National Defence / Défense nationale

Flight Comment

ISSUE 3, 2012

SAR

SEARCH AND RESCUE

SÉCURITÉ DES VOLS FLIGHT SAFETY

Canada

Views on Flight Safety

Major-General R.D. Foster, Deputy Commander, Canada Command

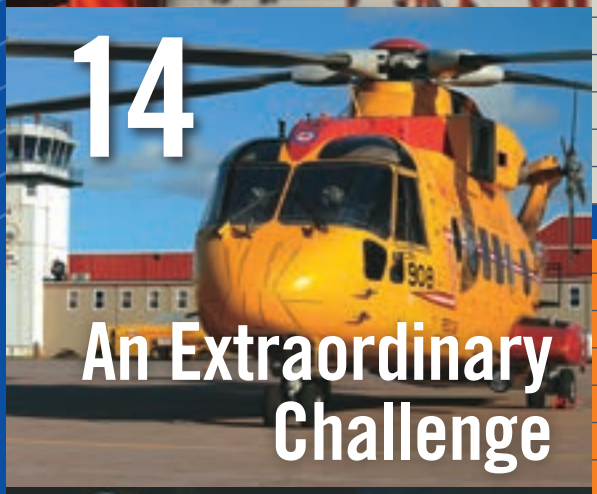
Flying past Fogo-Twiligate at about 2100 hours on a relatively calm and starry evening I could not help but be impressed with what I had just witnessed. The SAR team from 103 Squadron had just completed a let-down procedure over a Fishing Vessel (F/V), at night, through a fog bank. The radar aboard the *Cormorant* identified the vessel and the pilot expertly completed the let-down profile using the automated systems of the helicopter to arrive at an appropriate station-keeping position. From there, under goggles, he continued to let down until visual, cross-referencing the radar altimeter and ensuring that there was no overlap with the vessel on radar. I then watched as he instructed his junior co-pilot on the intricacies of night flying, under goggles, with a F/V moving at about 6 knots in 2 meter waves, with reduced visibility due to fog. No mean feat, and watching the co-pilot sweat-it-out with the proverbial formation flying "death-grip" on the cyclic verified my suspicions. Admittedly, I was impressed.

In the *Cormorant* cabin, while the pilot was completing the approach, the Flight Engineer (FE) was assisting the SAR Techs to prepare to exit the cabin. They had on appropriate wet suits, life vests, and other equipment. Given the word from the Aircraft Captain (AC), the FE would assume control of the *Cormorant* using a small joy stick in the rear cabin to establish the helicopter over the rear of the F/V to enable a hoist insertion of the first SAR Tech. The pilot would then resume control of the hover to remain exactly where the FE indicated. When ready, the FE would then manage the hoist with the first SAR Tech attached and winch him down onto the centre of the still moving, still bobbing, still somewhat obscured boat. Very impressive, and you can begin to imagine how the free-swinging SAR Tech, the FE fighting the swaying hoist cable, and pilot still under goggles at night in fog conditions, who is now taking direct commands from the FE during the exercise in order to ensure a stable and properly positioned aircraft, would have to all work together to lower this gentleman in-between the two masts, avoiding the fishing net outriggers and plopping him directly onto the centre of a 20x20 foot area. As I started to contemplate this next series of events, it was what occurred next that impressed me the most.

The AC, in a very calm and objective manner, came over the radio and announced that he was getting a little uncomfortable with the situation. The reduced visibility under goggles was not making the station-keeping easy. A conference between the experienced team members occurred, both pilots, the FE and the SAR Techs. A consensus was reached and it was decided to abort the exercise. There were no disgruntled objections, only professional acceptance that the team had made a decision and everyone would stand by it. This experienced aircrew operating as a team, weighing the operational requirement versus the increasing Flight Safety risk took appropriate action – they would do this exercise another day! That decisional moment impressed the "hell" out of me.

Establishing where the right level of authority resides regarding mission risk versus mission acceptance decision making is complex. In Afghanistan, the authority to accept the level of risk to conduct a combat mission based upon the current and likely threat versus the risk of success given the importance of the military objective, normally resides above the level of the AC and the aircrew. In the Search and Rescue mission, the authority to conduct a mission resides with the AC and crew constrained by existing Flying Orders and is based on various weather limits. However, as the sea-state, visibility, and complexity of the mission intensify, the increasing risk to the mission and the decision to continue on with the mission is ultimately left to the AC and crew. The orders do not cover every situation and more often than not, lives are at risk. Appropriate training and experience become absolute necessities in this paradigm.

As the Deputy Commander of Canada Command and the soon to be Deputy Commander of the Canadian Joint Operations Centre, I see every SAR rescue mission completed being the Force Employer. Every morning there is an update on which SAR crews have been tasked to go help Canadians in need. Every one of these crews has to step through a similar decisional moment weighing the operational mission-effect to be achieved against the invariably increasing Flight Safety hazard. Sometimes the decision is easy: stranded canoeists on an island. Sometimes the decision is hard: a stranded Inuit grandfather and his son off Hall Beach, with 10 metre waves, high winds, ice flows and at night. Having witnessed the teamwork from 103, 413, 424, 435, 442, 439, 444, 417 Squadrons in executing their missions and using their leadership, experience and understanding of mission risk, I sleep better knowing that they make the right decisions. And I remain impressed every time! ◆



Flight Comment

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Cover description

Photo: Cpl Vicky Lefrancois

Sgt Eric Dinn, 413 Squadron Team Lead is on the lookout for a possible downed aircraft during an exercise in the CC130 *Hercules* Aircraft.

Photo: Cpl Melissa Spence

Search and Rescue Technicians from 413 Squadron, on the CH149 *Cormorant* aircraft based out of 14 Wing Greenwood, conduct excercises in Sydney, Nova Scotia along with the Coast Guard from the Coast Guard College.

Photo: Cpl Darcy Lefebvre

Search and Rescue technicians board a CC115 *Buffalo* before participating in the jump accuracy event during Search and Rescue Exercise (SAREX) 10.

DIRECTORATE OF FLIGHT SAFETY

Director of Flight Safety
Colonel Yvan Choinière

Editor
Captain John Dixon

Graphics and design
d2k Marketing Communications

Imagery Technician
Corporal Vincent Carbonneau

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Send submissions to:

Editor, Flight Comment
Directorate of Flight Safety
NDHQ/Chief of the Air Staff
MGen George R. Pearkes Building
101 Colonel By Drive
Ottawa, Ontario Canada
K1A 0K2

Telephone: 613-992-0198
FAX: 613-992-5187
Email: dfs.dsv@forces.gc.ca

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Good Show

For Excellence in Flight Safety

Major Dennis Scharf

While employed as the Squadron Operations Officer at 435 (Transport & Rescue) Squadron, Major Dennis Scharf demonstrated exceptional determination and professionalism that was directly responsible for the preservation of critical RCAF resources. His actions identified a previously unknown flaw in a maintenance procedure and prevented a potentially deadly situation from reoccurring.

On 21 February 2012, aircraft CC130342 had just completed an air refuelling mission in support of Exercise *Cougar South*. The crew was conducting pilot training at Naval Air Station Key West and were just airborne following a touch-and-go when the Loadmaster declared that a fire had erupted in the rear of the aircraft. The aircraft was landed on the remaining runway and the crew carried out a ground evacuation with only one minor injury.

As a result of what became a catastrophic fire, the legacy CC130 fleet was grounded pending further investigation. Based on an analysis of available evidence at the time, the fleet was subsequently cleared to resume flight operations. Major Scharf was concerned that some information provided by the crew had not been accurately assessed and weighed prior to the fleet being cleared for operations.

The failure of an oxygen line in the rear of the aircraft was the primary focus of the Technical Authority's initial analysis. Based on a successful fleet-wide inspection of the oxygen lines, the aircraft were cleared to resume flying. Major Scharf was concerned that the source of the fire might actually be the auxiliary hydraulic pump, also located in the rear of the aircraft. His concern was supported by Squadron Maintenance and his CO; however the fleet remained cleared for operations. Working in cooperation with the Technical Authority and based on vigorous pursuit of his concern, the CO of 435 Squadron paused flight operations while the auxiliary hydraulic pump theory could be resolved.

Major Scharf serves with 435 Transport and Rescue Squadron, 17 Wing Winnipeg.

Major Scharf decided to personally inspect the two remaining airframes that were at the Squadron, focusing his attention on the Auxiliary Pump assembly. Lying on his back using a flashlight, Major Scharf identified a wire bundle that was incorrectly routed and had not been appropriately shielded with a protective sheathing. The wire bundle showed signs of chafing. Major Scharf immediately brought his discovery to the attention of the Squadron SAMEO. The maintenance deficiency was reported up the chain and subsequent fleet inspections indicated a fleet wide situation that had previously gone undetected.

As a result of his dogged determination, further loss of resources was probably prevented. Major Scharf displayed exceptional systems knowledge and a degree of dedication and professionalism that brought great credit to the RCAF. In recognition of his actions, he is awarded this Good Show. ◆

Good Show

For Excellence in Flight Safety

Corporal Elijah Porty

In September 2011, while tasked to provide escort assistance during a family day helicopter ride event, Corporal Elijah Porty demonstrated outstanding decision making skills and an extraordinary regard for the well being of another, when he protected a child from a dangerous situation.

The helicopter ride event involved several successive lifts throughout the morning of family day, in order to accommodate all of the family members who had requested to participate in flights. Each flight lasted approximately 15 minutes, and in between lifts, Corporal Porty along with another technician, provided escort of passengers to and from the helicopter. Following the second to last lift, Corporal Porty was guiding several disembarking passengers away from the left side of the helicopter, while the other technician helped an eight year old girl step down from within the left passenger area of the aircraft. Once on the ground, the girl made a rapid 180 degree turn and bolted toward the rear of the helicopter in an attempt to return directly to the hangar. Cognizant of the dangers inherent with helicopter rotor blades, Corporal Porty made a split second decision and leapt to stop the girl from nearing the rear of the helicopter while maintaining full situational awareness to prevent placing himself in danger. Corporal Porty directed her away from the helicopter, where she was met and safely escorted away by another AETE member. Observing the girl's six year old brother attempt to follow her, Corporal Porty turned back toward the aircraft's left side, caught the boy, and escorted him safely away from the helicopter.

With only a split second to decide, Corporal Porty placed the utmost importance on the lives and well being of others with the clear intent to prevent injury and/or loss of life. For his exemplary actions, he is most deserving of this Good Show award. ◆

Corporal Porty serves with the Aerospace Engineering Test Establishment, 4 Wing Cold Lake.

For Professionalism

For commendable performance in flight safety

Sergeant Luc Couture

On 13 December 2010, when a technician disconnected a ground power unit from a CF188, an electrical arc occurred between a Stewart-Stevenson power unit plug and the aircraft receptacle. The arc lasted approximately one second, only a few centimetres from the technician's head. Fortunately no injuries or damage to the aircraft were reported, despite the catastrophic potential of this incident.

As part of the ensuing investigation, the 3 AMS non-destructive testing section was tasked to develop a procedure to determine the internal condition of the electrical plug without damaging the equipment and ultimately establishing the cause of the arc.

Sgt (MCpl at the time of occurrence) Luc Couture suggested that X-rays should be used to determine the internal condition of the electrical connector, and his suggestion was approved by the chain of command. Sgt Couture not only produced excellent work, but also wrote and tested a new and safe work procedure which could be used in a multitude of situations. He created a template of a serviceable connector for comparison purposes in order to clearly and efficiently identify problematic connectors. The X-rays of the incident plug revealed that 2 wires were shorted together within the protective sleeve. This discovery led to a survey of all Stewart-Stevenson connectors as well as all hangar wall electrical supply plugs.

Sgt Couture's ingenuity led to the identification of 7 faulty hangar wall receptacles out of 12 and 14 faulty Stewart-Stevenson plugs out of 26, thus eliminating the potential of a short-circuit reoccurrence. Without this new technique, the problem would have gone undetected and could have led to serious injury to a technician.

The innovative inspection technique may be used by all units utilizing this type of aircraft electrical power supply. For his initiative, professional skills and significant positive impact on workplace health and safety, Sgt Couture is most deserving of this For Professionalism award. ◆

Sergeant Couture serves with 3 Air Maintenance Squadron, 3 Wing Bagotville.

Captain Scott Goebel

On 22 June 2011, Captain Scott Goebel, a pilot at 442 Transport and Rescue Squadron, was the aircraft commander aboard *Buffalo* 115456 that had just completed a local training flight. The aircraft was taxied to the ramp and all checks were completed for an engine running offload.

Upon exiting via the rear ramp, Captain Goebel looked back at the aircraft and noticed that the left hand spoiler was extended, but did not remember seeing an indication of this in the cockpit. He informed the on-coming crew of the anomaly. The new crew checked the situation based on his observation and found that the spoilers switch did not match the actual spoiler position. Following some troubleshooting, the aircraft was shut down and placed unserviceable. Since all checklist items had been completed without any indications that the spoiler was extended, the crew could have attempted a takeoff with a critical flight control configured to destroy lift. Captain Goebel's attention to detail and his follow-up ensured that on-coming crew was not placed in a dangerous position, which might have resulted in an aircraft accident.

Captain Goebel is commended for his astute observation and highly professional conduct. The deployed spoiler could easily have been missed as he exited away from the aircraft. His decision to look back and inspect the aircraft, averted a potentially disastrous situation and he is deserving of the For Professionalism award. ◆

Captain Goebel serves with 442 Transport and Rescue Squadron, 19 Wing Comox.

Warrant Officer Michael Cordick and Sergeant Dave Brewer

WO Michael Cordick and Sgt Dave Brewer, 429 (T) Squadron Loadmasters, were loading a C17 aircraft during an enroute stop in Ottawa. During the course of loading eight pallets, they observed that the first pallet was exceptionally heavy and that the declared weight was inconsistent with what was actually on the pallet. They inspected the entire load and found that the actual weight was significantly more than the declared weight of the pallets. They used a forklift that had an accurate built-in scale and they determined that collectively the eight pallets were heavier than stated by 13,000 pounds. Upon further investigation they determined that the pallets had been weighed using an improper procedure.

WO Cordick's and Sgt Brewer's outstanding attention to detail and professionalism while performing their duties was instrumental in rectifying a situation that would have led to incorrect takeoff data calculations and aircraft climb capability. Their findings and follow-on efforts also uncovered a second hazard: training inconsistencies in the weighing of pallets. They averted a potentially significant flight safety hazard, revealed a significant gap in training, and in recognition they are awarded this For Professionalism award. ◆

Warrant Officer Cordick and Sergeant Brewer serve with 429 Transport Squadron, 8 Wing Trenton.

Corporal Kent Campbell

As a student Flight Engineer (FE) at 442 Sqn Operational Training Flight (OTF), Cpl Kent Campbell was carrying out routine safety checks on Search and Rescue Technicians (SAR Techs). During the fourth of six boat hoisting lessons, he noted the cape-well was not properly assembled. He immediately notified the training FE and the SAR Tech. On closer inspection, the SAR Tech confirmed that the cape-well was not properly assembled.

A portion of the safety check is to inspect the "T" Bar, an apparatus made of webbing and hardware. The "T" Bar is used to connect the hoist hook to the SAR Tech harness, with a built-in mechanized cutaway. Integrated in the safety check of the "T" Bar is the inspection of the cape-well (the safety cutaway). The FE must check that the cape-well has been properly seated in the carrier, a set of sliding palls are engaged and the cape-well is locked with a set of very small spring loaded hooks. Cpl Campbell noted the spring loaded hooks were not properly seated.

His attention to detail during a routine check averted a possible inadvertent disconnect from the hoist. This outstanding action, from a student FE not yet fully trained, is most deserving of this For Professionalism award. ◆

Corporal Campbell serves with 442 Transport and Rescue Squadron, 19 Wing Comox.

For Professionalism

For commendable performance in flight safety

Corporal Gordon Smith

Cpl Gordon Smith, from the 19 Air Maintenance Squadron (AMS) Battery Shop, brought awarness to the unsafe condition of a 407 Long Range Patrol Squadron aircraft on 8 May 2012.

While transiting between 7 hangar and 407 servicing for work related duties, Cpl Smith noticed something out of the ordinary during a CP140 *Aurora* engine start. Upon closer observation, he quickly and correctly determined that a "Remove Before Flight" (RBF) flag was still attached to the aircraft, which now had all engines running and was ready for taxi. Cpl Smith immediately reported the situation to the 407 Servicing Desk Controller. The aircraft was radioed, the engines were shut down and the RBF flag removed, thus averting a potentialy significant in-flight danger to the crew and the aircraft. The fuel drain mast had been stowed and flagged as part of an approved torpedo download procedure. However, the RBF flag removal had been missed by the load crew chief, start crew and the aircraft flight engineer.

Employed in the 19 AMS Battery Shop and not with a maintenance groundcrew, Cpl Smith's outstanding attention to detail and swift reaction eliminated the potential for the fuel drain mast and RBF flag to depart the aircraft. For his exceptional professional reaction that averted a potentially significant flight safety hazard, Cpl Smith is recognized with this For Professionalism award. ◆

Corporal Smith serves with 19 Air Maintenance Squadron, 19 Wing Comox.

Corporal Benoit Hamel

On 28 October 2011, Cpl Benoit Hamel was undergoing initial training and familiarization at the Canadian Forces School of Aerospace Technology and Engineering's (CFSATE) NICAD Battery Shop, Aircraft Maintenance Flight. While testing battery vent plugs he astutely observed that the gauge used in the test procedure was not calibrated correctly. Upon further investigation, Cpl Hamel discovered that both the equipment set-up and the procedure for testing battery vent plugs were not in accordance with the CFTO. The resultant processes created a risk of battery overheat and gas build-up if the vents failed to operate as designed.

Cpl Hamel advised his CoC of the potential danger to personnel and aircraft and corrective action was immediately taken. The Flight Safety Investigation revealed that the CFTO testing deviation had become systemic over time and re-implementation of CFTO standards was required.

Cpl Hamel's professionalism, attention to detail and perseverance has led to new CFTO procedures for battery vent plug testing and a review of all RCAF Battery Shop procedures. Cpl Hamel is truly deserving of this For Professionalism award. ◆

Corporal Hamel serves with CFSATE, CFB Borden.

Corporal Paul-André Nobert

During the afternoon of 15 March 2012 at NAS Key West Florida, Cpl Nobert was carrying out the start and marshalling of a CC130 *Hercules* on an air-to-air refuelling mission in support of CF188 training operations. As Cpl Nobert marshalled the aircraft he noticed a movement on top of the aircraft wing and as the aircraft taxied past his position he saw a panel that was not sitting flush with the aircraft skin.

Cpl Nobert immediately notified his supervisor who tried to contact the aircraft by radio in order to delay the takeoff. Cpl Norbert, using the ramp control vehicle and its driver, made his way to the departure end of the runway where he then signalled the aircraft to stop and shutdown. Cpl Norbert and one member of the ground crew were then able to access the aircraft wing and an inspection of the area revealed that a panel covering one of the life rafts had been left unsecured. If this panel had remained unsecured, it is highly likely that it would have detached in flight. Moreover, without a properly seated panel, the lift raft could have deployed in flight possibly striking one of the CF188's refuelling or even the CC130 empennage.

The vigilance, quick action and admirable perseverance demonstrated by Cpl Nobert, as he was attempting to avert a potentially catastrophic situation, are commendable. He took determined actions in an extremely tense environment as CF188 aircraft were simultaneously departing to participate in this mission. For his exemplary actions, Cpl Nobert is deservedly recognized with this For Professionalism award. ◆

Corporal Nobert serves with 435 Transport and Rescue Squadron, 17 Wing Winnipeg.

Mr Oddmund Penner

On 24 April 2012, Mr Oddmund Penner, an apprentice servicing technician at 419 Sqn, was tasked with the start of *Hawk* A/C 218 for a Close Air Support (CAS) mission. Mr Penner entered the left hand wheel well to check the hydraulic pressure as part of the routine "last chance checks." While there he noticed an orange glow and overheat condition eminating from one of the grounding lug nuts, something that is not normally inspected as part of this check. Mr Penner signaled the crew to shut down, brought a fire extinguisher over to the left hand wheel well, and ensured the aircrew egressed the cockpit safely. He then continued to monitor the situation as the lug nut cooled down.

The flight safety investigation revealed that all of the aircraft's electrical load was passing through only one of two grounding lug nuts, this creating a temperature on the lug nut of 1380C. It is probable that the existing condition would have caused the lug nut to fail in-flight resulting in a total aircraft electrical failure.

Mr Penner's exceptional attention to detail and rapid actions prevented a serious condition from deteriorating into a significant emergency situation. In recognition of his professional actions Mr Penner is awarded this For Professionalism award. ◆

Mr Penner works with 419 Tactical Fighter Training Squadron, Cold Lake.

The Editor's Corner

Search and Rescue (SAR) and Flight Safety

In a search of our Flight Safety database, the term "SAR" revealed almost 800 CF incidents and/or accidents within the last 10 years. Although these included things like smoke and flare malfunctions, there are many recorded incidents involving hoisting, parachuting, mechanical failure of equipment and others. Search and Rescue operations is a dynamic environment with challenges not unlike found in combat. Crews must be ready to launch anywhere within their SAR region and sometimes beyond it, with no notice, within specified time restrictions and often in the very worst weather. Time is critical. Lives are on the line.

In this stressful and demanding environment, it is very easy to make mistakes and become a statistic. The CF has lost several aircraft and crews over the years while engaged in SAR operations. Fortunately this is rare and the majority of SAR ops end safely, a testament to the training, dedication and skills of our personnel.

We have among the best trained SAR Technicians and flight crews anywhere. This issue is dedicated to all those who tirelessly work in support of SAR Operations – "That Others May Live."

2013 Flight Safety Calendar

Some might be wondering why we have moved up the calendar poster to this early fall edition. With Christmas holidays and delays in distribution, some were previously not receiving the much anticipated magazine insert until well into February. This should fix the problem. We have also produced an inaugural Flight Safety flip calendar which should be ready for shipment as you read this. Our outgoing image technician, Cpl Alex Paquin, created this from scratch, so feel free to let us know what you think of the format and how it can be improved. Get your copy from your local flight safety rep.

Departing / Arriving DFS Staff

Our DFS Flight Surgeon, Major Helen Wright, has decided to accept a posting down east. As the author of "From the Flight Surgeon" column who never failed to meet a magazine deadline, she will be missed. The "quill" now moves to incoming DFS "Doc" Major Stephen Cooper. See his inaugural article in this issue. On that note, if there is a topic you would like our resident medical expert to write about, please let us know.

You may have noticed a different flair in our posters over the past year, and that has been because of the efforts of our Image Tech Cpl Alex Paquin. By the time this issue hits the streets, he will be transferred to Base Imaging in Borden. Thanks Alex! Incoming to the position is Cpl Vincent Carbonneau who brings an excellent background in aircraft photography from 14 Wing Greenwood.

We are also losing Major Kevin Roberts, one of our more intrepid senior investigators, to 412 Squadron to fly the *Challenger* aircraft. As one who regularly reads this publication (and quickly returns candid comments to the Editor), he will surely be missed. Incoming to the position is Major Phil Daunais, all the way from 437 Squadron. Welcome to flight safety!

I hope you enjoy the SAR issue and if you have ideas about flight safety related themes that you would like to see covered, drop me a line and we can discuss.

Captain John W. Dixon
Editor, *Flight Comment*

To the Editor

Letter from Warrant Officer Jordie Larson

Canadian Forces Land Advanced Warfare Centre, 8 Wing Trenton

I just received *Flight Comment*, Issue 2, 2012, and reading "The Editor's Corner" was shocked when I came to the "anonymity" note. For me, I considered it an honour and a privilege to have my experience printed in this magazine and hopefully have someone learn from it, *and* to have my name associated to it. Not wanting to have someone's name printed with their article… perhaps they are uncertain to the reaction their fellow co-workers will have after reading the stories... I can't say for sure. For myself, as soon as you contacted me to let me know that my article was being published, I let everyone know! As for not wanting their experiences published at all, I am amazed and saddened. This is a great learning tool that should be shared by all. If you can't learn from your own experiences, then why not learn from others!

Hopefully you will receive many more positive reactions and hopefully this "anonymity" trend will reverse and more people will permit their articles to be printed. If they do not wish to have their names attached to the story, so be it. But hopefully the articles can still be printed for the others to learn from.

Response:

WO Larson:

Thank you for your letter. Certainly we will continue to publish the best flight safety related articles we can find, with or without the author's name. As you point out, the important component is sharing the flight safety message. Thanks again for your contribution.

Editor

Correction: *Flight Comment* Issue 2, 2012 page 38, Epilogue CH146 *Griffon* (146476) indicated the incorrect tail number in the title and the incorrect date, which should have been 22 February 2011. The French version of the same page was correct.

From the Flight Surgeon

Who is Your Doctor?

By Major Stephen Cooper, Directorate of Flight Safety Medical Advisor, Ottawa

Access to health care has become vital to our modern society. Proper diagnosis and treatment of your illness or injury allows you to reach your full potential as an individual and to function in your roles with family, community and work.

Your care team is multidisciplinary. This means that it is provided by nurses, physiotherapists, dieticians, social workers, physicians and many other types of providers. It is organized into CDUs (care delivery units), so your care is coordinated and tracked. You may even be sent to see other providers outside of your base clinic in order to get the best care possible.

Your care also follows you on deployments, operations and exercises whether it is on ships, in the field or forward deployed at other bases. Sometimes your care may be provided by another country's health systems or civilian systems.

All of your care is actually coordinated and monitored within the system even though, as a patient, it may appear that you are getting "bounced around" or "never see the same person twice". We are a highly mobile population of individuals who are formed and reformed into different groups and teams on a regular basis. In addition, our individual health and well being are often dependent on the health and well being of those whom we are flying and working with.

Nobody chooses to be a patient; being a patient brings new and uncomfortable feelings of fear, pain, and loss of control. You must rely on strangers and their skill and knowledge to help you through the healing process which requires communication, trust and common goals.

The CDU clerk will probably be the first point of contact either by phone or in person when you come to sick parade or arrive for your appointment. However, after hours it may be the secretary at the walk-in clinic or even a civilian paramedic at the scene of an accident. You may then be seen by a series of different health care providers over the next several weeks or months.

This is the point where you may feel "bounced around" or that you have fallen through the cracks. Continuity of care is maintained by accurate charting in your Health Record, so that the next provider has a clear understanding of what tests and other interventions have been done by their colleague(s).

Your health information is not shared with your supervisors or co-workers; however, to protect your health and the safety of your team, Medical Employment Limitations (MELs)are provided. For instance, we will not share the fact that you have a broken arm, but we will give you a Medical Employment Limitation of "unfit push ups".

When you ask CF members who their doctor is, the common reply is: "I don't have a doctor". This may be due to frequent moves or a high turn over in clinic staff. This makes it difficult to build trust and communication with a doctor when you become sick or injured. This is where "Institutional Credibility" comes in. This is building the trust of all CF members that, no matter the circumstances, their care will be high quality and efficient, and that they will be treated fairly. "Institutional credibility" is gained by having outside organizations review and inspect our facilities and the way that we provide services. It is also earned one patient at a time by visiting the squadrons, flying with the aircrew and deploying with the units.

So what are the barriers preventing you from accessing this modern, organized, free and accessible 24 hour care? ◆

Maintenance IN FOCUS

Lines and Wires – *How are yours running?*

By Warrant Officer Chris Peasey, Senior Aviation Technologist, Quality Engineering Test Establishment, Ottawa

It's late and there is little time until the aircraft is due to depart on a mission. You are completing the before flight check and notice an electrical cable close to or touching a fluid line. Perhaps you see that a flexible hydraulic line is rubbing on a piece of the structure. What would you do in these scenarios? Would you just move the line or cable and hope they stay where you have moved them, or is everything clamped in accordance with the aircraft specific Canadian Forces Technical Order (CFTO)? These are actually very serious situations that could lead to complete system failures, fires or even the loss of an aircraft, not to mention the possibility of injuries or even death.

Notice that the wear on the structure has been repainted, yet the hose is still able to rub.

It is never ideal to route electrical wires near lines that carry flammables such as fuel, hydraulics or oxygen, yet we all know with the space limitations involved with aircraft design it is not always possible to have the ideal clearances. The separation of wires, fluid lines or oxygen lines from the aircraft structure and each other is critical and when a technician is inspecting these areas, they should always be on the lookout for any indication of wear or interference. It is imperative that the vibration and gravitational forces that flight applies to wiring and flexible hoses be taken into consideration. You cannot simply move a hose or a wire and expect it to stay. They must be secured in an approved manner, and odds are if you finding rubbing or chaffing of a wire or hose and they have been installed in accordance with the CFTO for that airframe, it will be happening on other aircraft.

The proper husbandry of electrical wiring and flexible hoses is essential to flight safety and to the ability to safely perform the mission. The repair of wiring and replacement of flexible hoses is costly, time consuming and could be easily avoided with a little attention

and forethought. If you notice a polished area on a structure near a wire bundle or flexible line, get a mirror and carefully inspect the wire bundle or line for evidence of contact. Generally, if the structure is aluminum and near a steel braided line, the aluminum will display wear. Repainting the structure and not clamping the hose to prevent further contact, is not the answer.

In the case of wiring and aluminum, it will depend on the type of wire and the insulation that is used. The damage could be mostly on the wire, the aluminum structure or both could be equally worn. There is no good form of contact between these items, but it is especially dangerous if the contact point is a sharp angle or the squared edge of the aircraft structure or a bracket. Squared edges will quickly work through the insulation of a wire and if it becomes jagged it can even damage the braid on a steel braided hose as well.

Contact of wiring to aircraft structures is not always due to improper clamping. It can also be caused by inattention when installing a cannon plug. Cannon plugs are designed so that the position of the back shell can be changed to avoid interference or aid in achieving the required clearance from a line or structure. Just because there were no issues before you changed a component, does not mean that you will not be required to adjust the position of a cannon plug back shell to ensure you still have the required clearance or proper routing for the wiring.

Adjusting the position of the back shell, would probably correct any interference issues.

The correct minimum clearances of electrical wiring are explained in the Canadian Forces Technical Order (CFTO) C-17-010-002/ME-001 and the correct installation of flexible hoses is detailed in CFTO C-12-010-040/TR-010. Both of these books are readily available through the DWAN (http://publications.mil.ca/pod/pubs/pubSearch.jsp). The information contained in these books is essential for anyone that is responsible for aircraft servicing inspections as well as technicians responsible for the installation and modification of wiring and flexible lines in RCAF aircraft.

It is our responsibility, as professionals, to ensure that we know and understand all of the basic principles of electrical and plumbing routing and clearances required, that may not be covered as clearly as they should be in the specific aircraft type CFTO's. Take some time and review the valuable information provided in the CFTO's mentioned in this article, and if you observe any of these types of interference issues, bring it to the attention of your supervisors so that the SAMEO can be informed of the situation. Remember: just because **"It's always been that way"** does not make it right. ◆

YOUR ATTITUDE > FLIGHT SAFETY > YOUR LIFE

Photo: Cpl Vincent Carbonneau

CH149 *Cormorant*

Search and Rescue in Canada – An Extraordinary Challenge

Captain John Dixon,
Directorate of Flight Safety, Ottawa

Captain Dixon previously completed two SAR tours on fixed wing aircraft, instructed the CC130 SAR Course and was qualified as Searchmaster.

Content was liberally reproduced from *Flight Comment*, No 4, 1987, "A Cold Dark Night" with the kind permission of LCol (retired) R.G.T. Nicholson.

CC130 *Hercules*

Photo: Cpl Vincent Carbonneau

CC115 *Buffalo*

Photo: DND

The local weather is 200 and ½ in blowing snow. The temperature is well below zero. The call to the standby crew comes in; there is an aircraft missing with 4 souls on board and little survival equipment. The search area is marginal VFR at best. If the aircraft is down with survivors, minimizing the time to find the aircraft and initiate rescue is critical. The SAR crew launches...

Search and Rescue (SAR) service in Canada has been established in accordance with provisions of the International Civil Aviation Organization's Annex 12, which provides the guidelines for a Nation to follow. Most countries, however, do not have the extraordinary physical and meteorological challenges with which Canada contends. An area in size from the southern border with the United States to longitude 145 degrees west in the Pacific Ocean to longitude 30 degrees west in the mid-Atlantic to the North Pole encompassing over 6 million square miles (18 million square kilometres) and some 56,000 miles of coastline (the longest in the world) is a daunting responsibility. This responsibility falls largely to the Department of National Defence.

Formally, the Minister of National Defence is the Lead Minister for SAR (LMSAR) who is responsible for the co-ordination of the national SAR Program (NSP). Under the NSP, the Canadian Forces and the Canadian Coast Guard co-ordinate the response to air and maritime SAR incidents through the Joint Rescue Co-ordination Centres (JRCCs) in Halifax, Nova Scotia, Trenton, Ontario and Victoria, British Columbia. Of note, these centres were previously called "RCCs" but the prefix "Joint" was added in 2001 to signify to the international SAR community responsibility for both aeronautical and maritime SAR. Significantly, the JRCCs handle over 9100 SAR calls per year with a breakdown of approximately 75% maritime, 15% air and 10% humanitarian.

Another significant Canadian SAR organization is the National Search and Rescue Secretariat (NSS) which is an arm's length group within DND accountable to LMSAR. NSS was established after the Ocean Ranger incident in 1982, with a mandate to manage and co-ordinate the NSP. While it does not direct or manage the work of its partners, it brings them together to ensure best use of their diverse resources and capabilities. These departments include the Canadian Forces, the Canadian Coast Guard, the Royal Canadian Mounted Police, Transport Canada, Environment Canada and Parks Canada. The NSS also coordinates the Canadian contribution to the *Cospas-Sarsat* satellite alerting system.

One significant non-government part of the NSP is the Civil Air Search and Rescue Association or CASARA. This volunteer Canada-wide aviation association is dedicated to the promotion of Aviation safety and to the provision of air search support services. This association operates in all 13 provinces and territories, has access

to some 375 aircraft and has 2596 certified pilots, navigators and spotters to fill the positions of crew member.

The CF dedicates significant resources in aircraft and personnel towards the Search and Rescue mandate and this dedication does not come without sacrifice. The SAR Tech motto "That Others May Live", captures this dedication. Significantly, in the past 10 years there have been almost 800 CF recorded flight safety incidents associated with search and rescue. CF SAR related losses include:

27 October 2011 – *Hercules* CC130323 – during an operational night water jump in the Arctic, the SAR Tech team leader became separated from the other two team members and sustained fatal injuries.

13 July 2006 – *Cormorant* CH149914 – during a night SAR training mission, the aircraft contacted the water during an attempted go-around resulting in 3 fatalities and 3 seriously injured.

18 July 2002 – *Griffon* CH146420 – after an initial aborted SAR launch due to weather, the aircraft launched from Goose Bay in marginal weather in rain, mist and fog. During transit, the object of the search was located and the crew started the return leg. While transiting at 200-300 feet the tail rotor failed resulting in a crash with 2 fatalities and 2 injured.

05 April 1988 – *Hornet* CF188773 – a CF188 two plane was launched from Comox at 0200 hours local during a period of bad weather and very high winds in an attempt to pinpoint the position of a fishing vessel in distress. Lead aircraft descended and made several passes over the ship. After the third pass, the aircraft impacted a steep mountain resulting in one fatality.

14 June 1986 – *Twin Otter* CC138807 – Rescue 807 was participating in a search in the Kananaskis region of BC when the aircraft impacted a rock outcropping resulting in 8 fatalities.

These tragedies focus attention on the hazards that can be encountered in SAR operations. It is against this reality that judgements must be made. The worse the weather, the more likely SAR standby crews will be called upon. Storms at sea, heavy icing in cloud, severe turbulence in the mountains, sudden storms in the prairies, squalls on the great lakes – when the weather deteriorates, the adrenaline starts to pump. When the standby crew gets the call, a drama begins in which the lives of those in distress will depend on the skill of the rescue team. It is also a time when aircraft commanders must make that gut wrenching decision on whether or not to proceed when conditions place the crew in jeopardy.

It is instinctive to aid those in danger, no matter how overwhelming the odds against a successful rescue. There are times, however, when skill and courage are not enough. Weather conditions that bring about the emergency can also hinder the assistance. Our SAR aircrew must make every effort possible to complete their mission, but must not jeopardize themselves by crossing the fine line between a successful mission and tragedy. I am confident that our crews are up to the challenge. ◆

References

Information from the following web sites was used in researching this article:

http://www.tc.gc.ca/eng/marinesafety/debs-arctic-shipping-operations-search-rescue-497.htm

http://www.ccg-gcc.gc.ca/eng/CCG/SAR_Maritime_Sar

http://www.nss.gc.ca/site/index_e.asp

http://www.casara.ca/

http://www.tc.gc.ca/eng/civilaviation/publications/tp14371-sar-1-0-477.htm

Photo: Sgt Matthew McGregor

CH146 *Griffon*

SAR TECHS

The RCAF's Only Elite Rescue Team

Photo: Sgt Matthew McGregor

Dedicated to Janik Gilbert – a true Canadian Hero

By CWO Yves Carignan, Commandant of the Canadian Forces Search and Rescue School, 19 Wing Comox

CWO Carignan has 34 years of service and has been directly involved in Search and Rescue as a SAR Tech since 1985. He has been posted to several operational SAR units, HHQs staff positions and is currently the Commandant of the Canadian Forces Search and Rescue School.

Search and Rescue Technician teams and their teamwork strategies have received an increased amount of attention over the past 27 years as have those of many elite teams. Numerous articles and books have specifically addressed issues critical to team performance. In fact, organizations that do not rely on teams–at least to some extent–are scarce. For the SAR Tech occupation, this scrutiny derives from the need to operate differently from the norm. This uniformity is inherent to the occupation because its members were, for the most part, recruited from the CF corps through an occupational transfer.

The SAR Tech occupation is made up of highly selected individuals, captured with a single mission statement: "That Others May Live". This singular focus can often be perceived by other members of the CF as being outside of the CF core capability requirements. From this an appearance of different rules and accommodations for the SAR Tech occupation starts to develop. Although for the most part these differences in rules are understood, at times they are not. For example, the distinctive clothing worn by SAR Techs is definitely understood but conversely, the coveted international orange beret is not. For the SAR Tech occupation, the international orange beret is a military heraldic symbol having intention of accountability more so than for obtaining admiration from others. The accountability is not to commanders or officers appointed above them in the chain of command, but to the performance contribution of those having the resilient perseverance that others took notice of as being beyond average or common place. In other words, it is a reminder that holds SAR Techs accountable to each other for the demanding requirements of their job. Working during operational SAR missions in two man teams makes the need for uncompromising performance paramount to the successful resolution of the incident. The beret represents this reminder to each of them on a daily basis.

Photo: Jax Kennedy

In an attempt to explain and demystify how SAR Techs coexist under these seemingly different rules, there is first a need to define the SAR Tech team, effective teamwork, competency, and self correction that allow the SAR Techs to operate differently while imbedded and reliant on the greater RCAF.

The SAR Tech occupation consists of a multitude of two person teams, poised to render life saving aid and to bring back to safety those victims of distress entrusted to their care. They possess specialized knowledge and skills and often function under unpredictable conditions and extremely high workloads. The SAR Tech two person team is made up of a Team Member and a Team Leader. Depending on the severity of the incident and the number of victims, these two person teams can morph into larger teams such as during a Major Air Disaster (MAJAD) response. Notwithstanding the number, they carry out a single collective action and are always interdependent on each other. This interdependence requires the team members to adjust to each other, either sequentially or simultaneously, in an effort to accomplish team goals. There are many examples of teams which use these same techniques to accomplish complicated and unique tasks. For example, aircraft flight crews are interdependent on each other during low level flying manoeuvres. Similarly, medical surgical teams work together while operating on patients to ensure no fail tasks are safely conducted.

Effective Teamwork is the actual teamwork that occurs when the team members interact and collaborate to achieve the desired outcomes. Conversely, the installation of a team structure in an organization does not automatically result in effective teamwork. Effective team performance requires a willingness on the part of team members to cooperate in the service of a shared goal, such as the goal of saving someone else's life. Moreover, effective teamwork depends on effective communication within the team, along with adequate organizational resources and support. In short, teamwork requires a shared acknowledgement of each participating member's roles and abilities. Without this acknowledgement, adverse outcomes may arise from a series of seemingly trivial errors that effective teamwork could have prevented.

Competency holds a variety of meanings; it is generally used to denote the qualities needed by a jobholder. More specifically, these competencies can be defined as three critical concepts which also form the three types of competencies. That is, the knowledge, skills, and attitudes that affect a major part of one's job and ultimately lead to success through training and development against well accepted standards. Generally speaking, all team members need to possess these attributes if they are to engage successfully in teamwork. More importantly, it is essential to understand the nature of the competencies required to function in a team. The following paragraphs define the knowledge, skills and attitudes that are inherent in most elite teams and specifically relate to the SAR Tech occupation.

Team knowledge competencies arise mainly through cross-training which exposes SAR Techs to the basic tasks, duties, and responsibilities of their peers, and is intended to promote coordination, communication, and team performance. Ideally this training alleviates the decline in performance that is likely to follow personnel changes and has the secondary benefit of improving implicit coordination (i.e., directing various activities without the need for explicit communication). The training is centered on shared cross-role information (teammates, task, equipment, and situation), enhanced understanding of the team members' roles, responsibilities, interdependencies, and cross-role task practice and feedback. SAR Tech history has demonstrated that cross-trained teams better anticipate the informational needs of their teammates, commit fewer errors, and display a higher quality of team process, compared with their counterparts who were not cross-trained. Again, these advantages are germane to the SAR Tech teams and their performance in a manner conducive to crew and patient safety.

This overall team knowledge and the needed competencies are the principles and concepts that underlie a team's effective task performance. Broadly speaking, selected members should know how particular skills and behaviours operate in a team setting, and when to do certain things. Furthermore, each member should know the team's mission and goals and have an awareness of everyone's responsibilities. This shared knowledge enables team members to better communicate and coordinate the different tasks they need to accomplish, thereby achieving successful team performance. Referring back to the two man team, it is critical in a rescue environment for SAR Techs to have a high level of understanding of each other's job, since there is an increased probability that either injury,

communication, the environment or weather will impact the ability of one or the other during the mission. For example when a SAR Tech team parachutes into the trees there is an increased potential for injury. A SAR Tech must therefore have an inherent knowledge of a team member's responsibilities and be able to take over, if required.

Team-skill competencies can be defined as the learned capacity to interact with other team members at a required level of proficiency. The SAR Tech occupation has taught me that adaptability, situation awareness, leadership, coordination, communication, and decision making, are crucial, teachable and measurable skills which directly relate to effective team performance.

Team attitude competencies have been defined as internal states that influence a team member's decision to act in a particular way. A positive attitude towards teamwork and a mutual trust among team members is critical to a successful team process. One of the most important contributors to a positive team attitude is a sense of membership to the team (i.e., a collective orientation). For example, every SAR Tech can connect to and rally around the phrase "That Others May Live". This contributes to a positive team attitude and helps create effective team bonding.

Teams know things, do things, and experience things within the context of specific environments. Each team member must understand the technical and tactical considerations of the assigned task, as well as the strengths and weaknesses of his or her teammates. In addition to carrying out their own responsibilities and altering them when necessary, all members also must monitor their teammate's activities and diffuse potential team conflicts. Effective teams exhibit these competencies while maintaining a positive emotional attitude toward the team itself. They also complete a rigorous self/team analysis of their performance during missions in an attempt to self-correct.

Self-correction is a naturally occurring process for effective teams. It often occurs at the meeting following every SAR mission and involves discussions of individual and team errors, as well as tactics for preventing the same errors in the future. Regardless of the relative success of the mission, this process focuses on error identification and correction and has particular relevance to the SAR Tech team performance in a crew and patient safety context. SAR Tech teams learn to observe their collective performance, categorize effective and ineffective behaviours, and present them in a structured format. They can then evaluate each aspect of the performance and provide one another with constructive feedback. When guided by a competent SAR Tech Team Leader, this method of team evaluation/introspection has been demonstrated to improve team performance. This is also a principle that is inherent to the Flight Safety organization when it looks at incidents that arise during the course of all of the RCAF's activities. This type of self scrutiny is highly stressful and requires individuals capable of handling it. Successful elite groups pay particular attention to training its members in how they handle stress through Stress Exposure Training (SET).

Stress can be a considerable negative influence on individual or team performance, especially in high stress environments where there can be ambiguous goals and severe time limitations such as experienced in the SAR mission operational environment. Stress-exposure training (SET) emphasizes a three-phase methodology designed to reduce the debilitating effects of stress through trainee instruction, skills training, and practise.

SET improves performance by providing a safe-but-stressful training environment similar to that in which the users will work. Skills are practised under graduated exposure to different stressors. SET training has repeatedly been proven to reduce stress anxiety, increase confidence and even improve cognitive and psychomotor

Photo: Sgt Matthew McGregor

performance under stress. Given the life-altering nature of decisions routinely required of Search and Rescue Technician teams, successful stress coping is an especially pertinent skill which is successfully developed through SET training.

Well organized and high performing teams exhibit a sense of collective efficacy. Their members recognize a dependence upon one other, and share the belief that they can solve complex problems by working together. Moreover, effective teams are dynamic; the members optimize their resources, engage in self-correction, compensate for one another with back-up behaviours, and reallocate functions as necessary. Because they often can coordinate without overt communication, effective teams can respond efficiently in high stress, time restricted environments. Effective teams possess the means to recognize potential difficulties or dangerous circumstances and adjust their strategies accordingly to increase safety.

I am extremely proud of being a member of such a professional and focused occupation and since I am a SAR Tech the contents speak mostly from that perspective. I am also cognizant of the enormous role and support that each member of the SAR community plays in the successful accomplishment of each SAR mission. I would like to personally thank each and every one of you. ◆

"THAT OTHERS MAY LIVE"

Always Have a Plan "B"

By Jason L. Gale LT (N), 413 Transport and Rescue Squadron, United States Coast Guard Liaison Officer, 14 Wing Greenwood

Lt Gale has fifteen years in the USCG with the first eight being served as a Boatswains Mate. He has been a Boarding Officer enforcing US maritime laws, Motor Life Boat Operator and an Underway Officer of the Deck. His first flying tour was with USCG Air Station Elizabeth City where he flew the HC-130J in support of SAR, Homeland Security, Narcotics Interdiction and Ice Patrol Missions. He is currently serving with 413 Transport and Rescue Squadron.

The hangars were quiet; the time was around 2200 local as the pagers went off for the United States Coast Guard *Hercules* SAR standby crew at Air Station Elizabeth City NC.

I was the assigned aircraft commander, with less than 50 hours since my upgrade and only one other minor SAR call out under my belt. My first officer was new to the aircraft but not new to aviation, having over 2000 hours in the legacy model HC-130, however she had been out of the cockpit for an administration assignment for the past couple of years. The rest of the crew was fairly new to C-130 as well with some basic SAR experience on hand. We had reported for duty around 1430 but like most night shift crews had limited sleep due to the early changeover time, having recently shifted from a 1600 hand-off to the 1430 time frame. As a required routine, risk assessment was completed as a group which indicated that some of the crew were already suffering from minor fatigue. Since this was a Friday night and no training flight was scheduled, these individuals were instructed to go to the barracks and get some rest. The weather looked good, winds would be calm or light and variable for most of the night and no rain or thunderstorms were forecast. However due to a tight temperature dew point spread and light winds, heavy ground fog was forecast starting around 2200. Despite all this, we were in the low amber (good to go with mitigation) on our risk assessment scale.

Just as my crew was retiring for the night at around 2145, the rescue coordination center (RCC) in Norfolk Virginia called with a tasking that would require our full attention for the entire night. A boater was reported overdue off of Cape Canaveral Florida and Air Station Clearwater was already working another case; could we accommodate the tasking? With no glaring risk factors, I said yes but let them

know takeoff would be delayed due to the on-load of fuel. Due to the possible length of the search and a two plus hour transit each way, I instructed the maintenance staff to provide a full compliment of 62,000 pounds. This would give me plenty of fuel to complete any assigned search up to 8 hours and return to Elizabeth City.

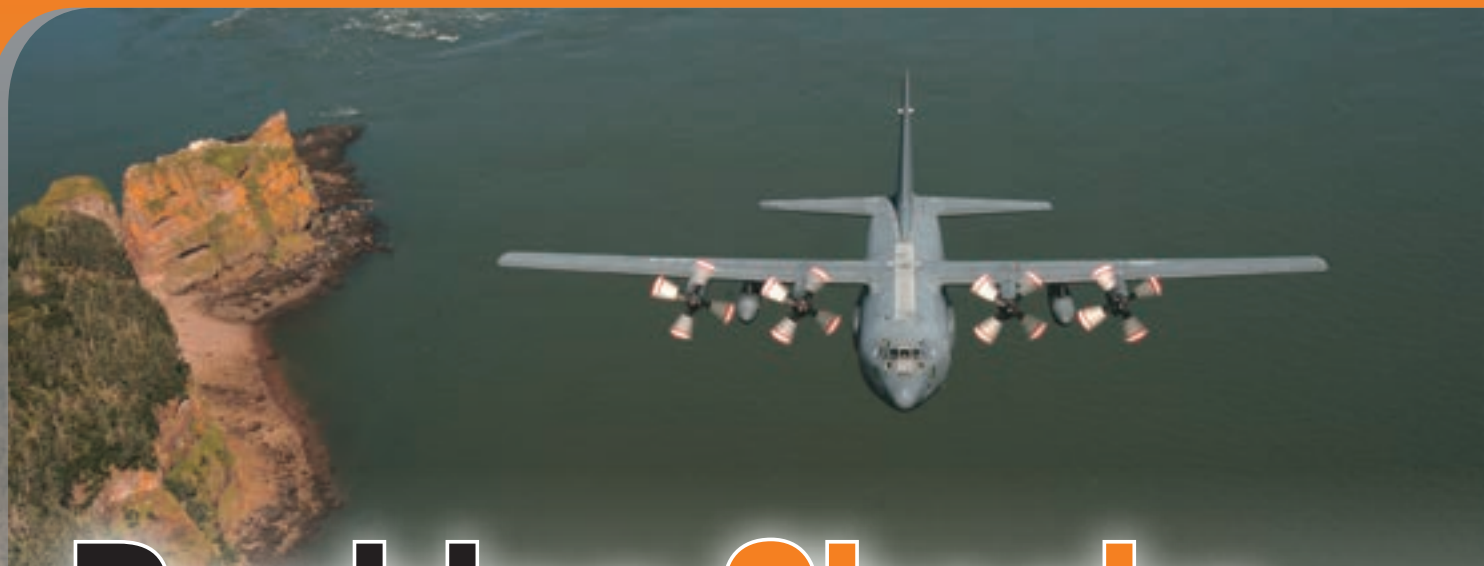
An instrument flight plan was filed to the commence search point and no takeoff alternate was required. Approximately fifty minutes after tasking we were taxiing out for takeoff. With all checklists complete and the tower about to close we received our clearance and commenced our takeoff roll. All went as planned as we took to flight and commenced a climb on course heading south and climbing to flight level 230. As we passed through flight level 180 we had just completed the transition to standard pressure when the aircraft caution, advisory and warning system sounded its aural alarm and flashed an advisory. The advisory indicated a High Shaft Vibration on the number 3 engine. As soon as the advisory came up I remembered from some informal training two days earlier that this was the only advisory that was a shutdown condition. An FAA circular advisory had been issued for certain model numbers of the engines that were now hanging off of our aircraft's wings. This advisory was due to cracks that could very likely occur in the propeller shafts that had a probability of failing catastrophically.

I stabilized the aircraft in level flight and asked the right seat to request a turn back towards Elizabeth City. Once complete, I requested the emergency checklist to be initiated. Just as I had thought, the checklist crew action called for a shutdown of the effected engine. As a crew, we completed the engine shutdown and cleaned up the checklist items. The tower at Elizabeth City had now closed but fire services were still available, however the fog had closed in sooner than expected. As we passed over the airport we could only see the low glow of the runway lights through the fog layer. Some serious thought was required due to the aircraft we were flying being limited to a sink rate of 300 feet per minute due to the fuel loading and we were going to make an approach into fog that could lead to a continue call and very possibly a higher rate of descent on landing, due to low visibility and crew fatigue. In order to mitigate this risk, as a crew we decided the best course of action would be to dump fuel prior to the approach. No one on our crew had ever previously been in a position that required fuel dumping. A request was made to Norfolk approach for the fuel dump, which was granted with instructions for us to proceed off the coast and switch over to Oceana approach control. Once up with Oceana, we were instructed that we could have a twenty mile length of clear airspace just off shore to dump. I requested the fuel dumping checklist and we commenced setting up to dump all of our external tank fuel and 10,000 pounds of our main tank fuel which would bring the aircraft below the sink rate restricted weight. Before we commenced dumping, we needed to determine how to avoid dumping in a circular pattern due to the 20 mile legs not giving us enough time to dump the required fuel in one pass. Utilizing a 25 knot off shore wind flow we ended up dumping for 15 miles and then emptying the dump masts before turning into the wind giving ourselves a couple of miles offset for the next leg.

Once all fuel dumping and associated emergency checklists were completed, we declared the emergency and received clearance for the ILS approach for runway 10 at Elizabeth City, since these approach minima had the greatest possibility of allowing us to land. With all checklists complete we commenced the approach which I flew from the left seat. We entered the fog bank at about 500 feet but were able to land without a continue call, however, just after all the wheels were safely on the runway we punched into a very dense fog bank that continued all the way to the ground. My eyes rapidly went from looking down the runway to directly off the nose with my only reference being the centerline lighting. The landing roll was completed safely despite the reduced visibility. Electing to back taxi on the runway in order to continue using the centerline lighting we were able to taxi to the ramp followed by the fire trucks that we only knew were with us because of the lights flashing through the fog. Once parked I decided my crew was through for the night until we got some crew rest and allowed the fog to lift. RCC concurred and a first light search was requested. As it turned out, the search was called off before we were required to depart the next morning.

The next day like every other emergency we go through as flight crew, I was Monday morning quarterbacked which is all well and good, however I started thinking about what I could have done better/differently. As I pondered my decisions in the cockpit I realized that at no point during the entire evolution had I briefed the plan "B" to include a three engine missed approach, and no one in my crew had questioned me on this. Wow, this really took me by surprise and made me realize that even though we most likely would have been fine with a lighter aircraft due to the fuel we dumped, I had not prepared my crew for what very likely could have been a three engine missed approach to an alternate landing airport. I had become overloaded without realizing it and had run so many checklists in a short period of time that I had lost sight of what might happen if we did not make it in on the first approach. Would we truly have been okay on the missed? Your guess is a good as mine but one thing is for sure, we carry two buckets as we go through our careers one full of experience and one full of luck. The experience bucket keeps getting refilled but the one full of luck will empty out and when it's gone, it's gone for sure.

My lesson learned was don't take shortcuts; pause and make sure you have briefed everything, especially when your crew is fatigued. Complete all checklists and always have a plan "B". When you think you are done, sit on your hands for a few minutes and always be open to input from your crew. Fly safe! ◆



Rushing Checks

Photo: Cpl Jessye Therrien

By Captain Phil (PU) Roy, 435 Transport and Rescue Squadron, 17 Wing Winnipeg

After 435 Transport and Rescue Squadron was called to assist in the search for an aircraft lost between Quebec and Oshawa, my crew and I (first officer) were launched in the night hours for Trenton. After landing in the morning, we were briefed on the search object and on our assigned search area. There was another *Hercules* crew and 2 *Griffon* crews there for the brief that morning.

Right after briefing, we took off from Trenton and headed toward our search area, which was about a 30 minute transit. Our search area, near Oshawa, contained a fair bit of traffic and therefore communications in the cockpit were very busy at times. We also had to be aware of and avoid numerous communications towers in the vicinity, some of which were not depicted on our maps. With all this, combined with undulating terrain and searching at 500 feet over the ground, there was certainly potential for an incident or accident. But thanks to the adrenaline, concentration and experience of our crew, our first search day went well and incident free after about 8 hours of searching.

On our second day, a total of 5 *Griffons* and 3 *Hercules* crews were there for the morning brief. Our search area for that day was not far from our previous day's area. At about midday we heard that the missing plane might have been found, however nothing was confirmed so we continued our search procedures. A little later in the day, we were re-tasked to search not far from Ottawa. The weather was marginal, but just good enough to accomplish our task. As we were finishing searching our last assignment, we were recalled. They had confirmed that the earlier contact was the missing aircraft.

After our initial night call out and then searching for a full 2 days, we were now rushing to get back home to Winnipeg before "busting" our crew day. For the last flight home, I was strapping into the right seat for the first time. I was trying to expedite my strap-in and instead of grabbing the standard hand bar to help with adjusting my seat, I accidently pulled the Fire Emergency Control Handle (FECH) of the Auxiliary Power Unit (APU). The FECH worked as published – the APU shut down and everything went dark. Luckily we were still on the ground and it was not an engine FECH that I pulled while airborne.

Lesson learned: always do your checks at your own speed; rushing them can lead to incidents and at the end of the day it might just slow you down further. ◆

DFS Comment:

I thank Captain Roy for sharing this persuasive experience. While the lesson learned to not rush checks is a valid one, there may be another point worth mentioning. How fatigued was this crew and might that also have contributed to the incident described? What was the motivation to "rush" back to home base – operational or a case of get-home-itis? Instead of rushing checks to reach home base before exceeding a maximum crew day, perhaps going to ground and departing the next morning with a rested crew, may have been worth considering.

Routine Or Complacent?

Photo: Cpl Vincent Carbonneau

By Captain Marc Beaumier, Air Combat Systems Officer, 14 Wing Greenwood

It was a beautiful day, like many days during the summer months in the Annapolis Valley. We were doing our routine preparation for SAR standby, and as expected when "CAVOK", the SAR technicians wanted to do a free fall jump at high altitude. Our plan was to takeoff, do the free fall jump from 10,000 feet, land, load the SAR techs and continue with other SAR training. All safety checks were conducted and the ramp and door of the *Hercules* was opened. The jump went without a glitch and the ramp and door was closed and secured before preparing to land. As per our routine, myself and the loadmaster started cleaning up the back of the aircraft of any loose comm cords, D bags etc. While doing so, we were informed by the front crew that we needed to land right away and load the SAR techs because we had just been tasked by JRCC on a mission up north. Thinking quickly and to avoid wasting time, we decided to remove the SAR windows right away and put in the paratroop doors before we landed. That would allow us to pressurize the aircraft on our way to the mission allowing us a higher altitude and a quicker transit. (We cannot pressurize the aircraft when the SAR windows are installed).

As I was putting the comm cords away, the loadmaster started to remove the right SAR window, and that is when I noticed that his "monkey tail" was removed from his harness. He therefore wasn't secured to the aircraft and he was standing by an open door while the aircraft was at approximately 7,000 feet. I quickly went and stopped him before he got any further. We then went through the proper safety checks before we finished our task.

It is not uncommon for crew to remove the harness or monkey tail as soon as the ramp and door is closed and locked, in order to allow more "freedom" to move around while doing the clean-up. In this case, the loadmaster had done so, and as our plan changed because of the SAR tasking, we failed to go through the proper safety check a second time for the open door. Therefore, neither of us initially noticed that a crew member was not secured before the removal of the SAR window.

We do a lot of training during a year in the SAR world and inevitably we do a lot of the same training sequences like the para jump. Routine can be a good thing; it can allow us to perform a task at hand effectively and easily ... but routine can also be dangerous. When a person becomes complacent during a routine training scenario, accidents can happen. Our "routine" was disrupted by the unscheduled SAR tasking. I believe that regardless of how often or recent you may have done a procedure, it is imperative to go through the standard procedure before engaging with a new task at hand. In this case a "new" safety check needed to be done and wasn't. ◆

Fatigue and SAR

How *rested* is your *crew?*

Photo: Cpl Jessye Therrien

By Captain Chris Jacobson, 435 Transport and Rescue Squadron, 17 Wing Winnipeg

I was on the night crew for a deployed detachment of two crews that were holding SAR standby posture in the western Trenton SAR region. We met the day crew at squadron ops at 0730 local in the morning we were to fly to Edmonton. The plan was that the day crew was going to drop us off in Edmonton to rest while they conducted training. After their day was done we were going to assume the SAR posture, and had planned to do some SAR mountain training in the Rocky Mountain House area. All went as planned until the SELCAL tone was heard: JRCC had a tasking for us that involved a transit to Rankin Inlet for 3 overdue hunters. We picked up an IFR clearance, assumed a Rescue call sign, and headed to Saskatoon for fuel and spotters. The entire crew had a feeling that this could turn out to be a long night.

After a short turn in Saskatoon and a long leg to Rankin, we found ourselves on scene. Thankfully, the 3 overdue hunters were found early in the search on one of the land features that JRCC had included in the original tasking. We dropped a radio to the party of three near a small shelter on land, and learned that all was well. They had taken shelter on the beach to wait out weather and had no requirement for assistance. JRCC released us; we picked up a clearance for Saskatoon, thanked the spotters, and headed for Edmonton to end a 15 hour crew day. What had begun as a routine training mission turned into an all-nighter, and it was beginning to show in the performance of the crew. We had all been awake for about 27 hours and had completed a mission in a dynamic environment with some challenging weather. Needless to say, everybody was glad to go to ground at the hotel in Edmonton.

At breakfast the next morning after about 8 hours of time away from flying duties, the AC of the day crew called me on my cell phone. All he said was that there had been a plane crash in the Lake of the Woods area, and the day crew was enroute to pick us up as JRCC wanted us to take the call. Clearly, this was a crew rest issue, as we needed 10 hours away from flying duties to be legally rested. But there had been a plane crash and no further information was available. My mind raced: clearly we were in violation of the regulations by accepting the task, but I felt as though lives could be at stake. Further, I had concerns with the fitness of my crew after last night's events and the amount of rest that was actually taken. I decided to mitigate this by using the resources of the other crew. They would be able to plan the mission and then spell us off in the transit to the scene while we rested enroute: not a conventional solution but probably a justifiable one.

As luck would have it, we were stood down prior to arriving at the airport while still being on the hook for another whole night of 2 hour standby posture. It was evident in the demeanour of the crew that they had worked hard all night and were shortchanged for rest. Could we effectively and safely complete another 18 hour day in difficult conditions if a call was actually received and the second crew was not available to help? I doubted it. I called my CO and waved the white flag explaining the situation and my reluctance to continue to hold SAR standby with my weary crew.

Crew rest issues are often a common flight safety topic in any flying community, however, the Search and Rescue specialty presents unique challenges in this area. My personal experience is that a full duty day that begins late in the day or at night will affect my performance and mood for 3 or 4 days afterward. It is a disruption of the body's normal rhythm and results in a substantial recovery period. I believe that the regulations are adequate to protect crews from fatigue issues, but as with any law, they must be applied with common sense and good judgement with due consideration for safety of flight. Lastly, the SAR role demands careful personal planning for rest prior to any standby period to maintain an effective and continuous response capability. ◆

SAR Flight

Photo: Cpl Jessye Therrien

Are you always aware of your surroundings?

By Major (Retired) Bill Lafontaine

Mr Lafontaine is a pilot with over 36 years of flying experience who recently retired from the RCAF. His experience incorporates an extensive training background and multi tours in transport operations, including time as a SAR pilot on the *Hercules* aircraft.

A few years back, I was a SAR qualified *Hercules* crew member flying a "strat" trip from Trenton to the east coast. While flying over the state of Maine, we heard a strong electronic locator transmitter (ELT) signal that we were also able to "home" on our ADF.

We reported this to Boston centre, which was the controlling ATC agency, and asked if they would like us to investigate a bit more. They said they would appreciate it if we could. The weather was scattered clouds, but very hazy. We descended in an attempt to more accurately pinpoint the signal. We were able to get a solid "on top" and decided to descend further to try to visually identify the aircraft in question, which we did.

It was a *Beech Bonanza* that had been forced down in a clearing for mechanical reasons. The plane was upright but had nosed over. The pilot, who was the sole occupant, was just exiting. He appeared to be unhurt and waved to us as we flew overhead. We advised Boston what we had discovered, who dispatched a state trooper to the scene within minutes.

A letter was sent by the pilot of the downed *Bonanza* that eventually made it to our squadron. He indicated how very grateful and thoroughly impressed he was with the speedy Search and Rescue response and capabilities of the Canadian Forces. What he did not realize, however, is that we came quite close to joining him on the ground, and certainly would not have been as fortunate as him to escape unscathed. We were so focused on the task at hand that we almost became a statistic ourselves.

This search was completely unplanned, and as such, we did not have any maps of the area to consult. As it turned out, we were in a portion of the Appalachians. When you think of rugged mountain ranges, you seldom think of this area, but there are definitely some high enough peaks and ridges that warrant your attention, as we found out. After flying over the site and visually confirming the status of the aircraft and its occupant, we immediately realized we were in a bit of a canyon, surrounded on three sides by some steep

hills and ridges. The hazy weather, with forward visibility of about 2 miles, denied us the ability to sufficiently determine the make-up of our environment.

Fortunately, we were able to add sufficient power and climb steeply enough to clear the hills. In the late 1970's, a Canadian Forces *Single Otter* crew were not so lucky. They were transiting the same mountain range when they encountered strong downdrafts and were unable to climb above the obstacles. They crashed, killing all on board.

I learned some valuable lessons from my experience that I was able to apply in subsequent missions, SAR and otherwise. Always be aware of the terrain and where you are relative to hazards. We are often asked to operate into some potentially treacherous areas. During a search, it is more likely to be a factor if the tasking is last minute or while already airborne, but can be a factor anytime you are operating in rigorous territory. It could also be during an instrument approach into airfields with some daunting topography, particularly in unfamiliar areas. The *Hercules* crew that crashed near Alert in the early 1990's is an example of a loss of geographical situational awareness. We are always vigilant while flying in mountainous areas like western Canada, but there are places that we don't think of as overly treacherous that can bite you in a heart beat. Although you can see sufficiently while looking down vertically, once you are in that weather phenomenon such as fog or haze or blowing snow, seeing horizontally will be a whole different issue. It will undoubtedly impede, or could completely block your forward visibility and awareness.

When you have to operate in steep or hazardous terrain, ensure you have a plan and enough energy to be able to safely exit. If that energy is not sufficiently available in the potential form (power) then make sure you have enough in the kinetic form (speed). Be able to recognize when you are getting low on energy or turn radius capability and don't hesitate to exit before you run out.

You can't totally eliminate risk, but you can minimize it. Be smart, and remember: ***Accidents don't just happen – they are caused***. ◆

Photo: Sgt Eileen Redding

We've got it covered!

By Captain John Dixon, Directorate of Flight Safety, Ottawa

As a first tour, newly upgraded Aircraft Commander on the CC138 *Twin Otter*, I was excited to be working in the Search and Rescue (SAR) role. We were part of a team that was frequently called out, usually in the worst of weather, all in an effort to save lives. It was also an opportunity to work with SAR Techs – those infamous, intrepid, heroic individuals who regularly jump out of perfectly serviceable aircraft.

Unfortunately, my first few searches ended with an aircraft found but with no survivors. The majority of call outs involved small civilian aircraft that had fuel shortages or inclement weather or lost bearings. Then one morning we received a launch call, and we were airborne at first light. A small aircraft had gone missing on a night training flight near Hinton, Alberta, with an instructor and student on board. There was no ELT (electronic locator transmitter) signal received.

Shortly after our launch, the SAR *Hercules* was also airborne on the same mission as ours. We proceeded straight to the local airport to start a square search and the *Herc* proceeded to an adjacent area. Within 30 minutes we found the missing aircraft about 3 miles from one end of the Hinton runway. The aircraft was inverted and appeared mostly intact, with no indications of fire, but there was also no visible evidence of survivors. We informed the *Herc* crew who asked to come into the area and have a look.

Meanwhile, we were discussing the best way to proceed. In spite of the location near the airport, there were no roads near the downed aircraft. It was also in a mostly wooded area, and a para drop would require landing in a neighbouring field and walking to the site location. As we had no idea of the condition of the occupants, or even if they were still with the aircraft, the SAR Tech team lead and I felt that a para jump was the best solution.

Once the *Herc* cleared the zone, we prepared for the drop. At this point I should mention that a very experienced SAR crew were operating the CC130. They asked if there was anything they could do to assist, and I was hesitant to ask for help – this was our mission! Then they asked if we would like them to climb up (for better reception) to send in the info message to the Rescue Coordination Centre. Good idea! I then suggested that after they sent in the message, they might as well return to base as "***we've got it covered***". They replied that they had lots of fuel and said that they would stick around a while.

As we proceeded with the drop, all went as planned except for when the two SAR Techs reached the ground; the terrain was much more difficult to cross than it looked like from the air such that it took some time to reach the aircraft. Once there, they immediately radioed that there were two survivors – one in good condition and one in possibly serious condition. Also, because the downed aircraft was inverted in fairly soft ground with inoperable doors, they couldn't remove or treat the occupants. They then requested the assistance of the SAR Techs from the *Herc*. Good thing they stuck around!

Fortunately, both instructor and student survived the accident and made full recoveries. I learned a few things that day, starting with "Don't be afraid to ask for back-up – you never know when it might be needed." When lives are on the line, ego and pride have no place. ◆

Low Lighting

Photo: MCpl Paul Lee

By Captain Wayne Atwood, 103 Search and Rescue Squadron, Gander, Newfoundland

It all began on a dark and stormy night (well that's how all Search and Rescue stories start on a Friday night at the mess after a couple of sodas). Actually it was a clear night with little weather to speak of, when the helicopter SAR crew pager buzzed (the dreaded night time call out). The crew was launched on a mission to recover a hiker that had fallen into a stream and fell over a 60' waterfall at an elevation of approximately 6700'. It was located on the Macbeth Glacier 70 nautical miles East of Castlegar, BC. Injuries were suspected to be severe including possible back and neck trauma. Needless to say, we were in a hurry to recover and transport the patient to a medical facility.

The *Cormorant* crew quickly got the pre-flight/flight planning/brief done. With the existing good weather, it would be a direct flight to Castlegar for fuel and then to the glacier to extract the injured hiker – too easy. During the brief, the night conditions were discussed and the effect low lighting might have on the extraction of the hiker. During our discussion, the SAR Tech team lead suggested that we request the Joint Rescue Coordination Centre (JRCC) Victoria to launch a *Buffalo* to provide top cover and flares if needed. Extra light is always a good thing – daylight is even better.

The book was signed, the flight authorized and we were turning rotors within minutes. Immediately prior to taxi we checked both of the pilot controlled lights, and of course the light on my side (right side) was not working. This was not an immediate concern since both pilots have lights controllable from either side, and we still had one light up front. In the meantime the SAR Tech team lead was fighting with the night-sun search light, (30,000,000 million candle power) and eventually had it working after some troubleshooting, grunts, and vocal words of encouragement to the light switch.

Once airborne our SAR Technician requested to use the night-sun "to test the functionality", and of course as luck would have it ... total failure. More strong words of encouragement were spoken to the light yet no response this time. One light left serviceable and en route to an unknown area somewhere off the side of a mountain – the cards were slowly stacking against the mission.

One quick stop for fuel in Castlegar and we were back airborne and en route to the glacier. Approximately 30 minutes later we began our first turn down the unlit valley; it was big and dark and my first thought was "wow, it's really dark in that valley". Then, as if the heavens opened up, our whole world filled with light. The *Buffalo* SAR aircraft (arriving on scene shortly before us) began to "chuck" flares, which exponentially increased the effectiveness of our Night Vision Goggles (NVGs). You could almost feel the crew's relief as we got closer to the area with the additional ambient light. As we proceeded to our latitude/longitude our first problem became apparent. Scattered amongst the mountain ridge were several helmet lights of other hikers spread out over a mile of the mountain ridge. Having no night-sun meant it would be difficult to identify the patient's whereabouts amongst the crowd (not to mention the danger the *Cormorant's* powerful downwash can create for hikers standing on the side of a cliff). After assessing the area, we found a location that looked like it could be our group of hikers surrounding the patient (the hikers were negative radios so no direct contact was made until SAR Techs were on the ground). We moved to a position offset from the patient's suspected position due to the *Cormorant's* downwash, and this is where we encountered our next problem. The low lighting combined with poor visual cues for the hover was now very apparent to the crew. Also, flares are useful but they eventually burn out. Occasionally the flares would dim and we were left holding tight for the next drop to light up the ridgeline. It's kind of like your kid playing with the light switch while you're working on something – almost.

Since the area selected for the hover was unsuitable for landing (the patient was located in a lower lying pocket below the waterfall) we were forced to hoist at a higher than normal altitude of about 200', which can significantly increase the pilot workload to maintain a steady hover. For most of the hoist, sitting on the right side of the aircraft, I was looking off the cliff several thousand feet down with little or no reference, while my FO on the left side had the cliff face and a hiker's helmet light for forward and aft references. The flares were effective but they sure couldn't replace the night-sun. Fortunately we were able to keep the aircraft stable and made a successful SAR Tech insertion and patient and SAR Tech extraction, all within our limited time to "bingo" fuel.

In hindsight, there were several factors that increased mission difficulty and risk to the aircraft and crew that we could have minimized prior to leaving the hangar, particularly given that it was a very dark night. Our first decision to have JRCC send a *Buffalo* en route to support with flares turned out to be our best decision. The low ambient light decreased the effectiveness of our NVGs, however the flares made conditions significantly better. In terms of time, this cost us only a few minutes for crew discussion, briefing and coordinating *Buffalo* assistance – a small price to pay for the additional support.

The second decision was to continue the mission with a faulty night-sun search light and without one of our pilot controlled lights. This significantly increased our workload in the hover and added to the difficulty locating the patient's exact position. This added a few extra minutes to the extraction, but could have had a greater impact if the hiker was travelling with a small group that wasn't easy to locate.

What did I learn from this? In two instances, consideration could have been given to shut down or return to base due to unserviceable lights. There was another aircraft in the barn that we could have departed with inside of 30-40 minutes. Although switching aircraft would have added time to our departure, we may have been able to decrease time spent searching for a suitable hoist area and identifying the patient's exact location. This probably would have decreased our on-scene rescue time.

The biggest lesson is that there are always options before you leave ground zero. Once you depart on a time critical life-saving mission, the decision to return due to faulty equipment becomes very difficult. The safest and most efficient decision may actually be to delay the mission at the outset and correct the unservicable equipment before departing (adding time on departure but likely saving time during the mission). With the benefit of hindsight post mission, we can say that although safety was not jeopardized, we did narrow the safety gap. ◆

Difficult Decisions

This article was originally printed in *Flight Comment* No 4, 1992.

We're grateful to this pilot for his interest in passing along an important lesson...

Friday AM, *0315* Hours

The calm of the night was shattered by the ringing of the telephone. Waking up does not take long when you are on SAR standby. The Rescue Coordination Centre (RCC) in Victoria requested that the standby CH113 *Labrador* helicopter be airborne at first light to pick up a fallen hiker on Mount Seymour. I called my crew and told them to prepare for a 0500 hrs launch. By 0430, the entire crew was in the hangar and ready to go. I called RCC once again to get further details of the situation. RCC told us the hiker was a 37 year-old male who set out the day before. He had fallen and was suffering from broken ribs, two critical breathing problems as well as possible back injuries. The North Shore Rescue Team, a civilian ground search organization, had hiked in the previous night and had already begun tending to the victim. Our job would be to locate, hoist and transport them to Vancouver's Kitsilano Coast Guard helipad. All sounded routine.

Shortly after 0500 we were airborne, enroute for Mt Seymour, a 45 minute flight from CFB Comox. Good weather was reported; about 4000 feet overcast with rain showers. Enroute the weather was a little worse than anticipated with visibility at times dropping to less than ½ mile. Ten minutes from the mountain the visibility improved but the ceiling was lower than forecast.

Photo: DND

Once on scene, we established communications with the North Shore Rescue Team. The ground party estimated that they were at 2300 feet. We asked them to fire a red flare to pinpoint their exact location; this was done twice, but the flares were never spotted. It was apparent that they were in cloud. We came into a hover just below the base of the cloud over a creek and asked if they could hear the helicopter. The reply was yes, so we started to hover up the mountain, in cloud, from tree to tree, moving upwards steadily. We hovered up along the creek bed until the ground party advised that they could no longer hear us. We were at 2500 feet at that point. The crews' eyes were strained as they called clearance to ensure a safe distance was kept from the trees.

The same procedure was used as we slowly and steadily descended back down the mountain side until we broke out at around 2000 feet. We advanced to the next creek and once again ascended into cloud. We continued up the mountain sideways until the creek became too narrow. This time the ground party reported we were getting closer. So the aircraft was turned to put the nose into the mountain side and we continued upwards.

The ground team was spotted. We manoeuvred to get into a good hoisting position and at 2600 feet, 10 feet from the trees and almost entirely in cloud, the hoisting operation began. From about 150 feet, the SAR tech was lowered to the site followed by the Stokes litter. Fortunately, the patient had already been stabilized by the ground rescue team, thus allowing the SAR tech to immediately assess the patient's injuries and prepare him for evacuation. After being secured in the Stokes litter, the patient was hoisted up and transferred safety aboard the aircraft where another SAR tech continued medical aid. Three more double hoists were carried out to pick up the men from the North Shore Rescue Team that had spent the night with the injured hiker. The task was complicated because our visibility was obscured to the point where the flight engineers at the door could not clearly see the SAR tech on the ground. The entire time in the hover seemed like only a few minutes. In reality, 45 minutes had elapsed.

It was not over yet. We still had to make our way down the mountain. Again, eyes were focused outside as we gradually descended approximately 600 ft until we broke out of the cloud. RCC was informed of our progress and had an ambulance standing by. Ten minutes later we landed at the Kitsilano Coast Guard helipad in Vancouver and the patient was taken to hospital. It was now 0700. Good morning Canada!

Throughout this particular rescue mission numerous difficult decisions were made. By using the experience and knowledge of each crew member the mission was completed safety and effectively. However, almost on a daily basis, SAR crews are faced with the dilemma of deciding whether to turn back or continue on with the mission. Often, lives are at stake but the temptation to jeopardize flight safety must be resisted. Aircraft commanders must appreciate their own limitations and capabilities, those of their fellow crew members and those of their aircraft. Respecting those limitations will ensure the safe and successful completion of many more inevitably challenging rescue missions. ◆

Photo: DND

Wildlife Strikes Part 2

By Major Jason Trudel

Photo: DND

Major Trudel wrote this paper as part of a masters thesis. He is a former exchange officer with the Directorate of Flight Safety Ottawa, previously flew the KC-135 and currently instructs air refuelling planning at the Mobility Operations School, Hurlburt Field, Florida. "Wildlife Strikes – Part 1" was published in *Flight Comment* Issue 2, 2012.

Control Methods – Determining Bird Attractants

After determining that a bird species is present, the next step is to determine the attractants for each species. These include food sources, nesting areas, as well as breeding grounds and protection from predators. Elimination of any of these aspects from the airfield will decrease the attractiveness of the airfield to that species. All actions must be taken carefully, however, as the environmental impact of any single action can often have unpredictable consequences. Mitigation plans that have the least environmental impact and the lowest cost should be sought out whenever practical. One of the easiest areas to target is vegetation management. This can remove food directly for birds attracted to seeds or other fauna. It can also reduce security factors, such as screening from predators. In some cases, vegetation cannot be altered. Old growth trees outside of airports, planned for shade, may have such strong social status that removing them is unacceptable to the local population and leadership. In cases like this, alternate methods must be pursued (Johnson & Clifton, 2011).

In addition to vegetation, building and facility construction and maintenance plans are extremely important. Management of water sources and open water access is critical. While waterfowl are attracted to open water, such as irrigation ponds on an airfield, bank contouring, nets, or surface disruption can greatly reduce the attractiveness of water for bird activity without impacting the utility of the resource. Buildings that provide shelter can either be modified, such as using spikes on rooftops, or continually monitored for bird activity.

Social/Political – Approved and Acceptable Measures

Despite the hazard that wildlife poses to aviation, there are severe limits on some types of control measures. In the United States, national level laws are the baseline for establishing hunting policies, which carry over to wildlife strike management programs. Even with guidelines established, wildlife species management can be a very sensitive issue. Public opinion can be strongly against wildlife population control, especially when lethal measures are involved. Although sometimes necessary, lethal measures are not the first step in wildlife strike mitigation. The most effective means of reducing the threat of wildlife strikes is to minimize the hazardous populations by making the airfield unattractive. Planned management of the airfield environment in regards to vegetation, water bodies, and physical structures can dramatically influence the attractiveness of an airfield to wildlife.

Wildlife Mitigation Strategies

Most airfields employ grass and trees as part of a natural landscaping plan. Trees provide nesting locations for birds, and offer shelter from the elements. They can also, to a degree, offer protection from predators. Grass of varying heights can aid or inhibit wildlife attraction. As grass provides a food source for some species of insects, this can provide a ready source of food for local birds. Conversely, taller grass can hide the approach of predators, and will be avoided by some species of birds for safety reasons. No single height of grass works for every location. Every airfield requires a dedicated, planned approach to vegetation management in order to minimize attraction, while still providing sustainable airport grounds coverings (Johnson & Clifton, 2011).

Water sources can also be a major source of concern. Fowl such as the Canada Goose are attracted to water, as water bodies frequently offer sources of food, and isolation from predators on the ground. Irrigation ponds, streams, and runoff collection ponds are typical features on many airfields. Careful management of the banks around waterways

Figure 4.3. FAA Reported Bird Strikes

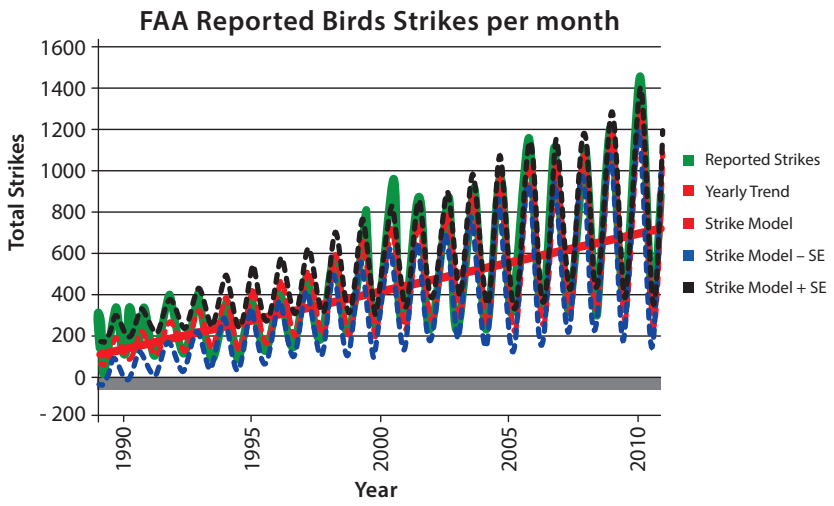
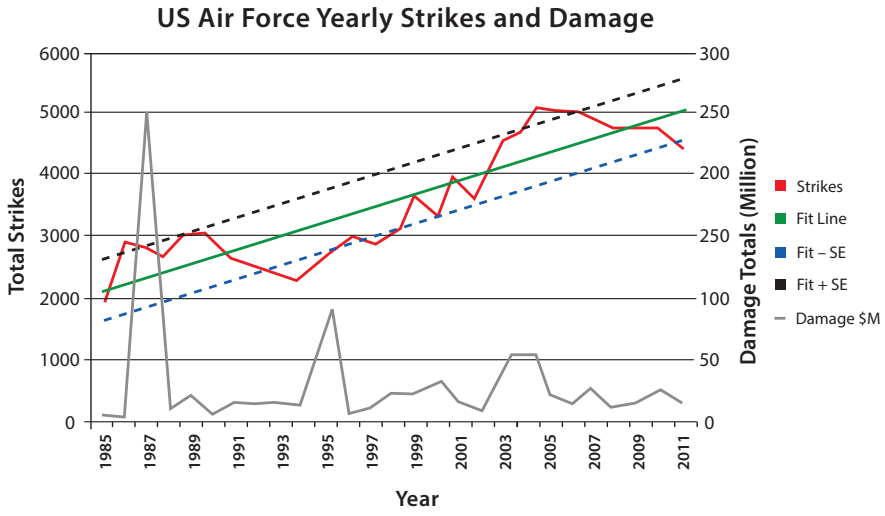


Figure 4.4. US Air Force Yearly Strikes and Damage Totals



is an immediate measure that can reduce the attractiveness of these areas to birds. Steep sides to a water body make escape difficult, and birds will naturally avoid this type of confinement. (Johnson & Clifton, 2011) Open water can also be split by causeways or narrow land bridges. This decreases the distance from land, and reduces the time a bird would be able to react to a predator's approach. For this reason, birds tend to avoid smaller bodies of water in favor of larger ones. (Johnson & Clifton, 2011) Finally, some waterways can be covered. Cover can be provided by nets for some areas, or by use of plastic balls. Many airports cover waterways with thousands of plastic balls which simply float on the surface, and disrupt the ability of birds to use the water. Rain easily passes the barrier and the floating properties of these devices prevent clogging of ducts and culverts. Reduced light penetration also lowers the amount of plant growth in the waterway, further reducing its attraction to birds (Smith, Craven & Curtis, 1999).

Aside from modifications of the airfield and facilities, actions can be taken to directly shape wildlife populations. These involve

Figure 4.5. Canadian Forces Reported Bird Strikes per Year

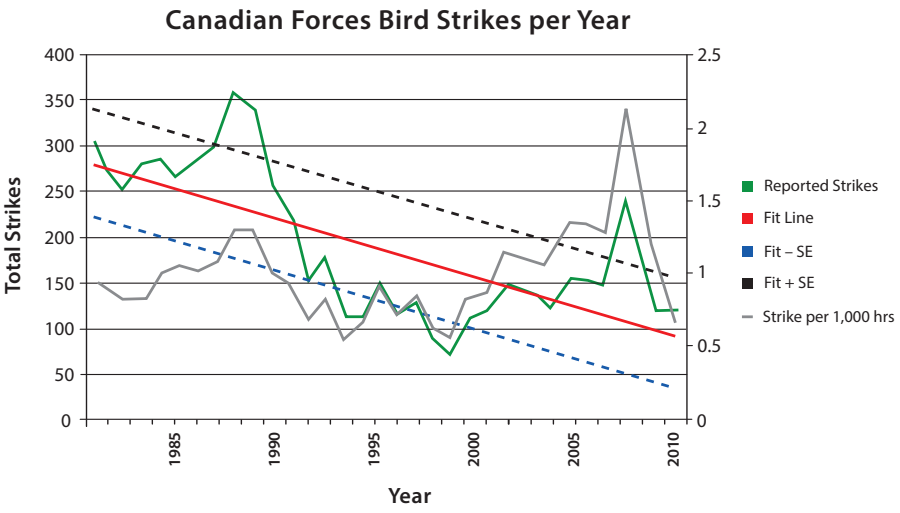
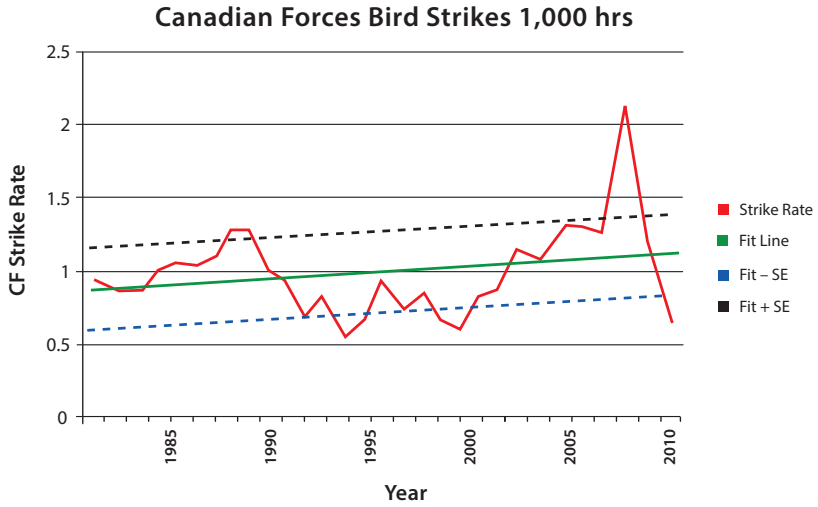


Figure 4.6. Canadian Forces Bird Strike Rates



both lethal and non-lethal actions. Non-lethal activities involve multiple scaring techniques. Pyrotechnics, laser dazzlers, decoys, and noise makers can all be used to scare birds. Decoys are often considered to be the least effective option. Propane powered guns can be effective, but are best used in conjunction with other techniques and varied in their time and location so that birds do not become accustomed to a certain activity profile and learn to ignore it (Bishop, McKay, Parrott & Allan, 2003).

The Israeli Air Force used Border Collies to great effectiveness in scaring birds. Their combined program of land management, waterway control, and Border Collie patrols was initiated in 2000. Over 11 years, the Israeli Air Force went from $10.2 million in yearly wildlife strike damages to approximately $9,100 per year in 2010. The strike rate was reduced from 15.84 strikes per year per base to 0.92 strikes per year per base in 2010 (Carter, 2011).

Lethal Control Measures

Amongst the more aggressive mitigation strategies, there are multiple lethal means for reducing hazard populations. Poisening may be effective, but is both harsh on the environment, and likely to draw high levels of public protest. The other lethal options involve culling (selective hunting) or introduction of predators into the environment. Predators are usually trained and controlled, and involve falcons and dogs.

Culling operations, though able to remove numerous birds, are not always effective in reducing hazard species. Unless culling is taken out on a large scale, the greater population in the area will normally backfill the losses. This can actually worsen the problem, as newly arrived birds fight for shares of local territory. By way of comparison, falconry has proven to be much more effective. A study of bird activity in Quebec compared two landfills, one using falconry to mitigate the gull population, and another selective culling with firearms. The BFI Facility at Lechenaie processes 1.28 million tons of waste, and is 8.0 km from a large gull colony near Montreal. The Waste Management facility at Ste-Sophie processes 340,000 tons of garbage, and is 37 km from the colony. Both facilities used pyrotechnics and gas cannons in conjunction with lethal means of bird reduction Thiériot, Molina, & Giroux, (2011).

The number of gulls killed at the Waste Management site by culling was 180, over 35 days. The number of gulls killed by falcons was only 10, and the falcons flew for 124 days. While the culling operations showed a 77% reduction in gull activity, the falconry program showed a 98% reduction in gull activity. This study was conducted over a 7 year period from 2004 to 2010. Although both programs were effective, the falconry program was more effective, and required a much lower kill rate to be effective. This can be extremely beneficial when hunting is either unwanted by the local population, or prohibited by local environmental laws.

Falconry was also used to great effect at the Dallas Fort Worth Airport. In 2007, an entire terminal section was unusable at the airfield due to blackbird swarms composed of thousands of birds. Nighttime falconry was brought in as a mitigation procedure. The first night, falcons flew for one hour to clear the blackbirds. On the fourth night, the blackbirds were gone in 20 minutes. No birds were present on the fifth night. In 2008, falconry was extended to cover other terminals. In the 2008/2009 season, falcons flew for 70 hours total, and killed 59 Blackbirds. In 2009/2010, 40 hours of active flying were completed, and 27 birds were taken. The following year, only three birds were taken over 14 flying hours. To date, blackbird activity remains negligible at this airfield (Boyles, 2011).

Ongoing Concerns – Rate of Wildlife Strikes

Despite various control measures, high levels of air traffic in conjunction with high levels of bird activity lead to conflict. To determine the extent of the problem, wildlife strike data from the FAA, US Air Force, and Canadian Forces was analyzed to establish trend lines. The trend data is a useful tool in gaining a perspective on the level of risk that wildlife strikes pose to aviation.

Analysis of Wildlife Strikes – Data Gathering Methods

Data for this analysis was gathered from 3 separate databases. FAA reports were extracted from the FAA website into an Excel file. US Air Force reports were taken from the US Air Force Safety Center website, and copied into an Excel file for analysis. Canadian Forces bird strikes were determined by running a query on the FSOMS database, and exporting the data to an Excel file for analysis. (Directorate of Flight Safety, 2011) Note that Fit represents a trend and SE refers to standard error.

Discussion Based on Results

The implication of this data suggests a strong probability that the trend (or Fit) in bird strikes is increasing. Further, the rate of increase per year also appears to be growing. The sinusoidal nature of the reported strike rates highlight the critical nature of persistent monitoring over the course of the entire year. Variations in reports from year to year were not accurately captured by this model to a statistically significant degree. It is important, however, to emphasize that bird activity is the result of a complex interaction of environmental and industry factors. For that reason, wildlife management programs must be frequently re-evaluated for their effectiveness and applicability.

The US Air Force and Canadian Forces records were evaluated using yearly summary data.

The alternate hypothesis is accepted in that US Air Force bird strikes appear to be increasing with a strongly significant probability. Conversely, the damage per year appears to be decreasing. The reasons for the decrease in yearly damage totals were not covered under this report, but may be due to improvements in equipment, as well as variation in the type of birds struck.

The strike reports retrieved from the Canadian Forces database yielded a decrease in reported strikes. While the trend line is statistically significant to greater than 95% confidence, the trend direction is the opposite of the alternate hypothesis. For the second case involving CF wildlife strikes, the total strikes reported were divided by the yearly hours and yielded a different set of information. The rates appear to be slightly increasing with time. This data does present an approximately stable, or slightly increasing situation, which would still merit efforts to reduce the rate of strikes.

Conclusion

Based on the number of bird strikes per year, and the level of damage caused, wildlife management will continue to be a critical component of the aviation safety system. While it is impossible to eliminate the risk posed by wildlife to airport operations, there are procedures that can be followed to mitigate the risk. Data collection is the first step. By determining the species present, then reducing the attractiveness of an airfield to bird species, the likelihood that they will pose a risk to aviation can be greatly reduced. Any mitigation must be balanced, to avoid conflict with law, public opinion, or unnecessary damage to the environment. Through sound, dedicated and persistent management, aircraft and birds can continue to share the skies safely. ◆

From the Investigator

TYPE: CH146 *Griffon* (146437)
LOCATION: Namao Airport, Edmonton, Alberta
DATE: 05 July 2012

During a basic handling and emergency training flight, *Griffon* CH146437, from 408 Tactical Helicopter Squadron (THS), experienced a hard landing at 1903 hours (local). Both pilots were unscathed but the flight engineer suffered minor injuries.

After having completed the planned manoeuvres, the Aircraft Captain (AC) terminated the mission and requested a straight-in approach to the fuel pumps. The advisory controller acknowledged the request and reported the winds as calm. The First Officer (FO), who was also the Flying Pilot (FP), then verbalized his plan to approach to the south of the fuel pumps, turn right and taxi into refuelling spot 1. He next conducted a modified left circuit and rolled out north of the helipad at approximately 150 feet above ground level, at 75 knots, and on a heading of 222 degrees. The approach was slightly fast and steep but under control until the aircraft reached 60 feet. The FO had just begun the right turn when he felt the aircraft rapidly sink. He increased collective in order to arrest the descent but to no avail. The AC reached for the collective but judged that it was already at its maximum position and, therefore, did not attempt to increase it. Unable to arrest the descent, the FO attempted to ensure that the aircraft was level prior to impact.

The helicopter impacted the ground in a slight nose up and right skid low attitude. The skid landing gear broke away from the aircraft, which came to rest on the underside of the fuselage near the edge of the Foxtrot taxiway. The aircraft sustained "C" category damage.

The investigation is focussing on power management, approaches to the 408 THS ramp and fuel pumps, aircrew flying rates, experience, and mentorship. ◆

From the Investigator

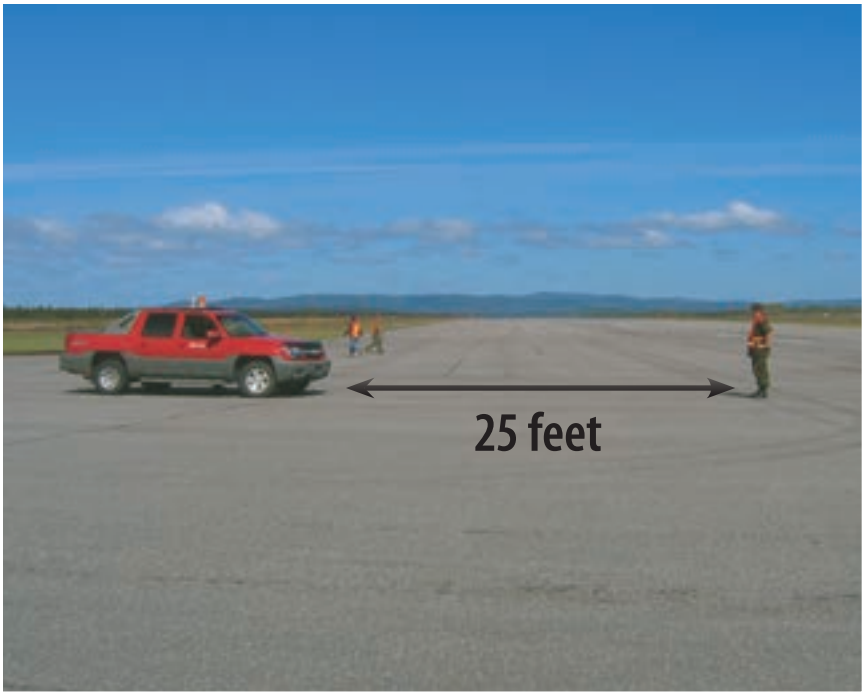
TYPE: Runway Incursion

LOCATION: Main intersection of runways 34 and 26, Goose Bay airfield

DATE: 29 May 2012

A civilian-operated *Beech* 1900 was in the flare to land when a ground vehicle entered runway 34 at the intersection of runway 26 and then stopped. The aircraft passed within an estimated 25 feet of the vehicle before it continued its landing rollout without further incident. There were no injuries or damage. A Class II Flight Safety Investigation, coordinated with the Transportation Safety Board, was convened to investigate the incident.

The investigation is focused on terminology used in Goose Bay airfield radio communications and organizational issues such as training and currency associated with ramp defensive driving training. ◆



Approximate distance between the vehicle and Beech 1900 wing tip.

From the Investigator

TYPE: CC130 *Hercules* J (130617)
LOCATION: 8 Wing Trenton, Ontario
DATE: 01 July 2012

Early in the morning of 01 Jul 12 (0212Z), contracted personnel working on a CC150 Airbus in 10 Hangar heard a loud noise and noticed that the *Hercules* in the adjacent Bay 5 was rocking from side to side. Upon closer inspection, they noted that the left main wing jack had collapsed and damaged the left main landing gear door. The right main wing jack had come off its jacking pad and penetrated approximately 12 to 18 inches into the wing. No fuel cells were ruptured. The right nose jack also came off its jacking fitting and torsional deformation of the airframe was noted on the aircraft fuselage skin near the left nose jacking position.

The aircraft had been on jacks for four days prior to the occurrence. There were no injuries as no one was working on the aircraft at the time.

The preliminary damage category is "C", although the aircraft is still undergoing damage assessment by the OEM. The two main wing jacks were sent to QETE for further analysis and testing.

The investigation is focussing on the jack assembly's maintenance, configuration and failure mechanism. ◆

Epilogue

TYPE: CH149 *Cormorant* (149907)
LOCATION: 55 NM NNE of Comox, British Columbia
DATE: 18 December 2010

Approximately 35 minutes into the outbound transit phase of a Search and Rescue mission, at 9400 MSL in level cruise at maximum continuous power, the number three engine failed. The aircraft commander immediately took control and turned towards Comox. The flight engineer and first officer then followed the prescribed emergency procedures to secure the engine. A run-on landing was conducted at Comox without further incident.

A teardown inspection revealed catastrophic damage to the stage-1 turbine blades and less severe decreasing damage to the other three turbine stages.

The engine and blade Time Since New (TSN) was 3265 hours. Individual turbine blade inspection showed that eight of the 34 blades were fractured at the root with characteristic fatigue features. Additionally, corrosion was observed on most blade surfaces; five had advanced corrosion damage.

Sulfidation, or hot-corrosion, is a chemical process that occurs in high temperature environments where trace amounts of sulfur from either petroleum-based fuels or airborne particulate is transported to the hot section blades through cooling bleed air. Sulfur deposits then build-up on blade roots, shrouds, and, to a lesser extent, the blade airfoil, corroding turbine blade surfaces. The engine Original Equipment Manufacturer (OEM) indicated that similar sulfidation has been observed not only on this type of engine, but also on a commuter aircraft.

Stage-1 turbine blades from seven engines, all with TSNs above 3000 hours, were inspected; all were found with corrosion damage to the blades' protective layers. Once the protective layer is compromised, it is just a matter of time before a crack initiates and leads to blade failure.

Based on the engine OEM's recommendation, stage-1 blades are now being replaced on all engines operating at TSNs above 2700 hours.

Safety recommendations include both a more in-depth analysis to determine if damage rates are influenced by geographical locations and continued work to identify the cause of CH149 engine sulfidation. Furthermore, the OEM and DND are evaluating the suitability of the CH149 Engine Maintenance Program. ◆

Epilogue

TYPE: SZ-23C Glider C-FYLP

LOCATION: Markham, Ontario

DATE: 18 June 2011

During an instructor proficiency training flight, the glider aircrew experienced a hard landing.

The crew launched from runway 09 at the Markham Airport and were towed airborne to an altitude of 3400 feet ASL. The Standards Glider Instructor (SI), who was simulating student performance, conducted the upper air work and initial circuit without difficulty while under the supervision of the Gliding Instructor (GI).

On the turn to final, the SI simulated difficulty with runway line-up to which the GI responded by providing verbal assistance. At approximately 100 feet AGL, the SI initiated a balloon and porpoise. The GI then verbally coached the recovery while the final approach continued.

At approximately 30 feet AGL, the SI initiated an abrupt and rapid pull-up of the glider. Upon seeing the glider's nose rise above the horizon, the GI took control from the SI; however, the glider stalled from a height of approximately 10-20 feet AGL, struck the ground firmly on the forward skid and wheel, and then bounced before stopping straight ahead. Both pilots egressed the aircraft on their own and were seen at the local hospital before being released. The front seat pilot suffered serious injuries while the rear seat pilot was uninjured. There was no damage to the glider.

Photo: MCpl Bradley Denoon

The investigation found that inappropriate technique by the SI placed the glider in a position from which neither he nor the GI could safely recover. Latent cause factors included expectancy and motivation as well as inadequate training.

Recommended preventive measures included several amendments to instructor training requirements within the Air Cadet Gliding Program. ◆