas, the media crew began backing away from the aircraft in a

crouched position and, unknowingly, rapidly approached the tail rotor area. Lt(N) Aqiqi ran to the media crew and physically restrained them a few feet from the tail rotor. The team was then escorted outside the danger area and away from the helicopter so that they could continue with their work.

Despite her trade as a PAO and a relative lack of expertise regarding helicopter operations, Lt(N) Aqiqi was able to recognize the potential for a severe, if not fatal, outcome had the media team continued on their approach to the tail rotor. Her immediate actions prevented serious injury and demonstrates that regardless of trade, position, or contribution to an Air Task Force, every member is instrumental towards the maintenance of Flight Safety. For her actions in preventing a catastrophic outcome, Lt(N) Aqiqi is highly deserving of the Good Show award. 🏆

Good Show

For Excellence in Flight Safety

Aviator Claudia Côté



Photo: Cpl Dominic Duchesne-Beaulieu

Aviator (Avr) Claudia Côté enrolled in the Canadian Armed Forces (CAF) in December 2014 as an aircraft structures technician (ACS Tech). Through an 11 month training tour with the 439 Squadron Aircraft Life support Equipment (ALSE) shop in Bagotville, Quebec, Avr Côté gained a professional reputation as a skilled and knowledgeable worker who meticulously carried out her tasks to the highest airworthiness standards. After completing her ACS course in November 2017, she returned to Bagotville where she spent seven months on apprentice rotation and training.

Following completion of her apprenticeship, Avr Côté was posted to an operational line unit at CFB Bagotville. Shortly after her arrival, she began to notice certain practices and processes that appeared to be inconsistent with her previous Airworthiness standards and ALSE training. After unsuccessful attempts to have her concerns

addressed locally, Avr Côté sought out the advice of an external subject matter expert who took immediate action and an investigation ensued.

Avr Côté's fortitude in facing an ethical dilemma and selecting the correct actions, despite her apprehensions towards the risk of adverse consequences to herself, is truly exemplary. Had she not persevered in voicing her concerns, the numerous identified issues would have likely persisted, posing a significant risk to flying operations and possibly leading to an accident or loss of aviation resources. The unwavering moral courage exhibited by Avr Côté exemplifies the CAF's ethos and military values of duty, loyalty, integrity and courage and makes her highly deserving of this Good Show award. 🇨🇦

Good Show

For Excellence in Flight Safety

Mr. Pal Sidhu

On 30 November 2018, Mr. Pal Sidhu was tasked to inspect the Liquid Oxygen (LOX) System on Hercules CC130336 at Cascade Aerospace in Abbotsford, BC. Upon inspection, Mr. Sidhu noticed one of the flexible braided hoses had been rubbing on an adjacent structure and that there was ice buildup on the Tru-Seal and LOX Converter fitting. When Mr. Sidhu raised the flex line slightly to get a closer look of the condition of the hose, the flex line rotated and LOX began to spray out of the loosened line.

Recognizing the catastrophic potential of a LOX leak, Mr. Sidhu immediately initiated the Emergency Response Plan and informed the supervisory staff of the condition. Mr. Mike Simpson, a second Cascade mechanic, was summoned to assist with containing the volatile situation. Mr. Simpson donned his LOX servicing gear and entered the nose landing gear wheel well to assess the situation. While Mr. Sidhu and Mr. Simpson attended to the leak, the hangar doors were opened to provide additional ventilation and the local fire rescue resources were put on standby. Cascade employees were removed from the immediate area and kept a safe distance from the aircraft. Mr. Sidhu and Mr. Simpson secured the leak and the aircraft was moved outside the hangar and away from other customer assets. The LOX leak was secured in a timely manner potentially avoiding a catastrophic loss or injury to personnel or aircraft.

Mr. Sidhu demonstrated a high level of aircraft system knowledge in his initial discovery of the LOX leak. His quick reaction to initiate the emergency response and his significant



Photo: Mr. Dave Scharf

contribution to the remarkable team work with Mr. Simpson brought this potentially volatile situation under control in a safe and timely fashion. Mr. Sidhu is most deserving of this Good Show award. 🏆

For Professionalism

For commendable performance in flight safety

Captain Scott Boer

On 25 March 2018, Captain Scott Boer, a CH146 Griffon instructor pilot with 403 Helicopter Operational Training Squadron in Gagetown, NB, demonstrated exceptional professionalism, situational awareness, and risk management when he reacted to a situation and prevented catastrophic damage to a helicopter and injury to aircrew.

While monitoring a student pilot's descending approach to a confined area landing zone, the aircraft rotor generated a "snowball" effect and references became obscured. As the helicopter settled onto the snow packed surface, it abruptly sunk approximately 14 inches into the snow further increasing the snowball effect. In a three second span, the crew lost their references, the helicopter abruptly rolled approximately 22 degrees and yawed to the right. This action put the helicopter 12 degrees past its slope limits and within a ½ rotor length from the surrounding trees.

Quickly assessing that he was in a dynamic rollover situation, Capt Boer took control, reverted to his instruments and expertly input left cyclic corrections to level the helicopter. While still engulfed in a snowball, Capt Boer applied collective and climbed free of the obscuring phenomena at approximately 50 feet above ground. After a scan of his aircraft systems and ensuring his crew was not injured, Capt Boer elected to land in a safe area and had the flight engineer inspect for damage while he checked the aircraft systems for over-torque conditions and unserviceabilities. After ensuring the aircraft appeared



Photo: WO Kip Cormier

serviceable, the crew returned to base where they informed maintenance who, after a detailed inspection, discovered underlying structural damage.

During the subsequent flight safety investigation, it was determined that the main rotor blades had narrowly missed impact with the ground. Had the blades struck the ground, the aircraft

would have sustained catastrophic damage and there was considerable potential for the crew to have sustained serious injury. Capt Boer's superior situational awareness, decisive action and exceptional skill directly prevented the loss of an air asset and avoided significant injury or possible loss of life. Capt Boer is fully deserving of this For Professionalism award. 🏆

For Professionalism

For commendable performance in flight safety

Master Corporal Tracey Cuthbertson



On 24 May 18, while auditing the previous day's maintenance paperwork, MCpl Tracey Cuthbertson, an Aviation Systems Technician with 403 Helicopter Operational Training Squadron in Gagetown, noticed an unusually high torque value recorded for the "lower cone torque check" completed on a Griffon helicopter main rotor head. Upon investigating the maintenance manual, MCpl Cuthbertson determined that the 375 inch pounds (in-lbs) listed in the aircraft paperwork far exceeded

the correct value of 125 in-lbs. This discovery spurred a flight safety investigation which determined that the maintenance crew misread the maintenance manual's torque setting chart and that the manual's reference for the applicable torque check was missing.

MCpl Cuthbertson's discovery of the unusually high torque value, an area normally outside of her auditor's role, resulted in the discovery of a latent unserviceability which had the potential to cause an in-flight emergency.

MCpl Cuthbertson is to be lauded for her outstanding professionalism and attentiveness to detail and is considered worthy of this For Professionalism award. 🇨🇦

Master Corporal Stephen Smith

On the night of 24 November 2018, Master Corporal Stephen Smith was conducting an Independent Check of Griffon CH146484 that had just undergone a post Air Transportation Kit assembly for use in the Op IMPACT mission. While inspecting the main rotor head, hellhole and surrounding area for task associated foreign object debris (FOD), MCpl Smith noticed something at the bottom of the hellhole observation area. Removing the left hand pylon access panel to see better, he confirmed the presence of multiple rags surrounding the tail rotor driveshaft coupling.

He immediately reported his findings and an investigation was initiated. After the rags were removed, a detailed visual inspection was performed and the aircraft was returned to service. Of note, Griffon 484 had just been received in theatre and had undergone several pre-flight and post maintenance action inspections while this FOD had remained undetected.

MCpl Smith's keen eye, attention to detail and inclination to preform comprehensive inspections, aided him in detecting a fault that had gone unnoticed during several previous inspections. These rags were difficult to observe and their location was outside the scope of his inspection. Had the rags remained



Photo: MCpl Krista Blizzard

in the cavity, they may have potentially contacted the driveshaft and caused excessive vibrations resulting in damage to the tail rotor system.

MCpl Smith's extra effort and attention to detail helped avoid potential damage and

associated additional maintenance to a helicopter assigned to operations in theatre. MCpl Smith is considered very deserving of this For Professionalism award. 🏆



Photo: DND

ERRATUM

Editor's notes in reference to issue 1-2019 of *Flight Comment*

My apologies to MCpl Jesse McIlroy for incorrectly spelling his name in his For Professionalism write up on page 10.

The NVG/LED compatibility graph depicted on page 26 was presented at the SAFE National Symposium in 2016 by Dave Bigmore and belongs to © QinetiQ Limited.

For Professionalism

For commendable performance in flight safety

Master Corporal Rob Vardy



On 19 February 18, Master Corporal Rob Vardy, a flight engineer (FE) with 413 Transport and Rescue Squadron, was conducting a pre-flight of Cormorant CH149902. While carrying out the function check of the rescue hoist system, MCpl Vardy noticed the rescue hook was stiff and did not spin freely as normal. Upon researching and then discussing the issue with IMP, he concluded that an extra washer had been installed resulting in the incorrect assembly of the rescue hook. It was then also discovered that the washers had been stacked-up incorrectly causing the binding and stiff

rotation of the rescue hook. This issue had been missed on previous pre-flight and daily inspections. To raise awareness of the issue, MCpl Vardy briefed 413 Sqn Cormorant Section FEs on his findings and a fleet wide Maintenance Alert was issued to inspect all rescue hoist systems and the rescue hook washer stack-up.

MCpl Vardy's finding and the subsequent immediate action carried out to fix the rescue hook assembly meant that the rescue hook was operating properly. Had the issue remained undetected, proper functioning

of the rescue hook was questionable and posed a risk to Search and Rescue Technicians who would be hoisted on that system.

Due to MCpl Vardy's attention to detail in discovering the issue, his diligence in determining the cause and his efforts to raise awareness to appropriate personnel make him highly deserving of this For Professionalism award. 🏆

Corporal Martin Bélair

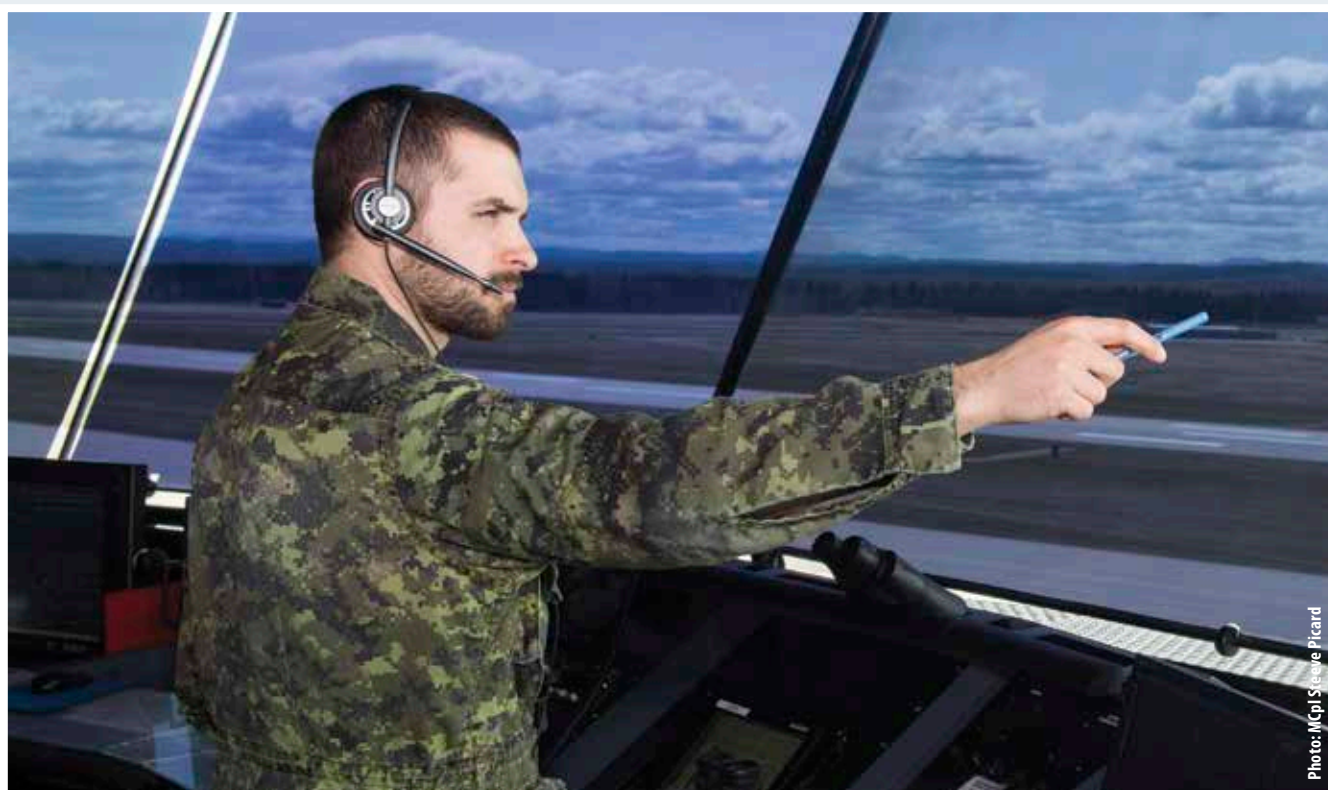


Photo: MCpl Séverine Picard

Cpl Martin Bélair is an Aerospace Control Operator at 3 Wing Bagotville, Québec. On the evening of 20 October 2018, Cpl Bélair distinguished himself with his impressive management of the Icelandair 688 airborne emergency.

Working alone as the on-duty Flight Advisor and holding the roles and duties of a Tower Controller, Ground Controller and Data, he noticed an aircraft on the radar displaying emergency code 7700. Further communication with the aircraft and other controllers indicated that the aircraft was dealing with a broken window, a potentially dangerous

situation for a pressurized aircraft, and was requesting an emergency landing at Bagotville airport. Cpl Bélair worked tirelessly to help coordinate emergency services and significantly contributed to the safe landing of the unexpected civilian aircraft, with its 162 passengers, at CFB Bagotville. When the situation was secured, he continued to work with external agencies to provide an outstanding service.

Cpl Bélair's simultaneous roles and duties significantly increased the complexity of the situation and workload. He demonstrated exceptional job competency, excellent

situational awareness and managed this stressful situation with composure and professionalism well above and beyond expectations. Cpl Bélair is highly deserving of this For Professionalism award. 🏆

For Professionalism

For commendable performance in flight safety

Corporal Taylor Côté



Photo: Sgt Yves Desfossés

Cpl Taylor Côté, a door gunner on the CH146 Griffon, was deployed on Op PRESENCE in Gao, Mali. On 7 October 2018, while cleaning weapons during an equipment care day, Cpl Côté noticed white sand and debris falling out of one of his M134D mini-gun's six barrels.

Knowing that the aircraft had not recently carried out any landings in a cloud of sand, he decided to investigate by field stripping the weapon. He then observed that there was

a dummy training round lodged approximately 1.5 inches inside causing a complete obstruction of the barrel. This weapon had been inspected the day prior by an Air Weapons technician and signed off as serviceable. Field stripping the weapon is not required during routine cleaning of the M134D. Had there been an engagement with the obstruction in the barrel it certainly would have caused damage to the weapon, with potential for injury to the operator as well as damage to the aircraft.

Cpl Côté was only recently qualified on the weapon system in theatre, but his attention to detail and going above and beyond the standard preventive maintenance requirements demonstrate a level of competency well above expectations. Cpl Côté is most deserving of this For Professionalism award. 🦋

Corporal Jeff Dietrich



Photo: Cpl Jeffrey Clement

On 12 October 2018, Buffalo CC115451 was being prepared for high-power ground runs after the Fuel Control Unit (FCU) was replaced on an engine. On his own initiative and outside of the normal ground run preparation routines, Cpl Jeff Dietrich, an aviation systems technician with 442 Transport and Rescue Squadron, decided to open the engine cowl and do a quick inspection of the ground run engine. Immediately, Cpl Dietrich noticed that the FCU had been rigged in a way that was extremely detrimental to the aircraft.

Had the rigging problem gone unnoticed, starting the engine would have caused the internal engine temperature to increase dramatically resulting in a hot start. Compounding this issue, the established emergency procedure would have been completely ineffective because the incorrect FCU rigging would have caused fuel to be pumped continually into the engine even when selected off. The risk of an engine fire and significant aircraft damage was high.

Cpl Dietrich's astute technical awareness and dedication to safety far exceeded what is expected from a technician at his level. His outstanding initiative and keen technical eye kept fellow technicians out of a dangerous emergency situation and preserved a Royal Canadian Air Force asset. Cpl Dietrich is considered a worthy recipient of this For Professionalism award. 🏆

For Professionalism

For commendable performance in flight safety

Corporal Marc-André Duguay

On 27 September 2018, during pre-flight checks on a SAR configured Hercules, the flight engineer reported that the Intercommunication System circuit breaker was popping regardless of the selected power source. Corporal Marc-André Duguay was tasked with troubleshooting the reported issue. After some investigation Cpl Duguay determined that this had been an intermittent issue for the previous few weeks and, indeed, upon his arrival at the aircraft, the issue was no longer present. Cpl Duguay took on the arduous task of inspecting wire bundles along the entire system and, in the cargo compartment, eventually spotted a suspicious bend in the wire bundle that ran very close to the hydraulic plumbing cover. The problem area was confirmed when the circuit breaker tripped as soon as the hydraulic plumbing cover was disturbed.

After gaining access to the area behind a panel, Cpl Duguay discovered evidence of electrical arcing and that a screw had damaged the coatings on several wires in the bundle. This portion of the wire bundle runs very close to a hydraulic line and several fittings. Had the arcing reached the hydraulic line, it could easily have resulted in a fire much like the one that caused the loss of CC130342 Hercules in Florida in 2012. Following his discover, a Fleet Wide Special Inspection was released to ensure that other CC130 Hercules squadrons would inspect the same area.

Cpl Duguay's dedication and positive attitude have made a significant contribution to the safe operation of the CC130 Hercules fleet and make him deserving of this For Professionalism award. 🦋



Photo: Dan Bard

Corporal Curtis Fox



Cpl Curtis Fox is a flight engineer with 408 Tactical Helicopter Squadron. On 2 January 2019, while deployed on Op PRESENCE in Gao, Mali, Cpl Fox was conducting a pre-flight check on Griffon CH146436 prior to a mission. When Cpl Fox inspected the right-hand engine air management system, he detected a structural irregularity in the air inlet cowling. Upon further inspection, he saw two rivets anchoring the air inlet bracket had sheared and, by feeling with his

hand, discovered a significant crack along 85% of the length of the cowling. He immediately reported his findings and a detailed investigation ensued. Had this defect remained undetected, the eventual structural failure and subsequent debris into the engine or through the transition duct/ejector could have caused a catastrophic event.

This area is not easily visible during a pre-flight inspection, is not accessed during servicing or first line maintenance, and had not been

looked at since the helicopter's arrival in Mali. The helicopter had flown 28.9 hours in theatre.

Cpl Fox's attention to detail and perseverance prevented the loss of a valuable resource that is critical in the support of MINUS MA operations. Cpl Fox's actions are indicative of commendable extra effort and he is therefore deserving of this For Professionalism award. 🏆

For Professionalism

For commendable performance in flight safety

Corporal Michael Lajeunesse

While deployed to Mali as a member of Op PRESENCE and assisting with the re-assembly of the second of two CH147F Chinook helicopters following air transportation, Corporal Michael Lajeunesse noticed that the hardware of the number nine sync shaft was "shadow" installed in an incorrect orientation.

During the air transportation kit disassemble process, a common practice has been to "shadow" install the disassembled hardware loosely back into the correct location and orientation to reduce the risk of lost hardware.

Discovering this potentially hazardous situation, Cpl Lajeunesse decided to inspect the first Chinook helicopter and determined

that its number nine sync shaft had also been installed incorrectly and that the aircraft had flown in this improper state.

Cpl Lajeunesse's keen attention to detail, expertise and quick reaction, led to the discovery and rapid rectification of an improperly installed component on two operational assets. It is for these reasons that Cpl Lajeunesse is considered deserving of this For Professionalism award. 🏆

Corporal David Lapalme

On 6 October 2018, Corporal David Lapalme, an aviation systems technician with 425 Tactical Fighter Squadron (425 Tac F Sqn) was conducting a "before check" inspection on a CF188 Hornet and found a damper assembly on the ground underneath the jet. Unsure of this part, Cpl Lapalme investigated further to find out where this damper had come from.

After inspecting all access panels and borescoping the engine, Cpl Lapalme found that the Electrical Control Assembly (ECA) was being held on by only two bolts instead of the normal four. Cpl Lapalme discussed his findings with maintenance and flight safety personnel at 425 Tac F Sqn, and it was determined that engine vibration had loosened these bolts resulting in the damper falling out. The ECA is the computer for the

engine and if this part were to separate from the engine or fail from extended exposure to excessive vibration it is highly likely that an engine flameout would occur.

Cpl Lapalme's attention to detail and perseverance in identifying the origins of the

damper demonstrates superior professional attitude and initiative. His dedication to go above and beyond makes him most deserving of this For Professionalism award. 🏆



Photo: Cpl Dominic Duchesne

Corporal Louis-David Ringuette

On 31 August 2018, while deployed on Op PRESENCE Task Force Mali, Corporal Louis-David Ringuette, an Aviation Technician, was tasked to clean the windshield of a Griffon helicopter that was scheduled for an upcoming mission. Prior to completing the task, Cpl Ringuette carried out a walk around to ensure the helicopter was safe and completed a visual inspection of the weapons installed on the aircraft. Upon inspection of a M134 Dillon machine gun that was located inside the cabin of the aircraft, Cpl Ringuette detected that a live round had been left in the weapon's chamber. He immediately notified the Air Weapons Systems Technician and chain of command, who made the weapon and aircraft safe. The mission was able to continue later in the day without harm or damage to any personnel or the aircraft.

Cpl Ringuette's actions to ensure the aircraft was in a safe state prior to the commencement of his assigned task exhibited exceptional situational awareness and thorough attention to detail. His vigilance prevented the potential discharge of a loaded weapon which may have caused damage to other aircraft or injury to personnel. Cpl Ringuette is considered very deserving of this For Professionalism award. 🇨🇦



Photo: Cpl Laura Landry

For Professionalism

For commendable performance in flight safety

Mr. Mike Simpson

On 30 November 2018, Mr. Mike Simpson was a key contributor to the safe resolution of a liquid oxygen (LOX) leak on a Hercules aircraft in Abbotsford, BC.

After a LOX leak was discovered by Mr. Pal Sidhu, Mr. Simpson, a mechanic with Cascade Aerospace, donned his LOX servicing gear and entered the nose landing gear wheel well to help assess the situation. While Mr. Sidhu and Mr. Simpson attended to the leak, the hangar doors were opened to provide additional ventilation and the local fire rescue resources were put on standby. Cascade Aerospace employees were removed from the immediate area and kept a safe distance from the aircraft. After Mr. Sidhu and Mr. Simpson secured the leak, the aircraft was moved outside the hangar and away from other customer assets.

Mr. Simpson displayed a professional attitude and significantly contributed to the remarkable team work and aircraft system knowledge that brought this volatile leak under control in a timely fashion. For his role in preventing a potentially catastrophic loss of an aircraft or injury to personnel, Mr. Simpson is considered a most deserving recipient of this For Professionalism award. 🏆



Photo: Mr. Dave Scharf

DFS

Commendation

The DFS Commendation recognizes outstanding professional long-term performance and dedication in the field of Flight Safety. The DFS Commendation is awarded to the following deserving individuals who, through their actions, have contributed significantly to enhance the capability of the FS Program across the CAF and who emulate the values and ethos promoted by the Program.



MAINTENANCE IN FOCUS

Ejection Systems Flight Safety Trend

by Shannon Saunders, DFS FSIMS Analyst

Recent Flight Safety Information Management System (FSIMS) analysis of Aviation Life Support Equipment (ALSE) systems has revealed an increasing trend in ejection system safety compliance issues. The scope of concerns include failure to remove the ejection seat pin prior to take-off, not reinstalling (or not fully inserting) the pin post-flight, and canopy jettison/fracturization systems not being armed or dis-armed in accordance with procedures.

While adherence to following checklist items is clearly the primary method to ensure ejection system items are not omitted, the use of a mnemonic (i.e. "PINS, PANEL, PITOT") may prove beneficial in ensuring checklist items are covered or re-verified at the appropriate stage of aircraft operation. In aircraft with multiple crew members, Crew Resource Management (CRM) principals are an effective mechanism for ensuring checklist items are complied with at all times. ✈



Photo: Cpl Louis Gagné



A Lonely Impulse of Delight¹... WITH CATASTROPHIC CONSEQUENCES

by Colonel (Retired) Chris Shelley, C.D.

Chris Shelley joined the Canadian Forces in 1973. After graduation from Royal Military College he trained as a pilot, flying some 3800 hours with 424 Squadron and 408 Squadron on CH135 and CH146 aircraft. He flew on operational deployments in Central America (1990) and Bosnia (2001). He commanded 408 Squadron and 1 Wing before serving as Director of Flight Safety from 2006 to 2008. Retired since 2008, Chris retains a lively interest in aviation history and flight safety.

Prologue.

Germany, 13 April 1945. Allied forces were across the Rhine and pushing the crumbling German army deep into its homeland. High above, a Canadian pilot rolled his RAF Typhoon into a strafing run on enemy road transport. Although targets were scarce, there was no shortage of flak and in mere seconds the Typhoon suffered a lethal hit. Quickly hauling his crippled machine into a steep climb, the pilot tried desperately to gain enough altitude to bail out. As the Typhoon slowed, he rolled level, fumbling with the canopy release. Still struggling, the pilot felt the onset of a stall and began to panic. "Is this how it ends," he thought. "Is this how I pay my debt to those poor women?" The shuddering Typhoon flipped onto its back...

Introduction.

Ever succumbed to an irresponsible impulse while at the controls? You would not be the first! The combination of boredom and a

powerful aircraft has led to many tragedies over the years. Seldom have bored pilots, "balanced all, brought all to mind,"² prior to endangering aircraft, crew and hapless bystanders by performing some harebrained stunt. The fact that disaster rarely follows an

"An accident from 1942 has a lot to tell us about boredom and its consequences, investigative jurisdiction and techniques, normalized deviance, tragedy, loss, and what it means to have a 'just culture.'"

impulsive act creates a kind of "normalized deviance," a generalized belief that it is ok to have a bit of fun because nothing bad is likely to happen. Aircrew, being human, are bored easily, and therefore the threat of impulsive (dangerous) behaviour will always be with us. Flying orders are meant to be a defence against this hazard (among others), but if history is any guide, they are far from an effective defence. An impulsive act can lead to an accident, followed by consequences that could well have been imagined but were seldom considered beforehand.

An accident from 1942 has a lot to tell us about boredom and its consequences, investigative jurisdiction and techniques, normalized

deviance, tragedy, loss, and what it means to have a "just culture." Although many years have passed, could the same factors play out today and if they did, what would be the effect on the RCAF? You be the judge!

Manitoba, 1942.

By October 1942, the British Commonwealth Air Training Plan (BCATP) was in full swing. RCAF stations were running at full capacity, with hundreds of aircrew graduating every month from RCAF schools across the country. Most graduates expected an overseas posting, but production demands sent many to RCAF training stations as instructors or staff instead. The worst posting was as a staff pilot. Staff pilots were little more than taxi drivers, ferrying trainee bomb aimers or gunners on canned routes for standard lesson plans day after day. Novelty soon wore off and most staff pilots became intensely bored with the lack of challenging flying. Worse, the pressure of meeting production demands coupled with a perceived need for economy led the RCAF to deny staff pilots proficiency or cross-country training to relieve the tedium of executing the same lesson plans day after day. This created a large population of very young pilots with significant skill-fade in emergency handling, and a strong tendency to engage in thrill-seeking behaviours whenever they were off the leash (Figure 1). The RCAF's answer to this challenge: more orders and more discipline! The result: a lot of accidents.

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Normalized Deviations at No. 3 Bombing and Gunnery School (3 B&GS).

3 B&GS at MacDonald, Manitoba (Figure 2) existed to train air gunners and observers (bomb aimers) to wings standard prior to posting to an OTU. The aircraft used to train air gunners was the Fairey Battle (Figure 3), an obsolete, single-engine monoplane bomber. The Battle provided a stable and reliable gunnery platform on which students could learn the basics. For staff pilots, life consisted of boring trips to and from the gunnery range at Lake Manitoba. The only possibility for a little excitement was to spice up maintenance test flights by indulging in a few forbidden aerobatics or some low flying.

On the morning of 14 October 1942, a 19-year-old staff pilot called Maintenance Flight to see whether any aircraft needed a test flight. Indeed, Battle 1601 needed a quick engine test, and the Canadian RAF Sergeant pilot was only too happy to oblige. The pilot notified his flight commander, who instructed him to get authorization from the Maintenance Flight Commander for the flight. Deciding not to bother with this formality, (pilots seldom

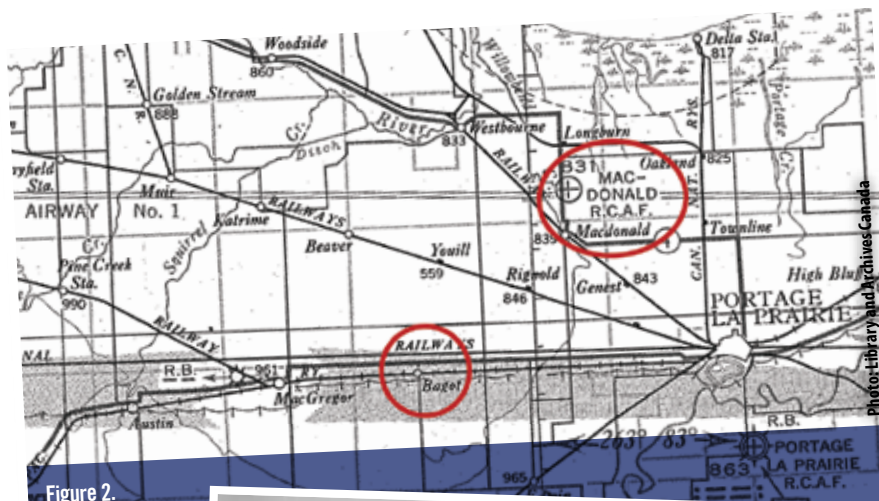


Figure 2.
Map – MacDonald
and Bagot – 1943.



Figure 3. Fairey-Battle, 1628 –22 Sept 1941.

did at 3 B&GS), the pilot chatted with the maintenance desk about the engine test, signed the L14 maintenance log and started the aircraft. Today, these actions would be classified as routine mission-centric. Mission-centric, in that flight commanders were extremely busy, the demand for test flights was large, most were routine, and leaders perceived that authorization procedures accomplished nothing beyond increasing their already considerable workload.

The occurrence pilot taxied bright yellow Battle 1601 over to Armament Flight, where he picked up two idle mechanics as passengers, not bothering to enter their names on the L17 Flight Authorization form or to even initial it himself. Passengers were not authorized for test flights, but mechanics enjoyed getting airborne and pilots liked to indulge them – another routine deviation at 3 B&GS. A peculiarity of the Battle was that a sheet of armour plate prevented the pilot from looking back into the rear cockpit, and so communication with gunner trainees or passengers relied

on voice tubes. The mechanic passengers of Battle 1601 failed to hook these up, so there was no means of communication in the aircraft. But, since the pilot saw no need to brief them, he did not bother to make mechanics strap in or hook up the voice tubes.

The pilot flew Battle 1601 to the west of Station MacDonald, conducting engine tests in a series of simple climbs and descents. Deciding that the engine was fine, the pilot flew south and descended below clouds to 400 feet above ground level (AGL). Deciding to have some fun, he dove to tree-top height, buzzing farms and cattle, pushing the decrepit Battle to its top speed of 160 knots (person-centric deviation)³. His mechanic passengers noticed pylons and wires ahead on the flight path but, being mute, were unable to alert the pilot to this hazard. Finding his windscreen and goggles obscured slightly by a fine mist of oil from the engine, (the cockpit hood being slid back to the open position), the pilot switched the control column to his left hand and used his right to push his



Figure 1. Avro Anson doing a high-speed low pass near Clareshom, Alberta.



goggles up onto his forehead. Suddenly, there was a loud bang as the windshield shattered, the control column was jerked from his hand and the aircraft dipped towards the ground. The startled pilot regained control and made a steep climbing turn to 400 feet AGL. Fearing the aircraft was damaged, the pilot continued up through the clouds and flew directly back to the station, 17 miles away. After landing and shutting down, he discovered his passengers were missing. The panic-stricken pilot reported to the Officer Commanding Flying (OC Flying), reporting that his passengers may have fallen from the aircraft in flight.

A quick search by OC Flying located the passengers. The startled mechanics had exited from the bottom of the aircraft while the pilot was leaving the cockpit, disappearing inside a hangar before the pilot saw them go. They were fine. Attention now turned to discovering what had happened. A quick inspection of Battle 1601 revealed a shattered windscreen (Figures 4 and 5) and damage to the port wing tip (Figure 6). Battle 1601 had clearly struck something, but what? The answer lay on a farm west of the nearby town of Bagot.

At approximately 1015 hrs that morning, a farmer had been repairing a barbed-wire fence on the south edge of his property, 17 miles southwest of MacDonald. The fence ran parallel to, and just below, a set of pylons carrying three electrical cables that supplied power to municipalities from Winnipeg to Brandon. The widowed farmer lived with two adult daughters and an infant granddaughter. Together, they ran the farm, and that morning the daughters were minding cattle a bit closer to the farmhouse. The farmer noticed a low flying yellow airplane coming towards him, but this was a common sight, there being several RCAF stations in the area. He was not unduly alarmed. However, the aircraft continued to tear along at tree top height and sliced through the lowest of the three overhead hydro lines, barely 30 feet above ground. Seemingly unaffected, the aircraft climbed suddenly to just below the clouds before turning northeast towards MacDonald. The startled farmer heard a loud crackling noise and saw one end of the severed high-tension cable had draped across the fence, sparking (Figure 7). Worse, his two



Figure 6. Court Martial wingtip.

daughters lay motionless on the fence, dead. The distraught farmer attempted to pull them off, but was thrown back with a vicious shock, saved only by the insulating value of his wiring gloves. Finally, he managed to chop through the fence with an axe and dragged the bodies to the ground. Neighbours summoned a doctor, who arranged for the power in the line to be cut and confirmed the two women had been killed instantly by electrocution. The toll: two dead women, three dead cows, and an infant child orphaned. Who was responsible?

A Question of Jurisdiction.

In Canada, law enforcement agencies can (and sometimes do) take an interest in military aircraft occurrences, particularly fatal accidents or occurrences that cause damage to private property. Today's RCAF is comfortable with managing the sometimes-competing interests of civil and military authorities, but this was not the case in the early 1940s.

An RCMP corporal attended the scene, gathering evidence. Civilians had been killed, and the property of the Manitoba Power Commission had been damaged, so he had a clear duty to investigate. He soon concluded that the offending aircraft belonged to RCAF Station MacDonald and he proceeded there to make enquiries on the afternoon of 14 October. However, the Station CO refused to provide the RCMP officer access to the station or to provide any information. Hardly a shining example of



Figure 4. Court Martial windscreen.



Figure 5. Court Martial windscreen side view.

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civil-military cooperation! The RCMP officer used his discretion to withdraw and seek instructions from higher rather than arresting the CO on the spot for obstruction. Civilians had been killed by an RCAF aircraft, and the RCAF would have to answer for it.

The RCMP reported the RCAF's lack of cooperation to the Deputy Attorney General for Manitoba. The Attorney General was not taking "no" for an answer and wrote directly to the Air Officer Commanding No. 2 Training Command in very strong terms. "Although we have been unable to get any information at MacDonald Airport, we have in indirect ways received information that would show, the gravest kind of disobedience of orders...and as a result two civilians have been ruthlessly killed." The fact that RCAF aircraft crashed on private property with depressing regularity, killing the aircrew, was bad enough, but now civilians were being harmed, and the Attorney General was not letting it pass. He suggested the AOC direct his officers to cooperate with the RCMP and the Coroner in providing any and all information requested. The AOC, wisely avoiding a civil/military clash that the RCAF was sure to lose, gave immediate direction to his subordinates to cooperate with the civil authorities in the fullest manner.

Shortly thereafter, the RCMP corporal arrived at RCAF Station MacDonald to a completely different reception. Assistance was given freely, and interviews were arranged. The RCMP officer enlisted the aid of RCAF technicians to seize the windscreen, port wing tip and port outboard leading edge of Battle 1601 as evidence. These items were sent to the RCMP Laboratory in Regina for forensic analysis.

Events now began to move quickly: the RCMP opened a file, the Coroner convened an Inquest, and the RCAF Station commander ordered both a Court of Inquiry and a disciplinary investigation.

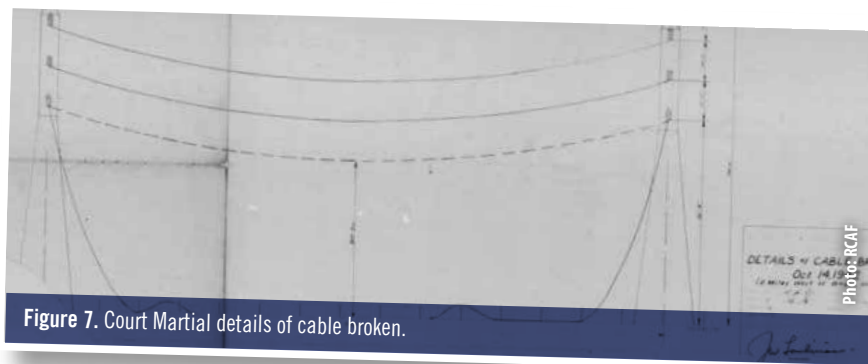


Figure 7. Court Martial details of cable broken.

The records of the four investigations provide an extremely detailed account of the occurrence, notwithstanding their disparate aims. The Coroner needed to determine how the women had died and who was responsible. The RCMP gathered evidence to support the Coroner and to provide the Crown Prosecutor with the means to try whoever might be held criminally responsible for the deaths. The RCAF Court of Inquiry needed to determine what had happened, who was responsible and whether any Claims against the Crown might arise. Finally, The RCAF investigated whether there was a basis to charge the pilot or any other person subject to RCAF discipline in relation to the occurrence. The enquiries and the subsequent court martial were completed by the end of November 1942

What Happened?

The RCMP laboratory matched paint and metal samples from the aircraft with paint flakes and metal shards found on the ends of the severed cable at the scene. This proved that Battle 1601 had struck the high-tension cable. The live cable had then fallen across the fence, and the two women who had been touching the fence were killed. It was for the RCAF to account for how the aircraft had come to strike the cable.

The pilot's flight commander, the maintenance flight commander and OC Flying all gave evidence that the flight had not been

authorized. However, the strong culture of normalized deviations meant that authorization was seldom sought for most short maintenance flights at the station, and procedures had only been tightened up post-occurrence. Therefore, the maintenance test flight itself was not an unusual activity. Neither had it been unusual to carry passengers on such a flight. All witnesses agreed that no one had authorized the pilot to carry out any low flying.

RCAF witnesses testified that flights below 1000 feet AGL were prohibited, outside of authorized low flying areas, and everyone knew it. Low flying due to weather or some other circumstance required an entry be made in the station Low Flying Book. No such entry had been made for Battle 1601. Although low flying ought to have been exceptional, witness testimony showed this was not the case. All civilian witnesses stated that it was very common to see low flying aircraft, such that they were hardly noticed, even though the farm in question was not close to any authorized low flying area belonging to any of the several RCAF stations in the area.

The occurrence pilot chose to cooperate with all investigations and gave a reasonably clear, if somewhat self-serving, account of events. At the Coroner's Inquest, he was provided "the Protection of the Court," (i.e.: his testimony



could not be used in a criminal proceeding) and his testimony there was the most forthright. He also pled guilty at the RCAF Court Martial. The composite picture that emerged provides an intriguing picture of RCAF culture in 1942.

The pilot maintained at first that he had been forced to descend below cloud to 400 feet to avoid getting undercast on his way back to MacDonald. He claimed to have inadvertently flown lower while trying to adjust his goggles, leading to the wire strike. When it was pointed out that weather reports and the statements of his passengers did not support this version of events, he admitted that once below cloud he had deliberately gone down to tree top height. He had given into an impulse to carry out some low flying. When it was suggested that he had tried to fly under the hydro cables, the pilot stuck with his story about adjusting the goggles, claiming he had not seen the cables. His passengers had seen the pylons and wires but had been unable to warn him.

What led to this person-centric deviation? The pilot explained to the Coroner's jury that, "at our school all our flying is more or less a job we don't like: the pilots at that station are trained to be fighter pilots,... and we are at a school that is a big disgrace. We have no chance of keeping up air practice: you are more like a taxi driver. In all the time that I have had at bombing and gunnery exercise, I don't think that I have had a ride where I could look at the country." He and his fellow staff pilots were frustrated, bored and saw the war was passing them by. They felt the RCAF owed them a little excitement.

Why low flying? "It is," he explained, "the thing a pilot likes best; near the ground, he gets a sense of speed. At service school we are taught to low-fly." But as a staff pilot there was no requirement for low flying in the syllabus, so the only way to indulge was to

extend a maintenance test flight for some illicit fun. The use of maintenance test flights by staff pilots for such ends constituted normalized deviance; everybody did it, knowing they might get into trouble if they were caught. No one had imagined that civilians might be harmed in the process.

The Coroner's jury examined all possible causes for the deaths. In the end, they concluded the cable strike by Battle 1601 had caused the electrocution of the two women, killing them. Not only that, but the farmer testified that the stress of the event had precipitated the death of a third daughter, already ill, three weeks later. The cost of the pilot's person-centric deviation had been high, indeed.

*"The cost of the pilot's
person-centric deviation
had been high."*

In his charge to the jury, the Coroner came out strongly that they ought to return a verdict of manslaughter. "If this boy was the cause of causing somebody's death, if he broke the rules and was doing something that he should not do then that establishes a prima facie case of manslaughter... you have to decide whether it was a case of accidental death or a case of manslaughter." Such a finding would have led almost inevitably to the laying of criminal charges by the RCMP.

However, the jury was reluctant to find the young pilot criminally responsible and returned a verdict of accidental death by electrocution, stating, "... we are of the opinion that the Hydro wire was accidentally broken by a plane flown by Pilot [X], by operating the

plane contrary to the rules of the Flying School." It was manslaughter in all but name, but the jury's failure to use this term would be significant. Justice would be left to the RCAF.

Just Culture, 1942-Style.

The AOC 2 Training Command convened a Court Martial at 3 B&GS on 12 Nov 42 to try the pilot on the following charges:

"An Act to the Prejudice of Good Order and Air Force Discipline, in that he in the vicinity of Bagot, Manitoba, on October 14th, 1942, as a pilot did fly aircraft Fairey Battle No. 1601 unnecessarily and without authorization at an altitude of less than 1000 feet above the ground, contrary to the provisions of CAP 100, Sec. 1., para 25;" and,

"An Act in Flying Which Was Likely to Cause Bodily Injury to Persons in that he in the vicinity of Bagot, Manitoba, on October 14th, 1942, as a pilot did fly aircraft Fairey Battle No. 1601 at a height of approximately 38 feet in such a manner as to collide with an electrical transmission cable and thereby cause danger of bodily injury to his passengers." (Figure 8).

A third charge of causing the death of the two women, had been drafted but was not pursued, as the RCAF decided the deaths were a matter for the civil authority. This decision had the perverse effect of rendering the two deaths immaterial as far as the court martial was concerned.

The Court Martial heard most of the same witnesses as at the Coroner's Inquest. The pilot elected to testify and gave a similar account, including blaming the slipping goggles for not seeing the cables. The prosecutor found it odd that the aircraft's passengers had seen the hydro lines and pylons, but the pilot had not.

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He suggested that the pilot had in fact been attempting to fly under the wires, but the pilot denied this assertion. As the height of the broken cable had been only 28 feet, and the aircraft had pitched down after striking the cable, the aircraft must have recovered with only inches to spare. The pilot's behaviour had been extremely reckless.

The Court Martial found the pilot guilty on both charges and delivered a stiff sentence: reduction to the ranks, imprisonment for six months with hard labour and dismissal from His Majesty's service with ignominy. However, the RCAF Judge Advocate General advised AOC 2 Training Command on review that the sentence was far harsher than previous ones for similar offences, the highest being detention for 90 days. The severity appeared to be based on the death of the two women. Everyone agreed the pilot's recklessness had killed them, but the court martial panel ought not to have considered this in sentencing as the pilot had not been charged with the deaths. Accordingly, the AOC commuted the sentence

to six months detention and remitted the punishment of dismissal with ignominy. The pilot would stay in the RAF and would fly again.

On 23 November 1942, the staff and students of 3 B&GS, MacDonald paraded to witness punishment. The Adjutant read the sentence of the Court Martial to the assembly and the Chief Instructor cut the sergeants stripes from the pilot's uniform. He then marched off to

"[...] the RCAF in 1942 lacked the concepts and tools to identify and correct systemic factors that led to occurrences."

begin his sentence of six months detention, but not before being allowed to marry his sweetheart, an RCAF airwoman. Presumably the honeymoon was somewhat delayed!

Aftermath.

The widowed farmer was devastated by the death of his daughters. Left alone to raise a two-year old granddaughter, he was treated cruelly by the RCAF and DND. The RCAF Court of Inquiry had identified potential claims against the Crown. Physical losses had been easy to certify. The Manitoba Power Commission claimed exactly \$200.30 for damage to the hydro cable and costs of repair, which was paid. For the farmer, claims for the loss of the cattle and funeral expenses had been straightforward: \$342 for funeral expenses; \$275 for three head of cattle. The farmer also requested compensation for the death of his two daughters and an allowance to assist in raising his granddaughter, \$100 per month until she turned 21. The RCAF made an initial offer of \$500. The farmer, having no one except a country lawyer to advocate for him, fought the bureaucracy for two years, finally wringing a payment of \$5000 from DND for all damages related to the occurrence, while the Public Trustee for Manitoba accepted a mere \$1500 one-time payment on behalf of the granddaughter. In the interim, the farmer went broke and was forced to sell up and move in with another married daughter, who bore the burden of supporting her father and her niece.

The Court of Inquiry, responsible for investigating the safety and administrative aspects of the occurrence, found the pilot at fault. No action was recommended against any other RCAF personnel, even though the investigation had uncovered a culture of lax supervision at 3 B&GS. No thought was given to the plight of staff pilots or what measures might be taken to provide them with adequate proficiency training or more varied employment. RCAF reviewers, up to and including the Chief Investigator Accidents (precursor to DFS) and



Figure 8. Flight path over power lines.



the Chief of the Air Staff, considered the problem to be disciplinary, and the answer to lapses of flying discipline was punishment, pure and simple. It would be tempting to dismiss this as short-sightedness; however, the RCAF in 1942 lacked the concepts and tools to identify and correct systemic factors that led to occurrences. The RCAF continued to court-martial any pilot suspected of a serious lapse of flying discipline. Unfortunately, this seems to have had little effect on such behaviour, as a review of court martial records reveals that low flying was only slightly less popular than going absent without authority! A review of sentences reveals that while the RCAF wanted to punish offenders, it did not want to lose the services of graduate pilots, who were valuable and scarce. Therefore, sentences of dismissal were rare, and were usually remitted by higher authority. After all, there was a war on!

Conclusion.

We have seen how in 1942 a culture of mission and person-centric deviation at an RCAF station led to a tragedy. Could this happen today? RCAF safety culture is light years ahead of that presented in above and continues to evolve. Yet, has impulsive behaviour disappeared? Probably not. Should we be concerned? Yes. To cite but one possible hazard, consider the challenge of aircrew and skilled trade retention in today's RCAF. Are we unknowingly creating a "staff pilot syndrome," where personnel are frustrated enough with the system to feel that "person-centric" deviations are justified to fulfill some inner need? Possibly. Is the pace at some flying units high enough to produce "mission-centric" deviations like those seen at 3 B&GS? Quite likely. Have we got the balance between Flight

Safety and Just Culture where we want it? Clearly, work in these areas will continue. Recognizing the threat posed by deviations and working to address the conditions that are

"Recognizing the threat posed by deviations and working to address the conditions that are likely to produce them is a challenge for RCAF leaders and safety professionals."

likely to produce them is a challenge for RCAF leaders and safety professionals, but one that must be met to ensure safe and effective air operations. If we fail, the price might be higher than we imagine.

Epilogue.

The RCMP laid no charges because the Coroner's Jury's failed to make a clear finding of manslaughter. The pilot completed his sentence of detention and was reinstated to flying duties. In due course, he returned to the RAF, posted to a squadron flying Hawker Typhoon fighter bombers. Boredom gave way to other emotions as he flew daily ground attack sorties through curtains of flak.

On 13 April 1945, his number came up when German flak hammered his stricken Typhoon. But fortune smiled on him once again. He bailed out, landed in Allied lines, and survived the war. ✈

References

1. From the W.B. Yeats' poem, "An Irish Airman Foresees His Death."
2. Ibid.
3. A person-centric deviation relates to a deviation contrary to established procedures based on personal motives, gains or goals. This type of deviation can be said to be in direct conflict with appropriate ethical behaviours and good order and discipline. It involves reckless, wilful, negligent behaviour or misconduct that may be carried out to demonstrate perceived prowess or skills.

ON TRACK

The Future is Now

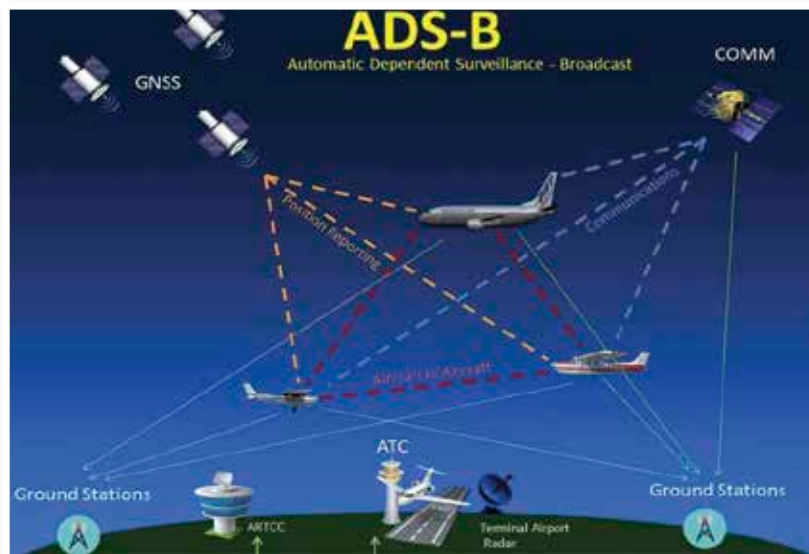
This article is the next instalment of a continuous *Flight Comment* contribution from the Royal Canadian Air Force (RCAF) Instrument Check Pilot (ICP) School. With each 'On Track' article, an ICP School instructor will reply to a question that the school received from students or from other aviation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

This edition of On Track will address some questions about ADS-B, a relatively new initiative to improve the safety and effectiveness of aviation, emerging as a requirement worldwide. The answer comes from Major Diana Dillard, USAF Exchange Officer.

What is ADS-B?

ADS-B, or Automatic Dependent Surveillance – Broadcast, is a means of continuously tracking and broadcasting an aircraft's position and airspeed. Let's break it down:

- Automatic: Requires no pilot input nor external interrogation
- Dependent: Depends on position/velocity data from aircraft navigation system



- Surveillance: Provides aircraft position, altitude, velocity and other data to facilities equipped to receive it
- Broadcast: Information continuously transmitted

There are two different types: ADS-B Out and ADS-B In. ADS-B Out is a transmit-only mode for aircraft, while aircraft with ADS-B In are able to receive transmissions from ground stations and other aircraft. ADS-B Out is becoming a mandatory requirement in many different areas of the world, to include the United States, Europe, and eventually, Canada. ADS-B In provides additional Situational Awareness and aids aircraft in self-separation, but is not forecasted to become mandatory anytime soon.

Why ADS-B?

ADS-B is becoming the popular solution for a variety of reasons. It is a cost-effective measure that performs better than today's surveillance systems and has multi-functional uses. ADS-B provides traffic, weather, and database products to improve aircrew's awareness and decision-making abilities. Using satellite and ground stations, it enables coverage over remote areas where radar is ineffective and by moving technology away from ground radar and ground-based NAVAIDS, more precise tracking with greater coverage occurs. ADS-B improves accuracy and reliability, and will eventually allow air traffic controllers to safely reduce minimum separation distances between aircraft.



How does ADS-B affect you?

In 2010, the Federal Aviation Administration (FAA) published an order stating that ADS-B Out will become a mandatory equipment requirement for all aircraft operating in airspace Classes A, B, C, and above 10,000' in E (with some caveats) in the United States, starting 1 January 2020. One-time deviations may be approved on a case-by-case basis, as long as it is requested with the controlling agency or agencies at least an hour prior to the planned operations; however, requests may be denied depending on the needs of the airspace at the time. There is a provision that is still being discussed regarding

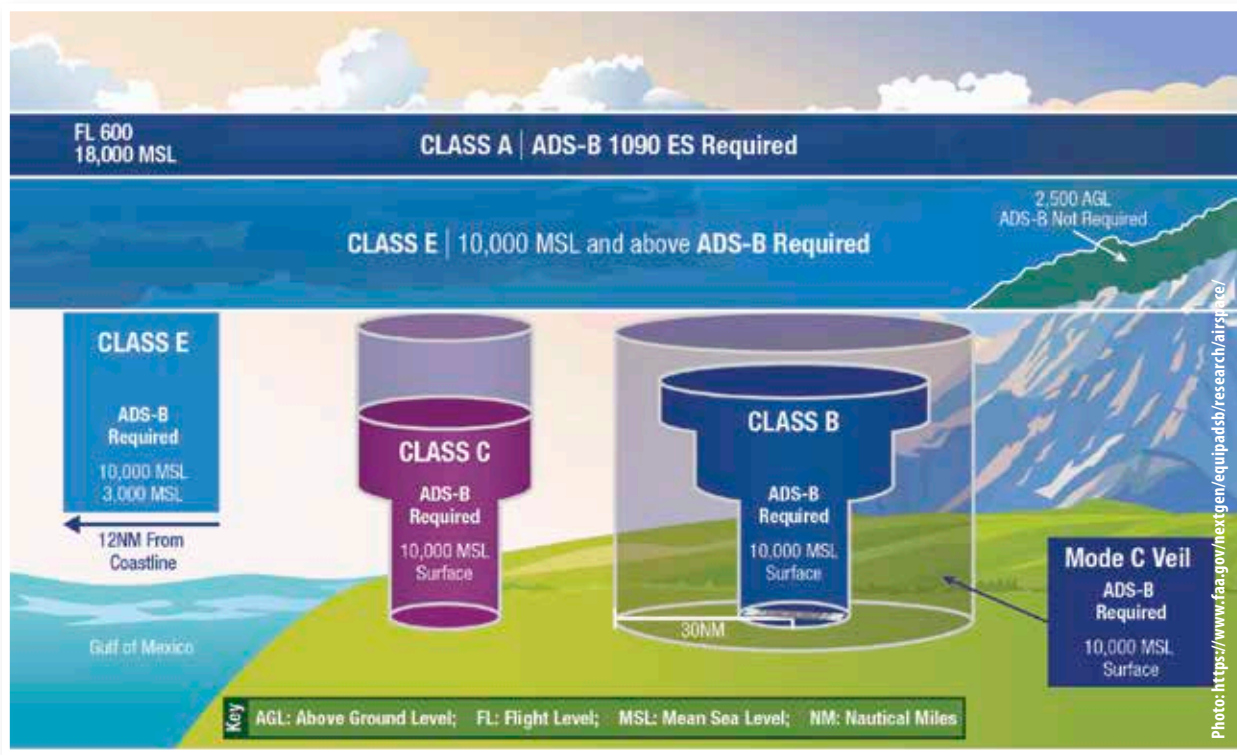
military operations in US airspace without ADS-B, but this will only apply to US military aircraft and foreign state aircraft flying as part of a Department of Defence -sponsored exercise or operation. In addition, the Chief of Air Staff Air Traffic Management Coordinator submitted a list through the NATO Aviation Committee on 11 Jun 2018, with the intent for a Memorandum of Understanding to be approved and published Fall of 2019, but for which official guidance is still pending. With all this in mind, until something is approved, one should not expect to be able to operate freely in the listed airspaces without the

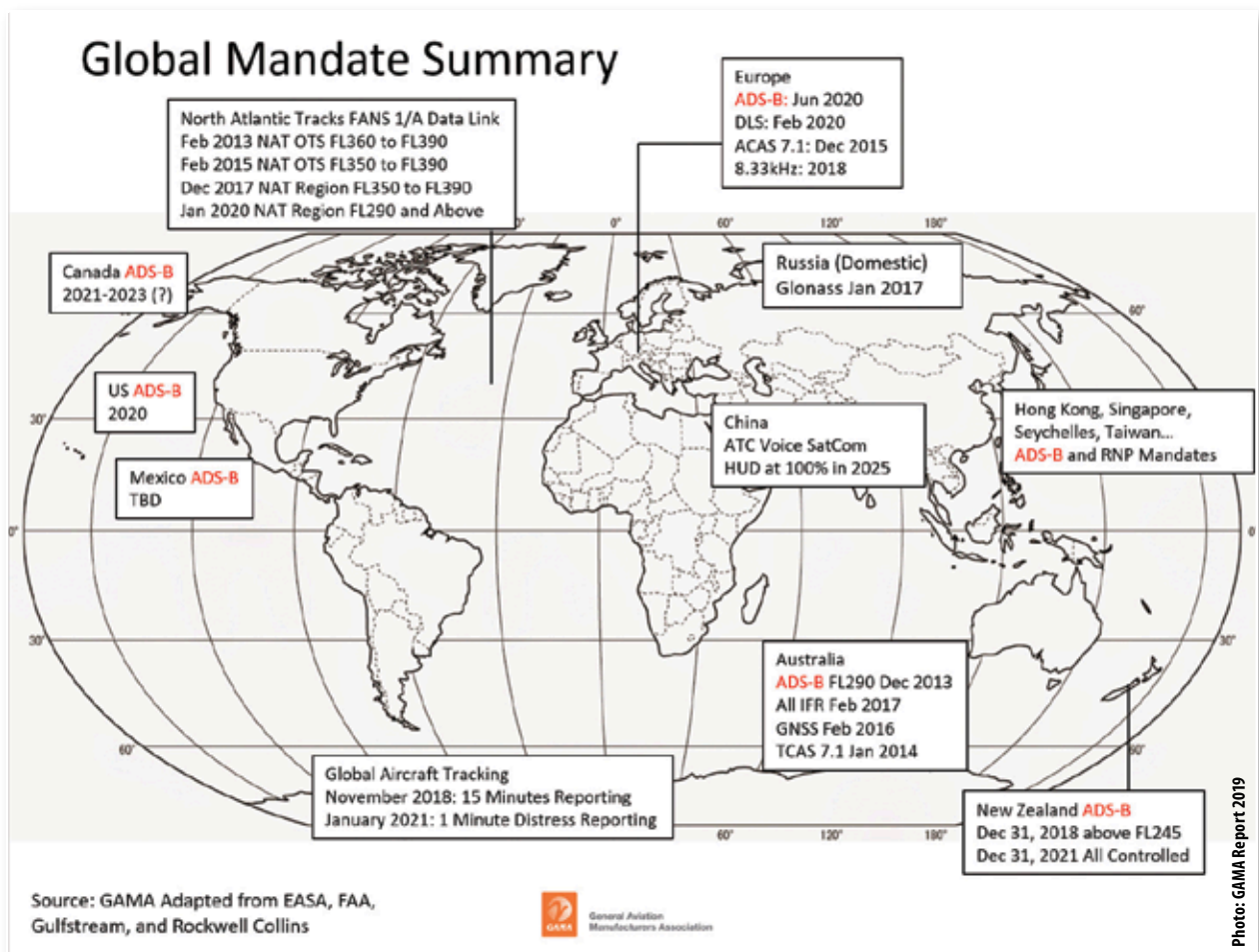
required equipment. For more information on coverage in the United States, check out the interactive coverage map found at the following link:

<https://www.faa.gov/nextgen/programs/adsb/ICM/>

Beginning 7 June 2020, European airspace will require ADS-B Out. This will affect fixed-wing aircraft with a takeoff weight greater than 5,700 kg/12,566 lbs or capable of a True Airspeed greater than 250 Knots. It only applies to aircraft flying IFR on

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General Air Traffic (GAT) routings. Without ADS-B, foreign state/military aircraft will be required to fly Operational Air Traffic (OAT) routings and may be unable to access certain destinations or airspace. While a 978UAT datalink is suitable in the US, a 1090ES datalink—using a Mode S Extended Squitter transponder—will be required for any flights in Europe.

In 2017, NavCanada proposed mandating ADS-B Out. This initiative is still in the planning phase, but be prepared to hear

more soon. It is expected to begin in Class A airspace and Class E above FL600 as early as 2021. Throughout 2022-2023, phases 2 and 3 are expected to expand the requirement to Class B, C, D, and E airspaces. In addition to the typical equipment requirements, Canadian Airspace will require "Antenna Diversity," meaning one antenna on top and one on the bottom, to accommodate space-based and ground-based stations. 🚀

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2. US FAQs on ADS-B: <https://www.faa.gov/nextgen/equipadsb/research/airspace/>, <https://www.faa.gov/nextgen/programs/adsb/faq/#g1>
3. Current requirements by country: <https://www.aopa.org/go-fly/aircraft-and-ownership/ads-b/where-is-ads-b-out-required>

WAKING UP WITH A FRESH PERSPECTIVE

by Captain Sally Riendeau, Wing Flight Safety Officer, 22 Wing North Bay

Members of 22 Wing North Bay/ Canadian Forces Base (CFB) North Bay are no strangers to shift work. Charged with protecting and defending the skies over Canada since 1963, the Canadian Air Defense Sector (CADS), partnered with the North American Aerospace Defense Command (NORAD), performs surveillance, identification, and control in a 24/7 operation that tracks and identifies over 200,000 flights a year. To accomplish this Herculean task, members of 21 Aerospace Control & Warning (AC&W) Squadron, 22 Wing's operational squadron, operate on a four-day shift cycle. Each crew works two 12-hour days followed by two 12-hour nights with a four-day break in-between cycles.

In 2016, the Fatigue Risk Management System (FRMS) was implemented by the Royal Canadian Air Force (RCAF) to mitigate fatigue experienced by members of the Air Force. Lieutenant-General Michael J. Hood, then

Commander of the RCAF, described fatigue as a "High priority threat to the RCAF that degrades operational effectiveness, flight safety, and the retention of trained effective personnel across all communities."

The 22 Wing Flight Safety team had already begun researching the validity of the squadron's shift schedules, to see if changes might reduce fatigue by implementing FRMS. Their research evolved from an investigation into actively seeking ways to combat sleep deprivations within 21 AC&W Squadron.

The Flight Safety team drew information from the Fatigue Avoidance Scheduling Tool (FAST) software, developed by the United States Air Force (USAF) and validated by the Department of Defense and Canadian Armed Forces. Trusted world-wide by government agencies and industries for fatigue research and accident investigations, the FAST software studies revealed that 21 AC&W Squadron's

shift cycle, which does not offer rest or naps, could leave members in a state of cognitive effectiveness equivalent at or above a blood alcohol concentration of 0.08% while on duty. After each shift cycle, members were then expected to be able to return home in their impaired cognitive state; possibly encountering challenging driving situations such as blizzard or snow storm conditions

The study of the same shift cycle with the addition of rest or a nap indicated members rarely fell into the state of cognitive effectiveness at or above 0.08% blood alcohol concentration. Also, significant improvement was shown with members registering in the range of cognitive effectiveness at or below 0.05% blood alcohol concentration. Simply, a nap did a world of good to improve people's cognitive effectiveness.

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These software results drove the 22 Wing Flight Safety team and 22 Wing Personnel Support Programs (PSP) Health Promotions to organize a heart-rate based study to determine the risks faced by shift workers. The study encompassed members throughout 22 Wing, with members from different flights and workplaces, including those who worked Monday to Friday during straight day shifts. Members were of different ages, ranks, and positions. All members wore heart-rate monitors to capture baseline metrics such as body mass index (BMI), body fat percentage, systolic blood pressure on night shifts, the total number of sleep hours, and quality of sleep. The study results indicated night workers had a higher systolic blood pressure and a lower number of sleep hours. Of these sleep hours, the quality rated was low to fair.

The findings of the heart-rate study in conjunction with the results from the FAST software indicated a drastic need for change.

A proposal to the 22 Wing Commander discussed the hazardous situation and outlined possible short, medium and long-term solutions. The short-term solution was to implement a FRMS policy and to continue research on finding an optimal shift schedule. The medium-term solution comprised of the acquisition and allocation of equipment and facilities to promote nap taking for members while on shift. The long-term solution included an education program to increase fatigue knowledge and awareness that would be delivered by 22 Wing PSP Health Promotions.

To support the medium-term solution, in the summer of 2017, the Wing Commander approved a purchase order for three sleep pods. A list of functional requirements for the sleep pods was developed to ensure they correctly addressed the need for shift workers to take naps, without adversely affecting the squadron's ability to conduct the mission.



Photo: Cpl Joseph Morin

The functional requirements for the sleep pods included:

- Noise Reducing – Must be able to dampen sound, however, still allow members to hear Public- Announcements.
- Light Reducing – Must allow for light reduction from ceiling lights to encourage quality sleep.
- Hygiene – Must support easy sanitization using common disinfectants and cleaning solutions.
- Portable – Must be easily relocated using minimal equipment.
- Transmissions – Must not have radio frequency (RF)-emitting functions, including Bluetooth. If these features are pre-installed, there must be the ability to remove or physically disable the services.
- Power – Must use standard CSA outlet 120V.
- Installation – Whether installation services are purchased or not, the equipment must be able to be installed without contractor support.

During sleep pod acquisition, PSP diligently provided education for personnel and the command teams on the effects of shift work. PSP promoted proper nutritional guidelines and offered other strategies to help reduce

fatigue among shift workers. Through a myriad of training approaches, including presentations, brochures and posters, the message about fatigue risk management began to be understood by members.

One of the biggest challenges to improving the FRMS by 22 Wing Flight Safety was changing the crew's culture, which for decades had always discouraged sleeping at work. The need for a paradigm shift was recognized early, and the Wing Commander took a leading role in encouraging this transformation. 21 AC&W Sqn personnel are adopting this new mindset across all ranks and seniority.

In June 2018, 22 Wing awarded Podtime® with the contract for three sleep pods and by late November the sleep pods were received by 21 AC&W Sqn. Over one weekend, the pods were assembled and installed at the back of the operations floor, where there was more privacy and less foot traffic. This newly cordoned off area included storage and hooks, allowing individuals using the pods a space to store uniform items and personal effects, including blankets and pillows for use in the pods.

22 Wing implemented new local policies outlining sleep pod use and hygiene protocols. Also included were recommendations outlining best practices for nap duration, the pros, and cons of using natural or

pharmaceutical sleep-aids, and the benefits of strategic caffeine use. The sleep pods are available to all members of 22 Wing who have access to the operations floor. The policy states:

“Sleep supplementation at any time of the day will help decrease overall fatigue levels but planning a strategic nap for the time when most impaired by fatigue is optimal in improving overall mental alertness. Research has shown impairment to be most typical from 0200–0500hrs; however, this can vary greatly with shift workers facing constant disturbance of circadian rhythms. Personnel should listen to their body to gauge their best time for a strategic nap. Trial and error may be required.”

Napping is a skill that takes time and consistent effort to develop and refine. The initial goal for the first few months of implementation was to encourage members to be comfortable with the

idea of taking naps during work hours. The pods require members to sign-in and sign-out on a log-sheet before resting. This log exists solely to capture data, including the use of the pods, duration of naps and what ranks are using the pods.

To date, the success of this program is the direct result of 22 Wing leadership recognizing a problem and taking the required actions to fix the issues. Leadership has modelled desired behavior by openly using the pods during the day, and they offer constant public support for the program. Their example has led to crew members feeling psychologically safe in using the pods during their shifts. The metrics gained so far from completed log sheets reinforce this positive change, and if pod use continues to remain steady, a follow-up fatigue study will be conducted in two years to gauge the long-term benefits of naps during a shift work cycle.

An assessment of operational effectiveness will be performed in the summer of 2019 to evaluate if any short-term changes are required. This FRMS project is a long-term endeavor and will continually be updated and modified as more data and feedback becomes available. There are already plans for expansion, and 22 Wing Flight Safety wholeheartedly believes this project is easily scalable to other wings and squadrons across the RCAF with the possibility of benefitting deployed units.

For more information on 22 Wing’s sleep pod project, or to help you determine whether your team could successfully adopt this initiative in your workplace, please contact Health Promotions Manager Lucas Demarco at lucas.demarco@forces.gc.ca, 22 Wing Flight Safety Officer Capt Sally Riendeau at sally.riendeau@forces.gc.ca, or 22 Wing Flight Safety NCM Sgt Danette Weyh at danette.weyh@forces.gc.ca. 🇨🇦

Photo: Cpl Joseph Morin



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CANADA HOSTS THE 147TH AIR FORCES FLIGHT SAFETY COMMITTEE (EUROPE) CONFERENCE

Photo: Cpl Bev Dunbar

by Lieutenant (Navy) Melanie Aqiqi, Public Affairs Officer, Directorate Air Force Public Affairs

Hosted by the Royal Canadian Air Force (RCAF), the 147th meeting of the Air Forces Flight Safety Committee (Europe) (AFFSC(E)) took place in Ottawa from June 23 to 28, 2019.

The conference offered RCAF Director of Flight Safety, Colonel John Alexander, an opportunity to highlight the historically low number of flight safety incidents in which Canadian military aircraft have been involved. Over the course of the last 50 years, the accident occurrence rate per 10,000 hours of flying has decreased from 0.510 to 0.081. The RCAF incident rate per 10 000 flying hours is 0.122 over the last decade and continues to decline.

"Canada has benefitted greatly from its participation on the Air Forces Flight Safety Committee (Europe), applying the lessons learned by other militaries to improve our own flight safety program," said Lieutenant-General Al Meininger, commander of the RCAF. "The historical low number of incidents gives me confidence in our robust airworthiness, maintenance, and safety programs, ensuring the safety of our personnel."

Fewer flight safety incidents are the result of the RCAF's open reporting culture to reporting and non-attribution of blame when investigating incidents, as well as an Airworthiness Program that guides a better risk assessment for operational planning.

RCAF membership on the AFFSC(E) allows for the rapid exchange of information pertinent to: on-going investigations abroad, changes in national aviation regulations, and new initiatives in flight safety.

RCAF membership on joint and Allied committees from Europe and South America, as well as NATO, promotes the free exchange of lessons learned from our partners in flight safety and increased awareness of preventative measures for the safety of our own forces.

The AFFSC(E) was formed shortly after the Second World War and consists of representatives of the flight safety staffs of NATO and European Air Forces. The current members of the AFFSC(E) are Austria, Belgium, Canada,

Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Jordan, Latvia, Lithuania, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, Ukraine and the United States of America.

The AFFSC(E) meets annually. This year's conference theme was "Risk Management: From Theory to Practice". The post of chair is currently held by the United Kingdom and is occupied by the Inspector of Flight Safety for the Royal Air Force.

"The most cost effective lessons that you can learn are those from someone else's incidents or accidents and flight safety is an area that you never stop learning," said committee chair Group Captain Tom Lyons of the Royal Air Force. "The Air Forces Flight Safety Committee (Europe) conference is an excellent opportunity to share experiences and exchange ideas. This year's theme of risk management from theory to practice demonstrates our commitment to maximising effectiveness without compromising safety."



Photo: Cpl Bev Dunbar

Directorate of Flight Safety (DFS) has a mandate to champion a pro-active and innovative Flight Safety Program to enhance combat-effectiveness through the prevention of the accidental loss of aerospace resources. DFS fosters the safe execution of operations

through independent investigations, active participation in the airworthiness program and leadership in the Flight Safety Program. ✈



AFFSC(E) participants learning how to safely paddle a Montreal canoe during their visit to Ottawa/Gatineau.

Photo: Cpl Bev Dunbar

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Photo: Col John Alexander

Sharing the Passion for Flight Safety

by Major Claire Maxwell, Directorate of Flight Safety, Ottawa

Throughout July and August 2019, DFS had the opportunity to promote flight safety to groups of children who were attending the SONART summer camp at the Canada Aviation and Space Museum (CASM) in Ottawa.

The collaboration between Jared Smith from CASM, Bev Harvey from TSB, Capt Alex Robinson and Major Claire Maxwell from DFS led to the development of an exercise involving a rusty, distracted, pilot having to take drastic measures with their Volksplane to avoid a drone while on short final for landing at Rockcliffe airport. The CASM, DFS and TSB team worked together to bring this scenario

to life. The children had to discover the cause of the accident through observation, hands on experience and by asking questions.

The arrival of the distraught drone operator (usually played by an enthusiastic child from the camp) and testimony from the accident pilot helped towards the discovery of a drone lodged in a nearby tree. The correlation between the downed aircraft and the damaged drone then led to a conversation about safety and Transport Canada's drone operating rules... especially the one that says you should not operate a drone within three nautical miles of an airport. 🛩️



Photo: Ingenium – Canada's Museums of Science and Innovation.



Photo: Col John Alexander



Photo: Col John Alexander

Flying Bricks

by Major Marc-André Asselin, 17 Wing Flight Safety Officer

I was invited for dinner at a friend's house a few weeks ago, when one of the other guests started showing videos he had taken from his brand new drone. The footage was showing the lights of Winnipeg as seen from 400 metres over the town of Niverville, located 30 kilometres (km) south of Winnipeg. He then showed me his drone. Folded in a bag that looks like a lunch box, the machine was the size of a common brick, and weighed roughly 2 kilograms.

The drone was ready to launch in a matter of seconds after unfolding the four rotor booms. The machine is operated by a remote control attached to a common cell phone which provides a user interface. After takeoff, it is flown by simply touching on a map to direct the drone where you want it to go within an 8 km radius. The software also has preloaded routes around selected objects to capture the perfect images. From my vantage point, I lost visual with the machine in about 20 seconds, since it was travelling at 72km/h. So I looked back at the screen which said 400, which I thought meant 400 feet, but he pointed out

it was 400 meters. I was shocked, and immediately asked the operator to demonstrate the auto-land features. In under a minute, I had witnessed the violation of several drone rules laid out by Transport Canada.

These include:

- Must fly below 122 metres (400 feet)
- At least 30 metres from bystanders and vehicles
- You must have visual with the drone at all times
- Must be 3 nautical miles (5.6km) away from airports
- Operators need a licence
- Drones need to be registered in Canada (if it weighs more than 250g)

After the demonstration, I steered the conversation towards the new set of drone rules Transport Canada is putting in effect 1 June 2019. It became very clear to me that the operator was not aware of the rules he was

breaking. He simply purchased the drone from an electronics store, and thought he was being responsible since the manufacturer states the software included will not allow operators to fly in active airspace.

According to market research done by Tractica, in 2015, 6.4 million drones were purchased worldwide, and that number is forecasted to be up to 67.9 million by 2021. In the US, 2.5 million drones were sold in 2016, forecasted to climb to 7 million per year by 2020. That is a lot of flying bricks!

Unfortunately, as aviators, there is not a whole lot we can do from the cockpit. These contraptions are small, heavy, difficult to see and, most importantly, their presence is nearly impossible to predict. Transport Canada is doing a lot of work to educate consumers of the risk these gadgets pose to aviation. But as Flight Safety advocates, we should all do our part to pass on the information. Report any drone sighting that seems illegal or dangerous to any law enforcement agency, including your friendly neighbourhood Flight Safety Officer. ✈

LESSONS LEARNED

Photo: Sgt Matthew McGregor



Oh No!

We're Going Over!


by Captain Scott Boer, 403 Operational Training Squadron

The following is an account from an instructor's perspective on how quickly a routine landing can go wrong, and how luck and muscle memory prevented a catastrophic loss of a helicopter. I have 2700 hours instructing on the Griffon over an 18 year span, and have over 5400 hours of flight time.

Our squadron was on a night surge to get our students graduated before the arrival of the next course in two weeks. As part of the weekend flying routine I was scheduled for a Sunday night formation flight.

The squadron had removed the skis during a warm weather deployment so I planned to modify my landing in order to prevent the helicopter from burying too deeply in the snowpack. The weather was clear with $\frac{3}{4}$ moon and moderate northerly winds, night vision goggle (NVG) illumination was very good but due to the fresh snow and a bright moon, the contrast conditions were flat light. This meant that the subtle shadows and textures that give you a sense of depth perception were being washed out.

We started at 20h30 and began with formation confined area circuits, navigation and lead changes. At the first two landing zones (LZ), we had large areas that had been in direct sunlight that day, which helped to melt down and solidify the snow pack. The snowballs were weak to moderate and we could easily see though them by turning off the NVG searchlight. Unfortunately the third LZ was a different beast altogether!



We were #2 in formation approaching the LZ from the south. The landing area was ringed by a forest and the southern half had been in the shade all day. We arrived over the treeline. I turned off the NVG searchlight to prevent washout and we began to descend into the area. The student was in the left seat and I was monitoring the controls and student from the right seat. The descent initially was very smooth, and although the lighting was flat, we could pick out some bushes and small trees as references.

At about 5-10 feet above the ground the flight engineer (FE) noted some right hand drift, and the student was correcting. Then in a split second the upper crust of snow broke free and a snow bomb of fine powder was exposed. We were instantly engulfed in a total whiteout! Before either of us could say "whiteout;" and before I could take control, I felt a sickening thump and an immediate lurch to the right.

We had impacted with right drift and the right skid had immediately impaled itself into the snow pack and stuck tight. We were in a dynamic rollover situation!

My eyes snapped to the attitude indicator (AI) and it felt like I was watching in slow motion from the third person as my hands and muscles began to fly faster than I could consciously think.

Impact... As I felt the lurch, time began to dilate as I grabbed the controls and my mind went into high gear.

1 second...

we were at 7 degrees, left cyclic, power going down to flat pitch.

2 seconds...

14 degrees, still rolling, hard left cyclic, power is down at flat pitch.

3 seconds...

23 degrees and still rolling. I could visualize the right disk only inches above the ground now, and felt myself lean left away from the ground. Cyclic alone was not going to stop the rollover so my body pulled collective to hover neutral in an attempt to power the aircraft up and out of the snow pack.

4 seconds...

With hover power and full left cyclic the aircraft heaved out of the snow pack and immediately swung like a huge pendulum over to the left at 20 degrees of bank.

5 seconds...

Now I was in a blinding snow ball, oscillating left and right, hovering somewhere around 4 feet, and with a tree line lurking about 25 feet off my right wing. Crap! I didn't trust the ground under me, couldn't see anything outside except an angry swirling green ball of snow, my only out was straight up.

6 seconds...

My life now centered on the AI as I used my unusual attitude training and muscle memory to dampen the oscillations, apply climb power, and keep the disk level in the climb.

15 seconds...

At about 40 feet we broke out of the snowball with ½ rotor clearance from the treeline that was on our right side.

Time returned to normal and my limbs began to shake as I felt a cold wash of adrenaline leaving my system.

I learned the following lessons that night:

1. Having an aircraft that was not properly configured for the environmental conditions made things worse when the landing was non-standard. An aircraft equipped with skis would not have dug into the snow pack so quickly or so deeply.
2. Rushing a landing before you can assess environmental conditions can quickly put you in a whiteout. I should have ensured we were descending slower and not at a rate that was faster than our reaction times. Especially on NVG's.
3. Core training on muscle memory and scan allowed my body and subconscious to react faster than I could consciously assimilate the information from the AI. I impacted, rolled right had full left cyclic, power on and broke free of the snow pack in less than 4 seconds. It truly felt like 30-40 very long seconds. My hands were flying faster than my brain was working.
4. LUCK is not a skill, I was lucky, very lucky that the blades did not hit the ground. Lucky that the skid was not hooked under an object; and lucky that while in the snowball I did not drift right into the treeline, or left and up into my lead aircraft.
5. The old saying "Truly superior pilots are those who use their superior judgment to avoid those situations where they might have to use their superior skills" is still true! 🔥

From the Investigator

TYPE: Twin Otter CC138803

LOCATION: Near Pelly Island, NT

DATE: 10 March 2019

The crew departed Tuktoyaktuk, NT with three scientists on board on a mission requiring the aircraft to land on unprepared sea ice surfaces.

After completing an uneventful landing on sea ice near Tuktoyaktuk for scientific research, the crew flew the aircraft to Pelly Island which is located 50 miles to the West. The crew first completed two reconnaissance patterns above the sea ice surface to assess wind and surface conditions. The crew then chose an into-wind approach for landing on the sea ice, approximately 1 mile away from the island.

The aircraft touched down on a smooth area of sea ice, but then bounced into the air after hitting an ice ridge perpendicular to the

aircraft's heading. The aircraft impacted the base of a larger ice ridge once it settled back onto the sea ice. The nose landing gear collapsed and the aircraft came to a stop shortly thereafter.

The aircraft was very seriously damaged. No personnel were injured and they were

subsequently evacuated to Inuvik, NT by civilian helicopter.

The investigation is focussing on both human factors and materiel. 4



Photo: Cpl Matthew Allan Sage



Photo: Capt Scott Bennett

From the Investigator

TYPE: Tutor CT114009

LOCATION: Comox, BC

DATE: 26 April 2019

The occurrence involved a CT114 Tutor aircraft from the Canadian Armed Forces Air Demonstration Team (Snowbirds) practicing a show routine in preparation for the upcoming air show season.

The Tutor was flying at 600 ft. above ground level in a formation of 4 aircraft. One of the wingman aircraft was rolled into inverted flight as part of the setup for the *Double-Take* maneuver. Having rolled-out lower than normal in plane to the lead aircraft, the pilot lost visual contact with Lead. The pilot executed a barrel roll to regain level attitude

while maneuvering clear from the lead aircraft and the rest of the formation. The aircraft was landed safely without further incident.

The investigation is focussed on human factors. 4



Photos: Sgt Halina Fofas

From the Investigator

TYPE: CH146477 Griffon
LOCATION: Cold Lake, AB
DATE: 13 December 2018

The crew of the CH146 Griffon was tasked to transport a replacement generator into a repeater antenna site within the 4 Wing Cold Lake training area.

The crew disembarked a team of five technicians at the repeater antenna site and then proceeded to pick up the replacement generator at a location approximately 7 miles away. The generator, contained within a netted pallet, was transported to the repeater antenna site via slung load with the use of an approximately 80 foot sling.

The generator was temporarily put on the ground so that personnel on the ground could attach two guidelines to help move the load (generator) to its final location. The helicopter then lifted the load with the intention of moving it to the base of the tower.

As the helicopter was manoeuvred into position to deliver the load, the main rotor blades made contact with the obstruction lights and support bracket at the top of the 96 foot tower. The crew conducted an

expedited emergency landing in the clearing adjacent to the tower. The helicopter's four main rotor blades suffered serious damage. There were no injuries to the crew nor the personnel on the ground.


The investigation is focusing on human factors. 





Photo: LS Justin Spinello



Photo: LS Erica Seymour



Photo: LS Erica Seymour

From the Investigator

TYPE: Harvard II CT156106

LOCATION: 20NM southwest of CYMJ

DATE: 24 October 2018

A student pilot from 2 Canadian Forces Flying Training School was conducting training on the CT156 Harvard II aircraft as part of the Phase II pilot training course in the NATO Flying Training in Canada program in Moose Jaw, Saskatchewan. This was the student's first solo mission to the Moose Jaw training area, located approximately 20 nautical miles south of the airfield.

The training consisted of aerobatic manoeuvres and the student pilot carried out a G awareness exercise prior to initiating a loop as the first manoeuvre. During the pull up, the student pilot recognized the symptoms of a G induced almost-loss of consciousness (A-LOC) and

reacted by reducing the flight control back pressure to regain visual acuity. The aircraft was in a near vertical attitude with airspeed decreasing rapidly. An initial attempt at an unusual attitude recovery was carried out, however the roll to the nearest horizon seemed ineffective. The student pilot carried out the Inadvertent Departure from Controlled Flight emergency procedure. The Power

Control Lever was reduced to idle and the flight controls were centralized. The aircraft floated for a period of time then adopted a nose low attitude while gaining airspeed. The student pilot recovered the aircraft and returned to base without further incident.

The investigation will focus upon human factors. 



Photo: Christian Coulombe



Photo: DND

Epilogue

TYPE: CT-155 Hawk and
S2R-T34 Thrush 510 P
LOCATION: 15NM NW of CYMJ
DATE: 21 August 2018

The occurrence involved a Royal Canadian Air Force high-performance CT155 Hawk jet aircraft with a crew of two, and a single pilot Thrush agricultural applicator aircraft. The CT155 Hawk had just departed from 15 Wing Moose Jaw airport to conduct a tactical navigation training mission. The Thrush was returning to Moose Jaw Municipal airport following completion of aerial spraying over crops west of Moose Jaw, SK.



Initially eastbound at 5,500 feet above mean sea level at 130 miles per hour indicated airspeed, the Thrush was in a descent through 4,500 feet above mean sea level at the time of the near mid-air collision. The CT155 Hawk was westbound at 4,500 feet above mean sea level at a ground speed of 360 knots when the two aircraft crossed paths from head-on. The weather was favorable for visual flight. Smoke from forest fires was causing a reduction in visibility of 4-6 statute miles.

The Thrush pilot observed the Hawk approaching from slightly right of head-on and immediately began an evasive manoeuvre, rolling left while deploying a smoke trail to make his aircraft more visible. The course member in the front seat of the CT155 Hawk saw the smoke trail and rolled left, away from the Thrush.

Both aircraft returned to their home airfields safely and without further incident. The investigation focused on 15 Wing's near



mid-air collision history and methods for avoiding mid-air collisions. Preventive measures focused on providing CT 155 Hawk pilots with a technical solution to enhance their ability to identify conflicting aircraft. 4



Epilogue

TYPE: Harvard II CT156105
LOCATION: 13 NM southwest of
Moose Jaw, Saskatchewan
DATE: 27 January 2017

A CT156 Harvard II was operating out of 15 Wing Moose Jaw SK with a two-pilot crew from 2 Canadian Forces Flying Training School. The crew comprised a Qualified Flying Instructor, who was monitoring from the rear seat, and a student pilot in the front seat, who was the pilot flying. The mission was an instructional flight to practice clearhood sequences, including basic aerobatics.

During the pull up into an aerobatic sequence, the instructor was not satisfied with the manoeuvre's progress and instructed the student pilot to recover, with the expectation the student would do so via a nose-high unusual attitude recovery. The student pilot did not carry out the expected recovery but believed the aircraft had departed controlled flight and carried out the "Inadvertent Departure from Controlled Flight" procedure. The instructor took

control of the aircraft and attempted to carry out an unusual attitude recovery, but believed the aircraft was not responding to control inputs and re-initiated the inadvertent departure from controlled flight procedure. During the subsequent recovery attempt the g-forces decreased, which resulted in a weightless condition in which the engine lubrication system could not supply proper lubricating oil to the engine and reduction gearbox.

Engine performance degraded after the aircraft was recovered. The instructor increased power in an attempt to get on a glide profile for a return to base. The attempt was unsuccessful, and the engine performance continued to degrade, leading the crew to carry out a controlled ejection. Both crew members sustained minor injuries during the ejection; however, the student pilot sustained additional injuries during the parachute landing.

The student pilot carried out a procedure that placed the aircraft in low-energy, weightless flight. The qualified flying instructor unknowingly allowed the aircraft to remain in a weightless state in excess of the time limit prescribed in the CT156 Harvard II Canadian Forces Approved Flight Manual, which reduced lubrication to the critical components of the engine and reduction gearbox. The resulting lack of lubrication caused damage and the ultimate failure of the engine.

Recommendations were made to improve instructor and student training and to increase emphasis and avoidance of critical regimes of flight such as zero-g operations. Changes were also recommended to aircraft maintenance practices involving engine oil consumption monitoring and seat survival equipment packing. 4

Photo: MWO Fenton

Epilogue

TYPE: Cessna 172 (C-GAYE)
LOCATION: Sainte-Marie, QC
DATE: 2 August 2017

The accident flight was part of the Air Cadet Power Scholarship Program and flown under contract by a civilian flight training unit. The purpose of this flight was to conduct pilot training. An instructor and a cadet pilot took-off from the Saint-Frédéric aerodrome (CSZ4) and conducted air manoeuvres training prior to carrying out two forced landing exercises. The first forced landing

exercise was uneventful and the aircraft was set-up for a second attempt. The instructor reduced the throttle to simulate an engine failure and the initial actions were carried out by the cadet pilot. A forced landing circuit was flown to a field with significant upslope terrain adjacent to the Chaudière River. Once it was evident the aircraft would safely reach the intended landing point, an overshoot was

initiated. At that point the aircraft was lower than what the school procedures required and limited the time and space available to conduct the overshoot. Full power was applied and a climb was established, but the aircraft could not out-climb the rising terrain and impacted the trees at the top of the hill.

The aircraft sustained very serious damage and both pilots received minor injuries.

The exact cause of the accident could not be determined with certainty. The investigation focused on the human factors and although acute fatigue was not a factor, chronic fatigue could not be ruled out. The preventive measure recommends a review of the student to instructor ratio and their duty days during the compressed summer program. 🔥



Photo: Capt Paul Spaleta



Photo: Capt Paul Spaleta