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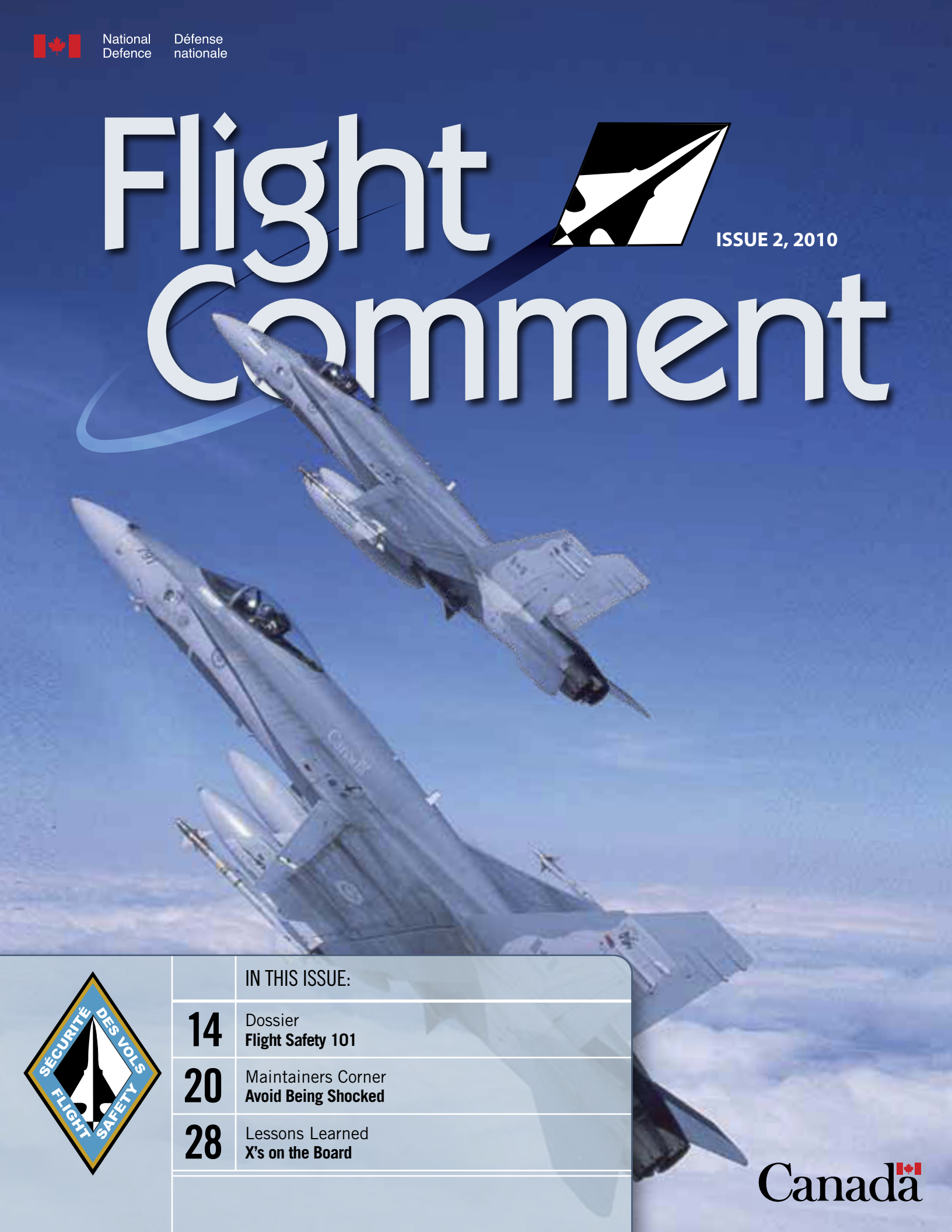
Flight Comment

ISSUE 2, 2010



SÉCURITÉ DES VOLS FLIGHT SAFETY

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Canada

Views on Flight Safety

By Colonel Dan Chicoyne, Director of Flight Safety, Ottawa

When it comes to Flight Safety ... **use your outdoor voice** ... and resist the dark side.

I joined the Air Force in 1984 as an Air Traffic Control Assistant (Private). My initial Trade Qualification Training (TQ 3) was conducted at the Transport Canada Training Institute in Cornwall. Throughout the course it was stressed to all students that "Flight Safety is Everyone's Business", especially those of us who were directly involved in flying operations. Following my course in Cornwall, I was posted to CFB Lahr in West Germany. One bright sunny day in Lahr, I was sitting in the Control Tower chatting with the Captain who was the on-duty Tower Controller. It was a quiet day and we were happy to hear that an American Air Force A-10 *Thunderbolt* was inbound for some practise approaches. After a few touch-and-go's, the Tower Controller asked the pilot if he would like to make a few runs on the strafing panels we had set up on the airfield between the taxiways. The pilot paused for a moment and then said, "we don't usually do this as a single-ship, but ... sure." At this point, the A-10 was just in the overshoot and had broken out of the circuit to set up for his run on the targets. It was at this point that something tweaked in my brain and I said to the controller that I thought the pilot understood this to be a live firing range, not a dry-run practice range. "Not to worry", said the controller, "these guys come here all the time." By this time the A-10 pilot had completed his checks and was re-joining the circuit for his "strafing run." The terminology he used convinced me to repeat to the controller that I believed the pilot understood this to be a live range and that I thought he was going to fire his 30mm canon as soon as he was in position. Again, the controller assured me that these guys came to Lahr all the time and this was routine. As the pilot turned on final, he transmitted "Turning final for the gun-run on the strafing panels." "**Sir!**" I yelled ... at which point the controller grabbed the microphone and declared "Be advised, this is a dry range only," resulting in the A-10 pilot pulling up abruptly and turning away from the airfield. The ensuing conversation with the pilot who, as it turned out, was just recently posted to Germany and had never been to Lahr before, confirmed that he had, in fact, believed he was cleared for live firing and was preparing to actually fire on the strafing panels.

I tell this story to stress a point. At the time of this incident, I was a very new member of the Air Force and the most junior member of Lahr ATC. After expressing my initial concern to the controller, I was somewhat apprehensive to reiterate that I thought the A-10 pilot believed this to be a live range. My apprehension to speak up was a result of the significant difference in rank between a Private and a Captain and the fact that he was obviously much more experienced than I was. But, I felt that the consequences of an A-10 tearing up the infield with a 30mm canon far outweighed the controller's ire I would have had to suffer had I been wrong.

In another incident involving a civilian airline, a very experienced pilot noticed a significant accumulation of snow on the wing of a taxiing aircraft on which he was a passenger. Though he was concerned about the amount of snow on the wing he was sure the crew must have been aware of it and decided not to bring it to their attention as he felt his comments might insult their professionalism. Unfortunately for all involved, the accumulation of snow, unbeknownst to the crew, was excessive and after take-off the plane was unable to climb, even with the application of full power. The aircraft crashed a short distance from the end of the runway resulting in numerous fatalities.

Members of the Canadian Forces (all members, not just those in the Air Force) are in a unique position in that they are frequently in and around aircraft and in aircraft hangars to a much greater extent than the majority of

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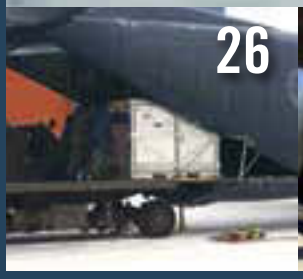

Regular Columns

Dossiers

Lessons Learned

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Good Show

For Excellence in Flight Safety

Master Corporal Anthony Vail

On 8 May 2009, MCpl Anthony Vail, a Search and Rescue technician student at the Canadian Forces School of Search and Rescue was conducting a static-line parachute jump to his first water landing at Comox Lake. As he exited the Shorts *Skyvan* aircraft, his life raft survival kit (LRSK) rose up over the parachute pack and became fouled with the static line and CSAR 7 parachute. Subsequently, the parachute failed to deploy and MCpl Vail remained attached by the static line in the slipstream behind the aircraft. Recognizing the seriousness of the situation, he remained calm and quickly assessed the problem signalling to the Jump Master to cut the static line. As MCpl Vail fell away from the aircraft, he attempted to cut away his fouled main parachute and then deployed his reserve. Experiencing very little deceleration, he noticed that less than half of the reserve canopy had inflated and the main parachute outer deployment bag (D-bag) and suspension lines were wrapped around the reserve parachute suspension lines. He recognized the potentially catastrophic situation and physically reversed the wrap of the lines to encourage the reserve parachute to open. MCpl Vail was very close to the surface of the water when his reserve canopy finally opened arresting his descent. Upon reaching the water, he initially skipped along the surface followed by a very hard landing, suffering minor injuries. A rescue boat and crew was immediately on scene and retrieved MCpl Vail from the water.

MCpl Vail's quick assessment of the situation and positive actions resulted in a successful landing under a degraded reserve parachute. MCpl Vail is commended for his professionalism and expert handling of a potentially life threatening situation. He is very deserving of this Good Show award. ◆

Master Corporal Vail is currently serving with 442 Transport and Rescue Squadron in 19 Wing Comox.

Good Show

For Excellence in Flight Safety

Major Carol Dupuis

On September 1st, 2009 Major Dupuis was the pilot in command of a CH124 *Sea King* helicopter supporting RCMP counter-narcotic operations taking place throughout Vancouver Island and British Columbia's lower mainland.

While hoisting an RCMP Officer to a confined area of interest some 60 feet below, Major Dupuis noticed that the transmission oil pressure had begun to fluctuate and was in danger of decaying below the normal operating range. Realizing that placing the officer on the ground within an illegal grow operation would expose him to risk by the suspected perpetrators, he immediately directed the aft-cabin crew to cease the hoisting evolution and recover the officer. To minimize aircraft time aloft and exposure to risk while hovering amongst rugged mountainous and forested terrain where the options to land were minimal he directed the flying pilot to depart the hover and make way towards a nearby, yet austere point of land that harboured the best potential for a successful emergency landing and safety for personnel onboard. During the brief transit, Major Dupuis directed his crew to complete a cabin check to further assess the severity of the situation. Subsequent scans of the instruments revealed that the decay of transmission pressure was deteriorating to critical levels and the aft-cabin crew's report of an oil leak from the transmission area verified that the cockpit indications were indeed genuine.

In the final moments of the transit, Major Dupuis took control and safely landed the helicopter on a small beach. During the emergency shut-down sequence he recalled that another aviator was recently operating in their vicinity and just prior to securing battery power, he switched to the emergency frequency and relayed their status and position which greatly aided in the resulting recovery process. The technical investigation revealed that during flight, the number two main gear box oil line had ruptured, resulting in a rapid loss of oil from the main gearbox transmission. Major Dupuis was able to set the aircraft in a safe area within 90 seconds of observing the initial indications of an impending main gear box failure.

Throughout this emergency, Major Dupuis' superior judgment, skill, professionalism and intrinsic situational awareness, culminated into a sterling example of how crew resource management can triumph over unpredictable risks. Major Dupuis is to be commended for his sound judgement and effective decision making during a challenging situation which could have led to catastrophic mechanical failure resulting in loss of life and equipment. Major Dupuis is truly deserving of this Good Show. ◆

Major Dupuis is recently retired from the CF, but was serving with 443 Maritime Helicopter Squadron in Victoria, at the time of the incident.

Views on Flight Safety *(continued from page 2)*

civilians would normally be. As a result, they can sometimes find themselves in a position where they see something that just doesn't look right. A nut or bolt on the floor or something that looks out of place or unusual should never be disregarded. If it doesn't look right, there is a good chance that it isn't. Never take for granted that someone must have already seen what you see and that it must be okay. Bring it to the attention of someone who works on the aircraft and don't feel intimidated if you are not aircrew or ground crew yourself; your actions may avert a serious incident or accident.

As stated by the Chief of the Air Staff and the Commander of 1 Canadian Air Division in previous articles, this is a time in Air Force history when the ops tempo is greater than it has been for more than 50 years. We are involved in operations all around the world and, as a relatively small Air Force, the loss of even a small number of our personnel or aircraft can have a significant effect on our ability to succeed in our missions. Flying operations carry a certain degree of inherent risk and no one should ever pass up the opportunity to reduce that risk if he or she is in a position to do so. As the Army and Navy frequently rely on the Air Force for support in the successful completion of their missions, it is imperative that everyone take on Flight Safety as a personal responsibility and voice any concern or observation without delay. Not doing so could potentially result in catastrophe.

The Flight Safety crest, which almost everyone is familiar with, has two sides; the white side represents accident prevention accomplished through education and the promotion of an honest and open Flight Safety culture that encourages early reporting of flight safety concerns in hopes of avoiding significant incidents or accidents. The dark side of the crest represents accident investigation; something we would all like to avoid. Some members of the CF may feel that they are not qualified to make observations about Flight Safety as it is not their area of expertise. My advice is that it is always better to say something than to say nothing. At worse, saying something and being wrong might lead to slight embarrassment; conversely, saying nothing could result in significant injury and/or loss of life ... maybe even your own.

So, if you take away only one thing from this article it should be that, as far as Flight Safety is concerned, speaking up and being wrong far outweighs keeping quiet and allowing a preventable accident to take place. Flight Safety and mission accomplishment go hand in hand during peacetime and wartime ops alike. Flight Safety is everyone's responsibility, just like mission accomplishment is everyone's responsibility; so never think that you are not qualified to speak up or to point out something that doesn't seem right. Avoid the dark side of the Flight Safety crest and join the fight to reduce the need for accident investigations to the lowest level possible. And don't worry about the members of the DFS investigation team ... in the unlikely event that accidents are eliminated altogether, we can always find other interesting jobs! ◆

From the Flight Surgeon

Don't Let Your Lifestyle be the Death of You

This article was originally printed in the 01/2010 issue of Aviation Spotlight Magazine. It is reproduced here with the kind permission of the Australian Directorate of Defence Aviation and Air Force Safety.

Flying is a complex task that requires the full cognitive, judgmental and psychomotor capabilities of aircrew. If these abilities are impaired to any extent, safety can be compromised.

Many conditions and substances can cause impairment. For example, all people occasionally can have mild illnesses such as colds that can potentially impair their performance. Some people have chronic conditions such as high blood pressure or elevated cholesterol that are not disabling but require the use of medication to control symptoms.

Drugs, both prescription and over-the-counter, can relieve symptoms and perhaps even cure the illness. Many people routinely drink alcoholic and/or caffeinated beverages. Each of these uses of drugs, as well as other lifestyle activities, can affect flying, particularly on long-range, monotonous flights; impair the aircrew's abilities and compromise safety.

Fit to fly

Your Flight Surgeon does not see you daily. They depend on you to seek them out when you think you have a health condition. On a day-to-day basis however, you have to determine if you are fit to fly or should seek medical attention. If you think of the following questions, it will help you make a good decision. Am I fit to fly? Yes, I'M SAFE.

I	Illness	Am I ill? Do I feel sick in any way?
M	Medication	I take drugs: will they impair my thinking, judgment or performance?
S	Stress	Am I mentally fit? Can I devote my full attention to flying?
A	Alcohol	When did I take the last drink? Am I suffering hangover effects?
F	Fatigue	Am I physically fatigued? Am I too tired to give 100 per cent?
E	Eating	Am I hungry? Did I eat too much? Do I have indigestion?

This simple mnemonic, I'M SAFE, is a checklist to help you remember the main lifestyle risk factors that might impair your performance during flight. There are few statistics on the effect of lifestyle on flight safety, but it is universally acknowledged that an impaired pilot is a safety risk. As mentioned earlier, one has to be fit for flying because it is a demanding task.

The Effects of Drugs on Flight Safety

A drug can be defined as any chemical substance that has an effect on living tissue but is not used for food. Drugs are used on or administered to humans as:

- An aid in the diagnosis, treatment or prevention of disease or other abnormal conditions
- For the relief of suffering
- To control or improve any physiological or pathological condition

Drugs can generally be classified into two broad categories – licit and illicit. Licit drugs are often referred to as medications and illicit drugs are sometimes called recreational drugs.

This distinction can be blurred when drugs that are legal if prescribed by a doctor are used without medical need or authorisation.

Alcohol and caffeine are the most widely used drugs. It is legal to consume alcohol in most locales, but the effects of the misuse of alcohol on transportation safety can be enormous. Many everyday beverages and food products such as coffee, cola and chocolate, contain significant amounts of caffeine.

Medicines

Aircrew should know that all medications, even those seeming to 'light', contain active components with desirable therapeutic benefits but also unwanted and often unpredictable side effects. Such side effects can vary widely across individuals depending on personal sensitivities and the pharmacokinetics of the drug. A drug that can relieve symptoms or cure a condition in one pilot may cause a violent and life-threatening allergic reaction in another.

Flight can alter the effects of medications. For example, the metabolism of a drug may be altered by flight-induced conditions including mild hypoxia, dehydration and jetlag. The undesirable effects of a drug are also sometimes delayed until well after the drug is taken. Care must especially be exercised when a drug is new on the market or taken in combination with other medications because little may be known about the resulting effect on flight safety.

Illicit Drugs

Many drugs, although illegal to consume or possess, are nevertheless widely used. Other drugs that have legitimate medical uses can be abused if not taken as prescribed by a doctor or taken for non-medical purposes. People seek a high or escape from reality by abusing substances such as:

- Cannabis (marijuana)
- Psilocybin mushrooms
- Opiates including morphine and heroin
- Cocaine
- Methamphetamine (meth)

Almost all illicit drug use leads to some level of impairment that is detrimental to safe flight. Illicit drug use is not only dangerous but also can ruin a flying career. As a member of the CF and aircrew, you should never use illicit drugs.

Alcohol

Contrary to popular belief, alcohol acts as a depressant not a stimulant. What is often mistaken for mood elevation from alcohol (for example; loud speech, aggressive behaviour) is actually a result of its disinhibiting effects. As one drinks, alcohol first affects judgment and removes inhibitions and then degrades psychomotor performance.

Blood alcohol concentration (BAC) is the measure typically used to indicate a person's degree of impairment. BAC is the weight of alcohol in grams per 100 ml of blood. The time for a person to reach a peak BAC after consuming alcohol varies depending on the rate of absorption of the alcohol into the bloodstream. This absorption rate can be influenced by body build and size, age, gender (females tend to be affected more than males), whether food has been taken with the alcohol and the type of drink.

Research indicates that the body clears alcohol from the bloodstream at a rate of about 0.01g/100ml each hour. However,

Photo: Cpl Shilo Adamson

the elimination rate of alcohol can vary greatly by individual depending on factors such as gender, body mass and drinking frequency.

Most countries and flying agencies have a bottle-to-throttle rule specifying how much time must elapse from the last drink until a pilot flies. An important point for a pilot to note is that alcohol can be impairing even after your BAC returns to zero. Anyone who has ever experienced a hangover can tell you that. Thus, while a nice cocktail and glass of wine at dinner before a noon departure the next day is probably fine, more extensive drinking can significantly increase safety risk even if your BAC is zero when you get to the cockpit.

The vestibular effects of alcohol can persist for as long as 12 to 14 hours after drinking and alcohol-related nystagmus (flickering of the eyes) can be detected up to 48 hours later when exposed to >+3Gz. These effects last significantly longer than a hangover, which is the widely held view of an alcohol after effect – drunk, hangover, recovery.

All of the available scientific evidence shows conclusively that any alcohol use causes impairment with the nature of the effects being dose dependant. At BACs below 0.03, euphoria and some impairment of judgment are evident. As BAC increases above 0.03, functions such as divided attention, choice reaction time, visual perception, tracking and steering, eye movement control, standing steadiness, emergency responses, co-ordination and information processing judgment have been shown to be significantly impaired. Above a BAC of about 0.05, lack of co-ordination and problems with gross motor control occur. Although sleep is promoted by alcohol because of its sedative effect, it can also actually impair sleep quality and even cause insomnia.

Alcohol, when consumed in excess amounts, has a wide range of short and long-term ill effects on an individual's health. Alcohol causes inflammation of the stomach, pancreas, and intestines, which impairs the digestion of food and absorption into blood. Moreover, acetaldehyde (the oxidation product of alcohol) can interfere with the activation of vitamins. Alcohol has a high caloric value; hence it can lead to weight gain when consumed in large quantities. It also causes low blood-sugar levels and dehydration lading to an increase in appetite.

Caffeine

Caffeine is a stimulant that is contained in many beverages, foods and over-the-counter drugs. The use of caffeine can prevent falling asleep, but it does not necessarily improve performance.

The performance of a person who is not significantly fatigued but may be bored or otherwise drowsy from lack of stimulation can possibly benefit from the stimulant effects of caffeine. On the other hand, a grossly fatigued individual may be kept awake by a large dose of caffeine but will still exhibit impaired performance.

It is important to remember that if aircrew are feeling fatigued they should be looking at an overall fatigue-management strategy rather than looking to coffee.

Aircrew can use caffeine from coffee or tea on long-range flights if they time its intake appropriately. It must be remembered however, that caffeine is a drug with possible negative side effects such as insomnia. Also, there have been reported cases of people taking toxic doses of caffeine in an effort to stay awake.

Photo: Cpl Jean-Francois Lauzé

Some Myths about Drug Use:

Over-the-counter drugs are not dangerous. Wrong. Any drug, even a vitamin or herb, can be dangerous and can interfere with safe flying.

If I take a medication well before the time of flight, it will not impair my ability. Wrong. While some drugs only produce effects for a few hours, many have long-lasting effects. Do not assume the deleterious effects are gone just because your last dose was hours before the flight. Ask your Flight Surgeon how long you should wait before flying after taking a prescription or over-the-counter drug.

I can take a medication that has been prescribed to another member of my family or a friend suffering from the same symptoms. Wrong. The same symptoms can be related to different conditions, and each person may react to a given drug differently.

The first few doses of the medicine I was prescribed did not cure my problem. I think I should double the dose or add another medicine. Wrong. There is an optimal dose for all medicines. Increasing the dose without your Flight Surgeons permission can be dangerous to your health and might impair

your piloting abilities. Combinations of drugs can produce unpredictable reactions. Always check with your doctor before mixing medicines.

A little use of illicit drugs is not dangerous as long as I do it well before flight. Wrong. Illicit drugs are dangerous to your health and your career. First, you never really know what is contained in drugs purchased illegally. You could be getting anything – even a dangerous poison. Second, the traces of some drugs, such as marijuana, can remain in your system for days or even weeks and will be detected by drug tests.

Nutrition and Eating Habits

Fatigue results in part, from a decrease in the stock of carbohydrates (glucose) in the body. There are few studies about the specific relationship between nutrition status and the physical performance level of a pilot during a long-haul flight. Nevertheless, it is reasonable to conclude that eating habits and their impact on nutrition can be related to aircrew performance and safety.

The energy expenditure of a pilot during a long-haul flight can be estimated at 200 kilocalories per hour (kcal/h). Since the stock of carbohydrates in a typical human provides a storehouse of about 2500 kcal, the desired glucose blood concentration (glycaemia) can be maintained for approximately eight to 10 hours between two meals for a man strictly at rest. However, even light physical or mental effort increases the body's need for glucose. Thus, even for a nominal workload of 150 kcal/h, the stored glycaemia begins to be used up in four to five hours without eating, resulting in decreased cognitive performance and fatigue.

Based on this simple example, it is reasonable to conclude that food intake is necessary after three or four hours of flight.

In addition to maintaining a sufficient stock of glucose, mental performance must also be maintained by an appropriate nutritional approach and timing. For a normally alert and rested person, the intake of fast (sweets) or slow (potatoes, cereal) release carbohydrates leads to a decreased level of alertness 30 to 60 minutes after intake. Thus, taking carbohydrates, while favourable to physical performance, can lead to a decreased level of cognitive performance. By contrast, a meal rich in proteins (meat, fish, eggs, milk derivatives) seems to improve the cognitive performance of those who are fatigued.

These considerations of nutritional physiology lead to the following principles to follow when flying long-haul flights:

- The crew should begin a long-haul flight with a high stockpile of energy from a meal consumed sufficiently long before the flight that it will not induce drowsiness. The optimal intake is about 800 kcal one hour before the flight that includes 50 percent slow release carbohydrates, 30 percent fats and 20 percent proteins.
- If the flight will last more than three hours, food intake should be scheduled during the flight. The energy bars often taken by athletes are not an appropriate substitute for more balanced food intake because they are too rich in carbohydrates.
- It is also important to drink water during the flight to avoid any decrease in performance and vigilance due to dehydration.
- After the flight, it is important to eat a meal to recover a good level of performance and alertness.

In the Australia Defence Force, aircrew are required to eat within six hours before commencing flying duty. Some typical menus that will help you follow these principles are shown below.

- Dinner the day before the flight: "spaghetti party" with 100-150 g of pasta (or potatoes) with white meat (chicken, veal or fish). A cream-based dessert.
- Just before the flight (at any time of the day or night): easily digestible foods rich in calories such as eggs, cheese, white meat, buttered bread, cereals and milk. Drink 250-300 ml of water. Avoid fresh fruits, pastries, cream-based desserts.
- Flights over two hours: eat a light snack.
- Flights up to four hours: two cereal-based energy bars can be eaten. Avoid the high-energy sport bars. Rehydration with water is not necessary if sufficient water is consumed before the flight.
- Flights over four hours: Small snacks should be eaten every two hours after the initial two hours of flight. Consume at least 250 ml of water every four hours. Eat a small snack (600-800 kcal) followed later by a healthy meal.

Physical Exercise

Regular physical exercise improves tolerance to environmental stressors in aeronautics and decreases the duration of post-flight recovery. Three one-hour sessions per week or 15 minute daily workouts are recommended. To improve general physical fitness, all types of endurance activities (for example: cycling, swimming, jogging, tennis) are recommended. To improve piloting performance (and to avoid any back or neck pain), physical training should focus on the postural muscles (cervical, back, abdominal and thigh muscles).

Just prior to a flight (about 10 minutes) you should wake up your muscles in order to avoid any muscular tension while on board. Muscular stretching during the flight is also beneficial. Following a flight, stretching exercises can be very beneficial. However, it is best to wait two hours after landing before engaging in endurance types of exercise for relaxation or fitness.

If your flight is scheduled in the morning, engage in endurance exercise at the end of the day. The reverse is not true, however, it you are scheduled for an afternoon flight. When flying afternoons, you should refrain from strenuous exercise that morning.

Summary

Safe piloting requires a fully capable individual. No level of impairment is acceptable. Almost all drugs, whether over-the-counter or prescribed, can impair one or more aspects of flying skills. Always crosscheck any prescribed medicines with your Flight Surgeon.

Alcohol is a drug that can be dangerous to flight even after it is out of your system.

Caffeine can be useful it its intake is properly managed.

Illicit drug use is not compatible with safe flight, your health or your career goals.

Good nutrition can improve your alertness and performance. Eat right and at the correct times.

Exercise, if properly timed, promotes better piloting performance and good health.

Do not fall prey to popular myths about drug use.

Before flying, assess your fitness by remembering to go through the I'M SAFE checklist (Illness, Medication, Stress, Alcohol, Fatigue, Eating). ◆

References

1. Danguir J. & Nicolaidis S. *Dependence of sleep on nutriment's availability. – Physiological Behaviour*, vol 22, 1979, pp. 735-740.
2. Ireland R.R. *Pharmacological considerations for serotonin reuptake inhibitor use by aviators. – Aviation, Space, and Environmental Medicine*, vol 73, 2002, pp. 421-429.
3. Newman D.G. *Alcohol and Human Performance from an Aviation Perspective: A Review*. http://www.atsb.gov.au/publications/2004/Alcohol_and_human_performance.aspx.
4. Rto Technical Report TR 014. – *Medication for military aircrew: current use, issues and strategies for expanded options*.
5. Schweitzer P.K. *Drugs that disturb sleep and wakefulness. – In: Principles and practice of sleep medicine*. Third edition, Kryger M.H., Roth T., Dement W., Saunders W.B. Publisher 2000.
6. Smith A.P. & Kendrick A.M. *Meal and performance. In: Handbook of Human Performance*. Saiths and Jones (Eds), Academic Press London Publisher, 1992, pp. 1-23.
7. Information in this article was sourced from Skybrary.

The Editor's Corner

With my inaugural issue of Flight Comment as your editor, I would be remiss if I did not first recognize the significant contribution of Captain Kathy Ashton, who has expertly filled this position these past couple of years. Before departing, she organized most of the content for this magazine, save for this editorial. Her assistance and cooperation in preparing me for this post have been invaluable, and I wish her all the best in her new position.

As a word of introduction, I come into the job as editor with my re-enrolment after previous careers of almost 20 years in the Canadian Forces flying transport aircraft and over 15 years within civil aviation. After operations on a dozen aircraft types in varying roles, one resounding theme throughout is that investment in an effective flight safety program saves lives, saves materiel, and contributes significantly to operational effectiveness.

This issue begins with some good words from the newly posted-in Director of Flight Safety, Colonel Chicoyne. There is a humorous take on a serious subject entitled 'Flight Safety 101' that everyone associated with flight safety should read. From the maintainer's side is the article 'Avoid Being Shocked', which is not only interesting but also applicable in work and home environments.

Finally, I would like to emphasize to all readers that an important aspect of any flight safety program is communication. This publication is but one small cog in the information wheel. However, communication works both ways, and I am looking forward to your articles, suggestions, comments, questions, and complaints (even compliments are welcomed here!). Don't worry about format, grammar, or spelling; that's my job. Those who submit something that is printed will receive a personal copy of the magazine, some swag, and the satisfaction that they are personally contributing to make the flight safety program a better one.

I hope you enjoy the issue. ◆

Think Safety, Fly Safe!

Captain John W. Dixon
Editor, *Flight Comment*

Who's Posted-in This Year?

By Major Ab Jagat, DFS 3-4

This article was originally published in Flight Comment No. 3 1995.

As we battle our way through another active posting season (APS), age-old fears arise wondering how the squadron is going to survive with the loss of so many key players. Obviously, most of the departing members will carry a wealth of corporate knowledge out with them. Incoming folks will generally lack that knowledge.

Air Command is working with fewer people and reduced experience levels at squadrons. If you complain about one unit's overall experience, you will find other units that are even worse off. The solution to this problem lays somewhere in the hallowed halls of higher headquarters. The more immediate concern is how to deal with the incoming personnel this year.

First-tour, junior personnel do not pose much difficulty. Proven training programs have been established and as long as appropriate training resources are also available, junior crewmembers will progress well.

Experienced arrivals, especially those with little or no time on the gaining unit's aircraft, can create a problem. This is when "halo effect" can rear its ugly head.

Halo effect is described as the tendency to attribute unwarranted skill or expertise based on unrelated or faded experience.

"One of the deadliest combinations that can appear during APS is a supervisor without any experience..."

As a result of halo effect, one finds tried and true training programs being improperly modified to accommodate the experienced arrivals. Junior training officers just learning how to teach the basic syllabus do not normally have the background to make significant syllabus changes or teach unusual students. "Excessive professional courtesy" between the junior instructor and experienced student can lead to an unsafe cockpit environment. While there is absolutely nothing wrong with preserving valuable training resources, the unit has to ensure the syllabus modification decisions are being made by experienced training/standards staff.

One of the deadliest combinations that can appear during APS is a supervisor without any experience on the squadron's role or its equipment. A few years ago, a squadron of 42 aircrew had its only 3 senior officers with no experience on the airplane. Just how much credibility do you think the senior officers as first officers had making operational policy for aircraft commanders? Actually with the right attitudes and good advice it did not turn out too badly.

When simultaneously learning new supervisory duties and a new airplane, one of the two will suffer. In trying to quickly develop experience and upgrade to aircraft crew commander status, senior officers may end up commandeering trips that would normally have been used to train the junior aircrew. The unit must ensure appropriate priorities are established and maintained.

A possible solution is to use subordinates as acting section heads while the incoming supervisor learns his new equipment. Experienced junior officers can make very capable supervisors. The knowledge gained will also be very valuable to the future senior officers.

The stressors of the active posting season normally wear off within the first six months. During this initial period, proper leadership is imperative to ensure that training and other duties are balanced safely and effectively. ◆

Flight Safety 101

By Lieutenant-Colonel Larry McCurdy, Directorate of Flight Safety, Ottawa

We are a fortunate bunch, those of us who aviate-navigate-communicate under the auspices of the National Defence Act (NDA). Unlike our commercial counterparts, who are struggling to implement a Safety Management System (SMS) in an environment where a mistake might cost you your livelihood, we have had 60-odd years to build on a safety culture that looks for better ways to prevent accidents. Keelhauling and the lash have just not proven to be effective protection against human error.

Assuming we are all human (the preponderance of evidence still suggests that this is probably true for most of us), and believing that human error is inevitable, then recognizing our fallibility and sharing our collective helmet fires is our best defence. In short, mistakes are a certainty, but repeating them is preventable. To this end, we want to encourage an open reporting culture, and to do that we must continuously demonstrate that occurrence reporting is not a punishable offence. Therefore, the aim of this Mercerian Rant[1] is to highlight the benefits of the present investigative process and discuss the proactive measures that the Chief of the Air Staff (CAS) and the Director of Flight Safety (DFS) have taken to arrive at the cutting edge of modern safety culture. It might also serve to enhance your lexicon of military acronyms – but that's just a bonus.

Investigations are Independent of the Chain of Command. Some would argue against the possibility that DFS is independent because ACAS writes his annual performance evaluation report (PER), and even if that were not so, we all know that posting season can arrive any time for an uncooperative senior officer, right? Right! However, DFS has a split personality. On one hand, he is the flight safety advisor to CAS (hence the PER); on the other hand, he is the Airworthiness Investigative Authority (AIA) for the Minister of National Defence (MND). This means that in the conduct of ANY flight safety investigation, not even the CDS has the authority to influence the final report. CAS and the CDS are free to disagree with the report findings; however, it is the responsibility and legal obligation of the AIA to produce an unbiased and thorough investigation and to report any attempted interference to the MND. This parallel chain of command ensures that DFS can operate freely in his role as the AIA.

Legal Obligation. Now we get down to brass tacks. DFS no longer conducts investigations under the NDA – you might remember the old system of Flight Safety Boards of Inquiry (BOI)? Back in the day, some lucky officer would be appointed by the chain of command (CoC) as President of the BOI to investigate on behalf of the CoC. These days the authority to investigate falls out of the Aeronautics Act (AA), where the Minister (our Minister) is charged with the legal obligation to investigate all military-related aircraft occurrences (which, as an aside, is distinctly different than "Accidents", as you will see later). This obligation has been delegated directly to the Officer filling the position of DFS – he is now the AIA. The AIA is responsible for training and authorizing all Flight Safety Investigators (now called Airworthiness Investigators) to conduct investigations on his behalf.

Your take-away is that when a Flight Safety Investigator shows up on your Wing, he or she is working for the AIA and the Minister of National Defence (MND). Further, when your UFSO is investigating the latest "D" Category occurrence at your Squadron, he or she is likewise working under the authority of the AIA. All of that means that every investigator from the unit on up to DFS has to follow the requirements of the Aeronautics Act, and its baby brother, the Canadian Transportation Accident Investigation Safety Board (CTAISB) Act[2]. So what, you ask? Wait for it!

CTAISB has a few gems, about which the entire Flight Safety Team (that means you) should be intimately aware. First, it introduces the concept of *privilege* to Cockpit Voice Recorders (CVR) and witness statements. They're not necessarily classified, but they have legal protections against publication and a prohibition against use in legal, administrative or disciplinary proceedings. An investigator cannot walk into the CO's office and say, *"Hey sir, you should hear what Billy said about you while he was busy breaking your aircraft!"* Similarly, witness statements or witness lists are never published or released for use in other proceedings. This is why Flight Safety Investigation Reports (FSIR) use statements like: *"Evidence supports the theory that ... "* or *"The investigation confirmed that ... "* The upshot is that there is no impediment to being completely honest and forthright even if the honest mistake you may have made resulted in a loss of life and resources. In fact, honesty is the best policy because it will expedite the implementation of effective preventive measures.

Still the CF Goes One Further: Flight Safety is not strictly an Air Force issue. The letter of delegation tasking DFS as the AIA comes from the MND through the CDS (Test on acronyms to follow). The series of publications that articulates, amongst other things, how we conduct Flight Safety Investigations, (*"Flight Safety for the Canadian Forces*[3]*"*) is endorsed by the CDS and is binding upon all Commanders[4]. So, if you're a *Sea King* pilot as I am, the Navy is an equal partner in the Flight Safety team and must abide by the concept of privilege; hence, walking the plank is discouraged as a preventive measure.

As stated earlier, CTAISB provides privilege to CVR and witness statements (and a few other things that only matter if you're the investigator), but CF policy, as articulated in the A-GA-135 series, provides the same privilege to all post-occurrence cockpit recording devices, including but not limited to Flight data Recorders (FDR), Video and Photographic Cockpit Recorders, and Heads-Up Display (HUD) recordings. This is significantly more protection than CTAISB alone presently provides. Why? It's because we want and need people to self-report!

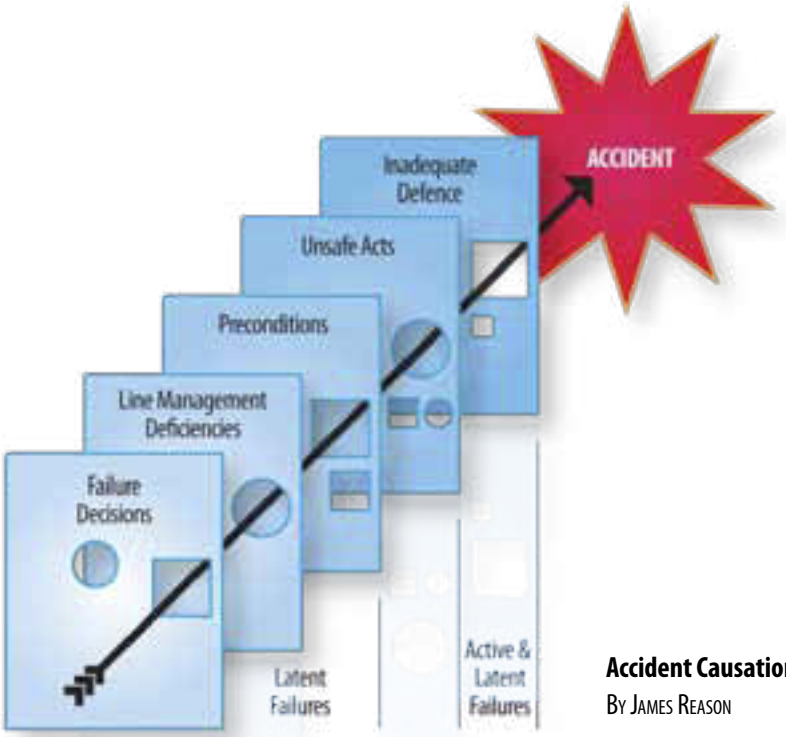
Ah! But What About Just Culture? Great question! Filing a flight safety report is not a "get out of jail free card". Just Culture is not about blame; it is about intent. If someone were to take an aircraft without authority, knowingly and purposefully fly it in a manner contrary to established procedure and subsequently have an accident, simply filing a flight safety report after the fact does mean he or she cannot be held accountable. In fact, nothing precludes the chain of command from launching its own investigation under the NDA and even taking the individual to the courts martial if that was deemed appropriate. However, DFS does not participate in collateral investigations. It must be noted that DFS Investigators are granted first right of access to factual evidence, so when there is a collateral investigation through the Chain of Command, DFS provides that body with copies of factual evidence (log books, manifests, training files ... etc) and a statement of cause if available. None of the Flight Safety privileged information is shared, and analytical work is likewise withheld.

Photo: Cpl Raulley Parks

In reality, aircrew generally don't set out to break aircraft and injure people (unless they belong to the enemy), but the holes in the Swiss cheese[5] sometimes align. What seemed like a perfectly good plan goes rapidly counter-clockwise, either because the system or the machine lets them down, or for some reason someone has a sudden and critical failure of the headphone separator. In any event, it is the investigator's job to find out why events unfurled the way they did and to design reasonable, affordable, practical preventive measures (Swiss cheese slices with fewer and smaller holes) to hopefully prevent a similar occurrence in the future.

So What Should I Do? First and foremost, you have to understand the concept of a just culture. It is the genesis and *raison d'être* for flight safety privilege, and violating that concept can very rapidly destroy any willingness towards open occurrence reporting – and reduced reporting inversely affects the accident rate (That's investigator-speak for a really bad thing).

Secondly, allow the FSO to do his or her job. There is a *de facto*[6] chain of command that runs from the UFSO to the Wing and Division FSO and thence to DFS for the purposes of reporting and subsequent investigation. This is why your FSO will soon be receiving a certificate from the AIA confirming his or her qualification level as an Airworthiness Investigator[7]. Think of it as having two Flight Safety Officers for the price of one: The first runs the awareness program for the Commanding Officer (advisor to the CoC), and his *alter-ego* works independently for the AIA and investigates occurrences after the fact, in the same manner that DFS works independently for the Minister. The alter-ego that works for the AIA does so in accordance with the standards established by the AIA and should not be otherwise constrained in the conduct of those duties. This does not mean that, as the CO of a unit, you cannot review a draft SR; in fact, at DFS, draft FSIRs are routinely distributed to Persons of Direct Interest (PDI)[8] in order to ensure accuracy and completeness; so there is no reason that the CO should not have the same opportunity with a draft SR. It should be noted, however, that input from PDIs is considered by the drafter, but inclusion in the final report is not mandatory. The chain of command cannot direct changes to a flight safety report.



Accident Causation model
By James Reason

Finally, set a good example by talking openly about lessons you have learned from mistakes you have made – just as I am about to do:

Group Sink: Years ago, when I was a subby[9] on one of our larger floating airports, my crew commander, who was a Major and therefore always right, planned something prodigiously imprudent – so ill-advised in fact, that even a bear of very little brain such as I, suggested that it might be a bad ... bad idea. Nevertheless, as an ever-lasting reminder of my own capacity for folly, I acquiesced to my boss' desire to proceed, and I subsequently came as close as possible to becoming fish food without actually going swimming! The details are unimportant now, but when the Detachment FSO (we'll call him Ben) tried to file a Flight Safety Occurrence Report, the ship's captain (we'll call him Sir) would not release the message. Back then, the only way information of any kind left the ship was with the Captain's approval, as neither e-mail nor FSOMS[10] had yet been invented. In any case, by today's standards, what happened would have been an E Category occurrence[11] with a Safety of Flight Compromise Level (SFCL) of Extreme.[12]

By today's standards, what should have happened is that DFS should have been informed via the WARN-DFS Hotline or a relay through an Ops Centre – or carrier pigeon if necessary. Now this might seem a bit weird to call in DFS when there was no accident, but remember DFS is mandated to investigate all occurrences, and it can be just as effective and certainly more economical to extract your life-saving preventive measures from an "E Cat" occurrence than from an "A Cat" accident. An accident, by definition, is an occurrence which, as a minimum, involves serious injuries and/or serious aircraft damage. DFS investigation of aircraft accidents is mandatory. A SFCL of high or extreme may not result in injuries or damage, but DFS involvement is at the discretion of the AIA, based on

the circumstances and potential preventive measures. In any case, occurrences with a high or extreme SFCL should be reported to DFS so that he can decide if a Class I or II[13] investigation is appropriate. Some considerations would be:

- How close was this to being a serious accident?
- Is there a likelihood of developing a reasonable and effective preventive measure?
- Are there operational, organizational, supervisory, or training issues above the unit level that require national-level attention?
- At which level or agency would the preventive measures be focused?

My example might be categorized informally as a sudden loss of judgement (SLOJ[14]) on the part of the entire Helicopter Air Detachment (HELAIRDET), but the assessment of risk was seriously flawed, and the reluctance to report was indicative of a weak safety culture. Others in the old HS[15] community would certainly have benefitted from an open and frank discussion of that unfortunate sequence of events, as I hope some readers will now, nearly thirty years after the fact.

Summary: Mercerian Rants are generally short and sweet, involving pointed opinion and odd camera angles. It is hoped that this article has likewise offered a new slant on how flight safety works and why we operate the way we do. Airworthiness investigation requires the open and honest cooperation of everyone involved. It requires the chain of command to accept the independence of the investigator and to refrain from using flight safety investigations to justify disciplinary action. Most of all, a strong flight safety culture requires a willingness to admit and discuss our mistakes. The old adage says that "confession is good for the soul", but it can also save lives. To err is human; to facilitate an effective preventive measure is airworthy. ◆

Photo: MCpl Kevin Paul

References

1. Mercurian Rant: As or like the possibly trademarked performances of CBC performer Rick Mercer.
2. http://laws.justice.gc.ca/eng/C-23.4/page-4.html#anchorbo-ga:s_28.
3. http://www.airforce.forces.gc.ca/dfs/publications/manual-manuel/AGA135-19Mar09-eng.pdf.
4. "Flight Safety For The Canadian Forces" chapter 7 para 19. *"Comds of commands, formations, wings, bases, and units ... responsible for conducting or supporting air operations shall ensure that all FS occurrences, the applicable cause factors and PMs are reported in accordance with the provisions of this manual." http://www.airforce.forces.gc.ca/dfs/publications/manual-manuel/AGA135-19Mar09-eng.pdf.*
5. James Reason's Model describes each layer of defence against accidents as a piece of Swiss Cheese. Even if you have ten layers of defences, sometimes the holes in the Swiss Cheese align, and accident's happen. http://en.wikipedia.org/wiki/Human_error_model.
6. Translates to: "in practice but not necessarily ordained by law" http://en.wikipedia.org/wiki/De_facto.
7. Airworthiness Investigative Manual (AIM) Chapter 5 discusses the qualification levels of Airworthiness investigators. http://www.airforce.forces.gc.ca/dfs/publications/manual-manuel/AGA135003-eng.pdf.
8. "A PDI is a person ... whose behaviour or the performance of whose products or organization may be commented on in the report ... Typically, PDI status is given to crew members, the CO, Comd 1 Cdn Air Div and contractors directly involved in the operation maintenance or manufacturing of the aircraft." A-GA-135-001/AA-001 *"Flight Safety for the Canadian Forces"* (Ch 2, para 9).
9. Naval-Aviator speak for Sub-Lieutenant, which translates into Lieutenant (Air Force).
10. Flight Safety Occurrence Management System – a National database for occurrence reporting, which is resident on the Defence Wide Area Network (DWAN) and accessible by all active Flight Safety Officers.
11. This is an event that has the potential to injure people and/or damage equipment, but results in neither.
12. SFCL rankings go from Low to Extreme. Extreme means the occurrence could very easily have been a fatal accident.
13. The Class of investigation drives the type of report required. DFS Investigators deploy for all Class I and Class II investigations. Class III and IV investigations are conducted at the Wing and Unit level.
14. Thanks to Jim Armour and Johnny Latimer for coining this unofficial Human Factors cause factor.
15. HS is the former abbreviation for "Helicopter-Shipborne". It has since been replaced by "Maritime Helicopter (MH) – oddly enough the airframe remains the same, but the ships have been upgraded twice.

MK-1 Eyeball

The Best Piece of Equipment to Avoid a Midair Collision

By Lieutenant Colonel Andy Woodrow, United States Air Education and Training Command aerospace and operational physiology consultant

This article was originally printed in the Jan/Feb 2010 issue of Torch magazine. It is reproduced here with the kind permission of the United States Air Education and Training Command.

We flew.
We saw.
We avoided.

Only when flying, that's not always the case. As far back as you can remember, the "Mk-1 eyeball" has not let you down. The concept of scanning is probably first identified as "important to remember" during infancy when you initially run your "nugget" into non-moving objects strewn around your play space (like chairs, tables, walls, etc.). You learn to keep your eyes moving as you "fly" through the terrestrial environment, and confidence grows in those orbs that bracket your nose.

Yet, no matter how fundamental the concept of keeping your eyes open and scanning may seem, in the flying environment, there are dozens of events each year that record how close two aircraft come to a failure to maintain appropriate spacing ... or even crash midair.

On Nov. 28, 2007, for example, two T-6A *Texan II* training aircraft collided over Mississippi. The instructor and student pilots in the first aircraft simply didn't see the second plane, also manned by an instructor and student, even though it was flying straight and level in the traffic pattern. All four pilots ejected, suffering only minor injuries. But both aircraft were lost... $10 million down the drain.

On Feb. 20, 2008, two F-15 *Eagles* collided off the coast of Florida when both pilots failed to clear their flight paths. One pilot was killed; the other ejected. The two destroyed aircraft cost $83.3 million combined.

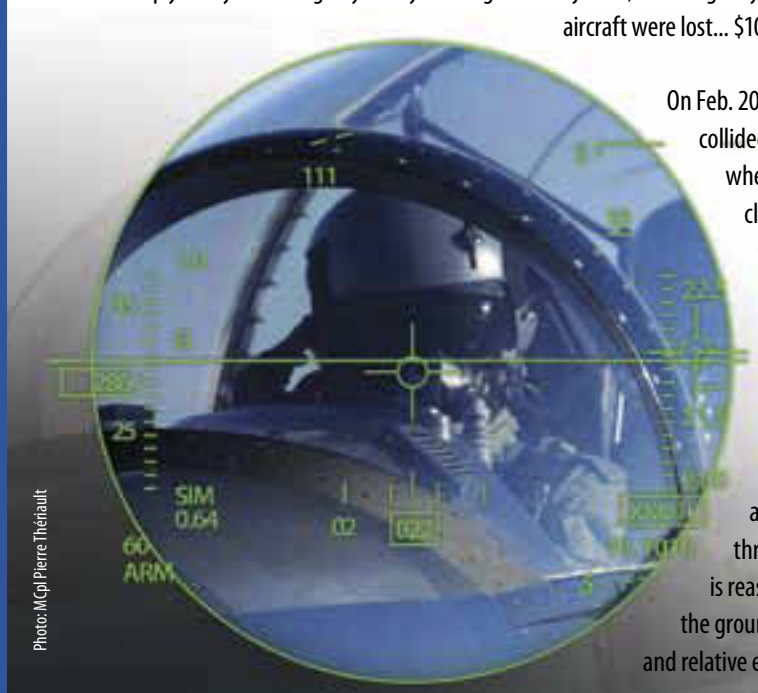


Photo: M Cpl Pierre Thériault

Applying see-and-avoid while walking through a crowded street is reasonably easy considering the ground speed, closure rate and relative ease of maneuvering around objects. Applying principles of vision in flight is physically and mentally more challenging by far.

Early records of commercial aviation are strewn with examples of the failed scans of the eyeballs. In the period 1958 to 1988, there were some 40 airliner accidents in the United States that involved midair collisions, killing a total of 908 people according to the National Transportation Safety Board (NTSB). The number of midairs has gone down only slightly in subsequent decades. In the period 2005 to 2009, the NTSB reports there were 33 midairs and 53 associated fatalities in civil aviation.

Typically, midair collisions occur with a mix of high-speed traffic operating instrument flight rules and low-speed traffic operating visual flight rules with one aircraft climbing or descending. Stunning in this analysis is the fact that midair events typically take place in daylight, under good visibility, with the low-speed aircraft within 30 degrees relative bearing of the other aircraft's flight path.

The most common cause cited in midair mishap reports to date is "failure of the pilots to see and avoid each other."

It's hard to deny that the conditions for midair are ripe in a high density environment packed with inexperienced pilots earning their wings; skills of scanning and accurately perceiving the threats are still being developed in the young aviator. Two aircraft occupying the same space

Photo: Cpl Eric Jacques

when there is a well experienced aviator scanning the horizon is harder to explain.

Visual science can help unbind some of the dilemma.

The smallest image that can be perceived at the fovea (central region of the retina) ranges from 0.5 to 1.0 minutes of arc. Probability of detection for targets which exceed 1.4 minutes (0.023 degree) of arc, visual angle, is going to depend on the size of the object, the anticipation of the object, and visibility factors (weather and conspicuity). In other words, as long as your eyes are open and the squishy gray blob between your ears is in the "ON" position, there is no physical reason to miss a target of reasonable size entering your space.

If only we were restricted to single, well marked, pre-briefed objects in the airspace!

Objects in our visual world are not packaged with a convenient code according to shape, size or color, so the brain (visual cortex) has to decipher and analyze every snapshot that arrives at the door. Now tie in the reaction time to the physical recognition of a midair target. According to measurements taken in military studies, the time necessary for a pilot to recognize a potential midair target and take evasive action is 12.5 seconds. Nice figure in a perfect world. Possibly a more relevant factor to consider is where the object appears on your retina.

Unfortunately, there is a precipitous drop in visual acuity as the target moves out of central vision to peripheral vision.

The scanning technique is central to the lecture on vision during initial physiological training and becomes a practiced and conscious skill developed as you break lock from the instrument panel long enough to assemble outside visual references. But here's the "big whammy" you may have overlooked: The peripheral eye is highly sensitive to moving objects and less sensitive to non-moving objects. Unlike central vision, if an object is projected on the peripheral viewing area with little or no movement, the receptors register "no factor" and a potential airspace conflict (e.g. target) is missed and may actually become a factor.

Despite relative motion of the aircraft, the object will only enlarge and not move across the retina. This was the case that involved a T-37 and a crop duster. Neither the student nor instructor in the Tweet saw the large yellow air tractor soaring to their right on a hazy midday in January 2005, and the aircraft collided, killing the civilian pilot. Size does matter, but so does perceived movement across the visual field.

How closely do bold, black letters set against a white background compare to complex targets against a low contrast background? In practice, not so much. But using this standardized measure, vision scientists have come to the consensus that the minimum visual angle to ensure somewhat reasonable accuracy and probability in detecting another aircraft is about 12 minutes (0.2 degrees) of arc.

One more ripple in this estimation is important to note. Most mathematical models account for closure rate, target aircraft size, meteorological visual range, but do not attempt to model physiological or mental processes underlying pilot performance. Individual situational awareness influences the speed and accuracy of time critical actions, and situational awareness can be bolstered or blasted by technology.

Work completed at the Massachusetts Institute of Technology that led to Traffic Alert and Collision Avoidance System advisory systems in the mid-1980s implied that the presence of TCAS increased traffic search effectiveness by a factor of eight (e.g. one second of search with TCAS was as effective as eight seconds of search without TCAS). Collision avoidance technology available in modern aircraft has been measured to speed acquisition time by up to 15 seconds and improve the probability of visual acquisition. Some estimates claim probability approaches 100 percent by the 10 seconds prior to collision mark.

Audio warnings and visual displays are well known to markedly improve visual-search effectiveness and TCAS computations for optimal avoidance manoeuvres complete the trifecta of see-and-avoid strategies. The sobering reality is that see-and-avoid has significant limiting factors when relegated to a purely visual task.

Nevertheless, the "Mk-1 eyeball" is as much a primary line of defense for the modern aviator as it was for the pioneers of flight. Combining the scan and cranium swivel technique with technology is a learned skill that must be practiced. Instructors and students deep in the weeds on knocking out syllabus objectives while perfecting flight techniques and skills-based learning need to remember to keep all available systems switched in the "ON" position when entering the pattern or manoeuvring through a military operations area.

It's worth a second look. Check-6! ◆

Avoid Being Shocked

By Major Sylvain Giguère, Directorate of Flight Safety, Ottawa

Back in the CF5 *Freedom Fighter* days, static build-up on the duel wind screen was an every day occurrence. The solution to eliminate the problem was for a technician to discharge the electro-static build-up by wiping the screen. To do this, the technician used a 12 inch by 12 inch black rubber mat attached to a wooden broom pole and connected to the nose landing gear via a grounding wire with alligator clips. All too often, while moving around the aircraft, the alligator clip from the landing gear would come undone and a poor unknowing technician, trying to be of assistance, attempted to reconnect the clip to the nose gear. The end result was a technician doing the funky chicken (a solo twisting dance in the prone position). Electro-static discharge hazards are still around today but are most evident in helicopter fleets. Procedures to safeguard against the hazard are generally sound but improvements are warranted given the recurring occurrences involving electro-static discharges.

The CH124 *Sea King* community have set Standard Operation Procedures (SOPs) to deal with electro-static discharge hazards associated with its haul down and hoist systems. There have been occurrences where grounding was not carried out as per SOPs and this resulted in technicians and/or aircrew experiencing moderate to severe electro-static discharge, either while deployed at sea or ashore at their home base. One particular East coast occurrence comes to mind when a CH124 had an unsafe landing gear indication and two technicians attempted to install a landing gear safety pin while the aircraft was in the hover. During the process, the technicians received several electro-static discharges before finally getting the safety pin installed. All this happened because the aircraft was not grounded prior to the pin being installed.

The strength of a shock depends on both the current and the voltage. The lower the current, the greater the voltage can be without the shock causing harm and vice versa. The amount of energy released in a shock is measured in joules. At energy levels of five millijoules, the human body feels a shock; this is the threshold of sensitivity. At ten millijoules, the shock becomes uncomfortable. An example of this is the charge discharged when a person walks on carpet and then reaches for the grounded light switch. A 100 millijoule shock is severe and a one joule shock kills. To put this in an aviation perspective, a CH-54A *"SkyCrane"* helicopter recorded upward of three joules of stored energy and was thus capable of creating a lethal shock. Stored energy is not harmful yet it is the method of dissipation that can result in injury. The occupants of this CH-54A helicopter would also have had the equivalent of

three joules of stored energy and would normally be protected by the airframe upon landing. This story changes if one of these occupants were to be hoisted down and become the direct link to grounding the aircraft.

Statistics show that there are still electro-static discharge occurrences for our helicopter fleets. The causes are varied. In a particular case involving the CH149 *Cormorant*, it was found that the static discharge cable (SDC) was not effective in reducing the aircraft potential. The SDC is a long cable used when hoisting to prevent or lessen any discharge to a person. It acts like a grounding cable, so when it makes ground contact, the helicopter potential is reduced with respect to ground. In this case, the SDC was not effective as no grounding was achieved due to the depth of snow. For another electro-static discharge occurrence, the SDC was simply not used due to snagging hazards in trees or boats and could not reduce the aircraft potential. Thus personnel on the ground should always regard a helicopter as a possible source of electric shock.

To raise visibility on this issue, a Hazard Report (Hazrep) is in effect to identify the electro-static discharge hazard for the CH149 *Cormorant* and to better understand the conditions under which static shock occurs. The Technical Authority is currently reviewing the possible application of static dissipative paint to the main and tail rotor blades and the possible replacement of the discharge cable snap hook on the hoisting system.

Technicians and aircrew members operating or interacting with hoist and haul down systems must be sure to check the equipment ("Deadman`s Stick", static discharge wand, etc.) to ensure its availability and serviceability or the next act could be your solo funky chicken. Electro-static build-up should always be considered a real threat rather than a mere inconvenience as it can cause severe muscular spasms, local burns, and even be lethal. SHOCK and OW can be avoided! ◆

OPERATOR DISTRACTION ON THE AERODROME

By Master Warrant Officer Gillis, 410 Tactical Fighter Operational Training Squadron, 4 Wing Cold Lake

Photo: WO Carole Morissette

"... we become aware of a hazard, we process the implications to the hazard, then we plan and act; this is done instinctively and in split seconds."

The debate over cell phone or electronic device use in vehicles is a hot topic and makes a great discussion issue, with many opinions. As a former Human Factors in Aviation instructor, Flight Safety Investigator and General Safety Officer, I wish to provide some insight on this topic. Thirty years experience in the aviation field has taught me one thing; I would never endorse or recommend the use of any device that interferes with safe operation on the Aerodrome. The main reason is some people believe they can multi-task; that is drive and talk on the phone at the same time or worst yet, use an electronic device to text. However, when you understand how the brain functions you will also understand why we do not multi-task all that well. First of all, our minds really only process one thing at a time and we jump from thought to thought. Basically our minds are always processing information from our environment. It is a survival trait, in that we are looking for hazards to our well-being. I will call this the awareness stage and once we become aware of a hazard, we process the implications to the hazard, then we plan and act; this is done instinctively and in split seconds.

A good example would be a deer running in front of your moving vehicle. Once you see the deer (awareness) and take action (plan) your response is to brake hard or steer out of the way. We know what the implications are (collision) and we plan and act, usually without thinking. This full process (avoiding a deer), awareness, implication, plan and act, happens in less than a second. Now if you have the driver on the phone, the driver will see the deer, however, because the brain is processing verbal information (I call this "the bucket is full") the implications do not get processed and the plan and action processing does not happen. I have personally experienced this in Winnipeg three years ago. I was picked up by a friend at the Winnipeg airport and on the drive downtown, a young lady smashed into the back of our vehicle. When she got out she said she was on the phone and did not see us. Believe it. We were there. The damaged vehicles definitely proved that. However, in my job teaching human factors in aviation, I fully understood what she was experiencing.

The next time you are driving a vehicle on the airfield, think about all the dangers involved. Taxiing aircraft, armament convoying, sweepers, fuel trucks, servicing vehicles and emergency response crews are just a few of the hazards. Think about how many times corrections are made in the safe operation of the vehicle. The visual clues are processed along with sensory information (acceleration, braking, sound) and rather than calling it driving, we are actually operating in a collision avoidance regime. Failing to process information on our surroundings for only a short time could lead to a collision with another vehicle or aircraft. This is the main reason for posted speed restrictions on the ramp. The faster we drive the less reaction time we have to a hazard. It is for this reason that when a person talks on the phone they are not fully processing the visual clues, in that they do not realize implications of danger and fail to take appropriate actions. Some argue that it is no different than talking to a fellow passenger. I disagree. The passengers see most of what you see and often will alert you to any dangers. A person on the phone with you sees nothing and is therefore unable to warn you. When you are listening or talking on a phone, you are processing verbal information (not driving information) and when you finally "clue in" it is often too late. What are the driving signs of "clue out"? Ask any experienced safety officer. Driving becomes erratic and speed limits are exceeded without knowing it. Other indicators include sudden stops, tail gating, swerving and crossing active runways without a clearance.

The message is simple; the operation of a motor vehicle on the aerodrome requires the full attention of the driver in his or her surroundings. Using a cell phone, blackberry and other electronic devices substantially increases your risk for an accident. The safety of operators, passengers, pedestrians and the preservation of resources rely on drivers staying focused, alert to hazards and to take appropriate action to prevent collisions. ◆

POSTPONED

By Guy Castilloux, IMP Aerospace

"An injured person with a broken leg in Algonquin Park required assistance and evacuation to a hospital."

Photo: MCpl Tom Trainor

INSPECTION

In August 2008, a CH146 *Griffon* helicopter was on a routine Search and Rescue (SAR) training mission when the aircraft was tasked for a search near Windsor Ontario. The aircraft had 12.1 hours remaining before it was due for its 25-hour/ 30-day inspection.

The aircraft flew 7.2 hours that day and had 4.9 hours left until the inspection. The crew decided to stay overnight in Windsor and fly the 2.5-hour trip home to Trenton the next morning. On the return flight home, the crew was diverted to assist an overturned vessel near Port Colbourne on Lake Erie. As they got closer to the scene they were stood down and preceded to the Toronto airport for fuel. The aircraft now had 2.8 hours left until the required inspection and home base was only at 0.7 hours away. Again, the pilot decided not to do the 25-hour/30-day inspection.

The crew was only 20 minutes away from Trenton when they were once again tasked with a SAR mission. An injured person with a broken leg in Algonquin Park required assistance and evacuation to a hospital. The crew inserted the SAR technicians to prepare the injured patient for airlift and the aircraft proceeded to the nearest airport for fuel. Upon landing the Flight Engineer realized that the aircraft would not have enough hours remaining to retrieve and transport the patient to the hospital and return to Trenton. After consultation with the Aircraft commander, they decided to call the Squadron Aircraft Maintenance Officer (SAMEO) and request permission to over-fly the inspection by one hour.

After considering all of the factors involved, the SAMEO authorized the flight with the caveat that if they had to land and shut-down the engines the inspection would then have to be carried out. The crew completed the mission and returned to base with 0.6 hours past the inspection.

No mishap occurred and the mission was a success but this situation could have been easily averted if the inspection was completed in advance. Sometimes, not wanting to spend the extra time required (4 to 5 hours to complete an inspection) could have had big safety implications especially if a major problem occurred (which could have been discovered during the inspection).

Lessons learned: plan ahead, try not to push the envelope, and always stay within your safety zone. It only takes one small problem to ruin your day. ◆

Photo: Cpl David Hardwick

Ramp Support

By Captain Amanda Ives, 2 Air Movement Squadron, 8 Wing Trenton

As a student on the Logistics Officer Air Mobility Support Course we were taught the importance of using the ramp support when loading and unloading freight pallets that weigh greater than 2,000 pounds, as well as the importance of using the ramp support when the aircraft exceeds the centre of gravity limitations on the CC130 *Hercules* aircraft. The ramp support is used as a safety feature to provide support to the ramp during loading/unloading operations as well as ensures the aircraft remains level and that the tail end does not drop. The use of the ramp support is standard operating procedure for Canadian Mobile Air Movements Section personnel for all freight pallets weighing 2,000 pounds or more.

I never really understood the importance of this small piece of equipment until I was deployed overseas and saw how other nations load and unload their aircraft. As the Tactical Airlift Unit Officer in Charge of the Air Mobile Air Movement Section at Camp Mirage, I made a visit to Kandahar Airfield to meet with my Movements counterparts. While there, I observed the loading of an Allied *Hercules* aircraft. A freight pallet weighing approximately 6,000 pounds was being loaded onto the ramp of the aircraft. As the weight shifted from the forklift tines to the ramp, the tail end of the aircraft started to drop down, approximately one foot. It was then that I noticed there was no ramp support. Luckily the crew onboard were quick to react and took control of the pallet moving it across the ramp and onto the cargo floor before the tail of the aircraft could drop any lower.

Observing this procedure made me realize just how important the use of the ramp support is. It made me think about the potential flight safety issues such as: damage to the hydraulics, ramp, further aircraft damage, damage to the freight or most importantly, potential serious injury to personnel. It made me think of the numerous flight safety issues that could have occurred and that could have easily been avoided by taking five minutes to set up the required ramp support. ◆

Time Well Wasted?

By Capt David McLeod, 419 Tactical Fighter Training Squadron

As daily schedules continue to become busier we look for ways to avoid wasting time. Sometimes this means shaving time off daily tasks or having to shorten mission briefs to remain flexible. Often what loses out in the pre-mission briefs are domestics. These become standard operating procedures (SOP) and unfortunately items such as an "emergency of the day" get dropped off completely. Recently I had an experience that showed me why briefing a well thought-out emergency scenario is important.

It was a sunny Thursday afternoon and after a very short lunch break I began briefing a 1v1 basic fighter manoeuvres student solo mission. I had flown the first mission of the day in the same formation as this student. Since we had only a short time to eat lunch, I was considering shortening the mission brief. Instead, I stuck with the full mission brief and my emergency scenario focussed on how my student pilot should react in the case that his flight lead might have an in-flight emergency.

After take-off and a short transit to our air combat training area my student and I got right down to business and began our training sequences. Roughly 12 minutes into the flight, after terminating a Defensive Bandit Prediction and setting up for the next sequence, the aircraft's "MASTER CAUTION" sounded and I received an engine oil caution. In a single-engine jet, any engine related problem is nothing to mess around with. I "knocked-off" the mission and began heading back towards Cold Lake. As briefed, my student wingman closed up to a supporting formation position. After I completed the initial actions my wingman and I went through the emergency checklist. Working together we ensured no items were missed. We discussed options for landing back at Cold Lake should my engine fail and coordinated with air traffic control. Fourteen minutes later I was safely back on the ground waiting for a tow back to the hangar.

What could have been a confusing and protracted situation was smooth and efficient with the help of having covered a similar scenario in the pre-flight mission brief. Sure, we can't cover every scenario imaginable but if we commit to providing relevant scenarios (and not always the same ones) in our mission briefs we can maintain a meaningful contribution to flight safety. Passing on experience and knowledge – educating – will always be a key component in our flight safety net. Time well spent? I think so. ◆

Photo: WO Serge Peters

X's on the Board

By Captain Loyd Olson, 2 Canadian Air Division Headquarters, Winnipeg

After more than twenty years working with the Air Cadet Gliding Program my curiosity has always been peaked by one thing. That thing is not the beauty of silent flight (that is beauty), nor is it the occasional chance to ride a thermal beside a hawk (that's just plain amazing). That thing is the tendency to rush. Rushing on the glider field or adjusting our operations to gain a rapid turn-around between flights.

As many of you know, from April to June and September to November the gliding program takes cadets up for glider familiarization flights - 2000 feet, six to fifteen minutes long, enough to "*stimulate an interest in aviation*". During summer months the program provides glider pilot training for older cadets.

During the weekend Famil Flight season, a bus of 40 cadets arrives at the gliding site. The gliding site leader may feel a sense of personal responsibility to ensure all 40 cadets receive a flight; so that person pushes his ground crew for a 'rapid turn-around' - get 'em in, get 'em up, and get 'em done before the bus has to depart. And as the weekends come and go, the gliding site staff become very proud of the number of glider flights they can achieve in one day. During the summer ab-initio glider courses, cadets arrive at one of our five gliding schools to be licensed within six weeks; so the Chief Flight Instructor, Flight Commanders, Standards Officers, and everyone at the school engage in operating the gliding school at the highest rate of launches per day as possible - 'get the Xs on the board before bad weather hits'. And as the months pass, that gliding school becomes very proud of how they managed to overcome yet another 'time crunch'.

Xs on the board. Increased Ops Tempo. Surge Mode. Get 'em in, get 'em up, and get 'em done. They are all the same thing, and they are always done for the same reason: Being Efficient - as defined by the number of launches completed per day, per season, per year.

So where is this focus on numbers coming from? Ourselves.

As gliding site leaders, what questions do we ask at the end of the day? Is our first question, "how many flights did we do today?" Why isn't it, "did everyone have fun today?" or "did our guests/students have fun today?" or "was the operation smooth and safe today?" As a gliding site leader, how many times have you seen a junior pilot struggle with their strap-in or their pre-flight checks? As you observe them working on these items, in your gliding site leader role are you thinking more about the time it is all taking and wishing they would 'just hurry up' so you can get another flight off? On approach, if you detect that your present profile will carry you beyond the launch point which in turn will require your glider to be pushed back for the next launch; do you initiate some drastic measure to steepen your approach to ensure you land back at the launch point? What message have you given to your junior pilots? That it is not acceptable to land long because pushing back takes too much time?

At gliding sites we scurry about trying to make every second count so we can get as many flights in as possible. I have never seen this type of rush-rush-rush at an Air Force Squadron or civilian flying club, but I often see it at cadet gliding sites.

As gliding site leaders our main focus needs to be the cadet whose safety has been entrusted to us by their parents. Whether it takes an extra two minutes for a pilot to prepare for a flight, whether it takes an extra twenty minutes to position the glider for the next flight, or whether someone needs to tell a portion of those 40 cadets on the bus that today's conditions are not right for everyone to go gliding, our main focus must be safety. Instead of being beautiful, gliding gets plain ugly when Xs on the board take precedence over safety. ◆

From the Investigator

TYPE: Glider Schweizer 2-33A (C-FNWO)
LOCATION: Pineview Airpark, Ontario
DATE: 6 September 2009

The occurrence took place on the second day of the fall gliding season at the North Western Ontario Gliding Centre (NWOGC) located at the Pineview Airpark near Kakabeka Falls, Ontario.

The day was dedicated to completing currency checks and winch conversion training for staff prior to conducting cadet familiarization flights on subsequent weekends. The occurrence pilot had already completed 10 supervised launches as part of Winch Operator training, earlier that day, and had completed two glider flights in the hour prior to the accident.

The occurrence flight, the pilot's third glider flight of the day, was a winch launch that took off at 1600(L) from runway 33. The front seat passenger was at the controls for the takeoff. The passenger was qualified on type but neither current nor proficient, not having flown the Schweizer 2-33 for two years. The glider reached an altitude of only approximately 850 ft above ground level (AGL) off the winch launch, some 150 ft below normal circuit altitude. The release and the initial turn towards the downwind leg of the circuit were uneventful. However, the passenger felt rushed and overloaded with the flying and did not modify the circuit despite the consistently lower than ideal altitudes achieved throughout the circuit.

On base leg, at approximately 300 to 400 ft AGL, the passenger gave control back to the pilot in command (PIC) who then turned the glider onto the final approach leg of the circuit. The PIC then slowed the glider to approximately 45 to 50 miles per hour (MPH) in order to get "over the trees on final". Both the PIC and passenger verbally expressed concerns about being able to clear the trees and make the runway, at which point the pilot initiated a turn to the right toward an open field.

During this final turn, the right wing struck the ground; the aircraft pivoted 180 degrees around the wing and came to rest upright, approximately 65 ft from the initial impact point. The two occupants sustained serious injuries. The glider was damaged beyond economical repair.

The preliminary investigation has indicated that the glider had not suffered mechanical problems prior to the accident. The investigation will focus on training practices and human factors. ◆

From the Investigation

TYPE: CF188 *Hornet* (188925)
LOCATION: Smoky Hill Range, Salina, Kansas
DATE: 17 November 2009

The incident occurred on the Smoky Hill Range, near Salina Kansas, during the hours of darkness. Canadian military personnel conducting a Forward Air Controller (FAC) course were using a ground laser designator to guide a laser guided training round (LGTR) from aircraft CF188925 to a range target located approximately 790 metres to their south. The occurrence happened during the first drop of the night. The ground party consisted of FAC instructors and students with the instructors operating the ground laser designator and performing FAC duties as a demonstration to the FAC students. The pilot of the CF188 was a Fighter Weapons Instructor Course graduate and the Squadron Air to Ground Tactics Standards Officer. Using standard procedures and following pilot / FAC mutual confirmation of the correct target using infra-red techniques, the pilot was cleared for his attack run. However, instead of homing to the intended target, the LGTR impacted approximately 15 metres southwest of the laser designator and the ground personnel. There were no injuries and further training was terminated.

To date, no anomalies have been found with the airborne or ground equipment in use. Prior to the drop, the range staff had used the "Weapon Danger Zone" software to determine that the laser designator was at a safe operating location. The guidance available to the FACs indicates that the (LGTR) seeker field of view must not encompass the area of the laser designator while the laser is transmitting. The investigation determined that the laser designator was in fact in the field of view of the seeker while the laser was on, although this was not known to the FACs at the time since they had no way of determining this information.

Immediate preventive measures taken include 1 Canadian Air Division promulgating a minimum linear separation between the target and the designator. Other recommendations pertain to providing FACs the means to determine whether they are in the field of view, or not, and the requirement for further work / coordination between the applicable organizations to determine what safety footprint can and should be used with LGTRs and other such weapons, to ensure training is carried out at a level of safety acknowledged and accepted by the appropriate chain of command. ◆

Epilogue

TYPE: CC130 *Hercules* (130328)

LOCATION: Aylesford Lake, Nova Scotia

DATE: 07 July 2009

Static Line (SL) parachutist training to a water landing was being conducted in the early afternoon from a CC130 *Hercules* aircraft for a group of four Search and Rescue Technicians (SAR Techs). The destination drop zone (DZ) was the northern portion of Aylesford Lake. Streamers were dropped to assess the wind before the drop and a recovery boat was in position on the lake prior to the jump. The cloud ceiling over the lake required the jump aircraft to operate at 1,500 ft Above Water Level (AWL), the minimum altitude for SL training. The surface wind was assessed to be from the north at 2 to 3 knots.

The entire exit sequence took approximately 20 seconds and the occurrence Sar Tech, the last of the four parachutists to leave the aircraft, ended up exiting the aircraft over a wooded area to the north of the lake. He experienced line twists upon exit and lost several hundred feet of altitude prior to obtaining full parachute deployment. Once the parachute was open he turned downwind in an attempt to transition toward the planned DZ water landing. During the descent he recognized that he would not be able to make a water landing and assessed that the area immediately below him was unsuitable for landing due to obstacles. The SAR Tech then attempted to locate and manoeuvre to an alternate landing location, resulting in a late, aggressive low altitude turn into the wind. This resulted in a partial deflation of the parachute and an increased descent rate. The SAR Tech sustained serious injuries when he landed on sloped terrain beside a road surface that circles Aylesford Lake.

The investigation focused on the Jumper's assessment of the planned drop; low level canopy handling characteristics and the exit sequence of SAR Techs wearing equipment suitable for the planned water landing.

It was determined that the combination of the prolonged exit sequence and the low exit altitude placed the last jumper in a position where it was not possible to make the intended DZ. The line twists on exit further reduced the distance that the jumper could cover. The SAR Tech's focus on attempting to make a water landing delayed his assessment of an alternate landing location. The late, somewhat aggressive final turn into wind for landing resulted in a rate of descent that exceeded the jumper's ability to react and adopt a proper parachute landing fall position.

This occurrence has been reviewed within the unit to develop safe training practices focused on jump profile planning, early selection of an alternate landing area and the importance of using the parachute landing fall to absorb energy. ◆

Epilogue

TYPE: CH146 *Griffon* (146441 and 146479)

LOCATION: Vancouver International Airport, British Columbia

DATE: 19 October 2009

Two CH146 *Griffon* helicopters, operating in formation, filed a VFR flight plan to depart from the Vancouver International Airport. The helicopters began their flight from parking spaces located behind an airport building, hidden from the tower controller's view. The pilot of the lead helicopter used the call-sign "GRIFFIN 11" throughout the mission and *unintentionally* did not add the term "FLIGHT"; or any other phrase to indicate he represented aircraft in formation. Air Traffic Control (ATC) interpreted the call-sign "GRIFFIN 11" to be a single helicopter. The lack of special wording in the call-sign to indicate the helicopters were a formation, contributed to the occurrence.

When ATC observed a lone CH146 helicopter emerge from behind the building, it was cleared to fly across an active runway. When this helicopter was clear of the active runway; ATC next cleared a fixed wing aircraft to take-off. Prior to this aircraft commencing its take-off roll, ATC observed a second unknown CH146 cross the active runway 2,000' behind the first. Although no accident occurred, a critical level of aviation safety was compromised when the second helicopter crossed an active runway without a valid clearance and in front of an aircraft that was cleared to depart. Subsequent radio transmissions by ATC confirmed the helicopters were operating as a formation.

The investigation determined that neither of the pilots in the second helicopter heard the take-off clearance issued for the runway they were about to cross, nor did they identify to the lead helicopter that they were significantly outside the briefed position in trail. The excessive spacing developed between the helicopters when the lead helicopter commenced the departure in an expeditious manner, while the second helicopter was delayed manoeuvring to clear an unanticipated ground obstacle.

The pilots of both helicopters believed that tower controllers were provided with all filed flight plan information, including information that they were operating as a formation. The investigation discovered that this is not the case and information about the number of aircraft on all flight-plans is automatically removed from Nav Canada tower display terminals. Nav Canada is now reviewing this issue.

The CH146 Standard Manoeuvre Manual says formation call-signs should be composed of a word, followed by a colour and the suffix word 'FORMATION'. This method of call-sign designation is common in some CF fleets, but not standardized throughout the Air Force and the information is not readily available to civilian ATC agencies. Furthermore, civil regulations do not address formation radio telephony procedures. A recommendation from the investigator has been made to 1 Canadian Air Division, Nav Canada and Transport Canada Civil Aviation to standardise this issue.

The investigation highlights the need for complete regulations, solid crew coordination and disciplined radio procedures – all doubly important in military formation situations. ◆

Epilogue

TYPE: CH147 *Chinook* (147204)

LOCATION: Kandahar airfield, Afghanistan

DATE: 24 January 2010

The flight of occurrence was a night mission to include hover, simulated slung load, dust-ball and pinnacle landing training. At the time of the occurrence, the senior FE was in the forward cabin (Fwd FE) positioned at the right door and the junior FE was in the aft cabin and positioned at the ramp (Ramp FE). All five crewmembers were wearing NVGs and conducting a pinnacle landing. A pinnacle landing is where the aircraft will land either all four wheels or only the two rear wheels on an elevated surface, a mound or a ridge in order to load or off-load cargo or passengers. In the case of a two-wheel landing, the aircraft's front wheels are held off the ground during the manoeuvre. This procedure can combine various aspects of mountain flying, confined area and off-level landing techniques.

The Ramp FE had opened and lowered the ramp to an above-level position where he positioned himself on the ramp to observe the right rear wheel and the intended landing spot. He was laying down mid way up the ramp, perpendicular to the longitudinal axis of the aircraft with his head outside of the aircraft and shoulders between the ramp and the airframe. As the wheels touched down, the Ramp FE heard a loud bang, felt the aircraft shudder and simultaneously started feeling crushing pressure on his shoulders. He blacked out and sustained serious injuries. Upon hearing the Ramp FE moans, the Fwd FE and the Door Gunner turned and noticed that the Ramp FE was pinched between the ramp and the airframe. They went back, extracted the Ramp FE and administered first aid as the aircraft proceeded to KAF. The aircraft was met by the Canadian Helicopter Force (Afghanistan) [CHF(A)] Deputy Commanding Officer who instructed the AC to fly to the Role 3 hospital where a medical team tended to the Ramp FE. The aircraft returned to X-ray ramp, was shut down and quarantined.

The investigation revealed that the Ramp FE developed his own technique of laying across a partially opened ramp to provide conning and check for obstacles during pinnacle landings. This technique, facilitated by the lack of proper training, the absence of clear direction and an exposure to modified procedures, created an unrecognized hazard during pinnacle landings.

This accident prompted CHF(A) to suspend all pinnacle landings performed with the ramp open. 1 Cdn Air Div/ TASET issued the B-GA-002-147/FP-001 CH147D Publication Supplement that clarifies pinnacle landing procedures. Safety recommendations include developing a CH147D FE Qualification Standards and amending the Publication Supplement to include the procedures and warnings provided for pinnacle landings to other CH147D manoeuvres requiring ramp operations. ◆

Post occurrence: Simulated position of Ramp FE

Damage to C7 magazine and knife worn by Ramp FE

Epilogue

TYPE: CH149 *Cormorant* (149909)

LOCATION: 19 Wing Comox, British Columbia

DATE: 23 July 2008

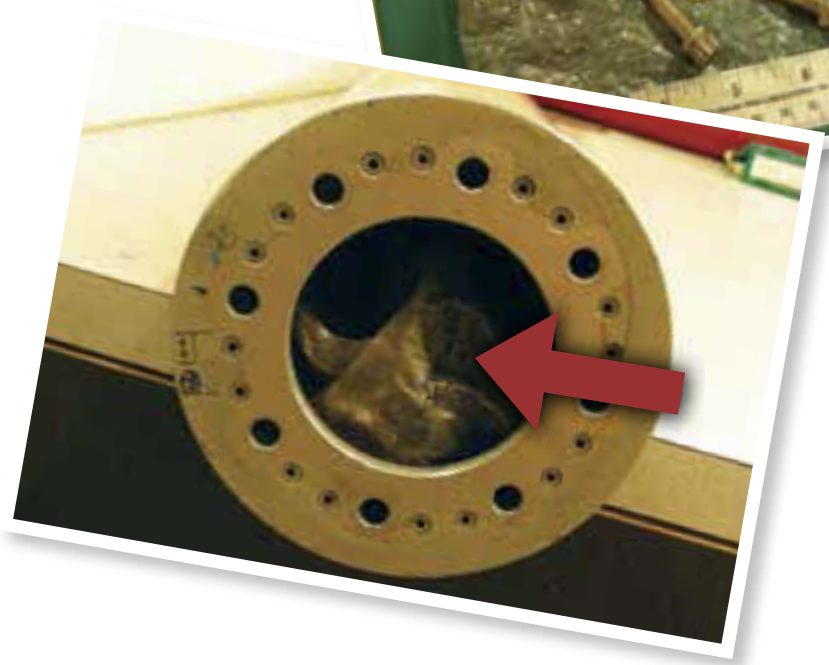
Cormorant CH149909 is operated by 442 Transport and Rescue Squadron (TR Sqn) and maintained under a maintenance contract. Most heavy maintenance is done in Comox; however, certain larger projects are transferred to a contractor facility. *Cormorant* CH149909 was delivered to the maintenance contractor facility on 1 Jun 07 for extensive maintenance and repairs which included replacement of expired driveline components and a 500 hour inspection.

Upon return of the aircraft to 442 (TR) Sqn, following the completion of the inspection and having flown more than 20 hours in transit and maintenance test flights, the crew reported vibrations in the tail rotor (TR) pedals. In the course of troubleshooting, a crack in the aircraft skin was found in the vicinity of the No. 2 driveshaft support. During the removal and installation of the No.3 TR driveshaft section, a technician noted a rattling noise emanating from the No.2 TR driveshaft section as it was rotated. On further inspection, they located a plastic bag containing bolts and washers inside the TR driveshaft. An examination of the bolts and washers revealed that they corresponded to the No. 1 TR driveshaft support mounting bolts. The last maintenance on the TR driveshaft took place at the maintenance contractor facilities.

The No.2 TR driveshaft section was extensively damaged by the repeated impact of the loose bolts and washers inside the hollow centre of the driveshaft. This component has very low damage tolerance and is considered damaged beyond economical repair. Although it cannot be positively established, it is probable that cracks located in the fuselage in the vicinity of the No. 2 TR driveshaft support are related to the vibrations induced by the out-of-balance driveshaft section.

The investigation concluded that the Standard Plant Procedures regarding the issuance, marking and storage of replacement components and small parts were not followed. The accepted maintenance procedure for storing hardware was to place hardware in a "zip-loc" bag, attach an identification tag to the bag and finally to attach the bag to the part associated with the hardware. Additionally a non-official maintenance practice had developed to draw components from supply very early, in order to ensure parts availability when ready for installation, leaving components uncontrolled and unmonitored on open shelving units for an extended period, which in this case was 10 months.

The Flight Safety Investigation Report contains recommendations to ensure that the Standard Plant Procedures are clarified and a more efficient and prioritized system of parts management is put in place. A General Safety assessment of the physical working environment has also been recommended. ◆



Epilogue

TYPE: CH149 *Cormorant* (149915)
LOCATION: Gander, Newfoundland
DATE: 16 October 2008

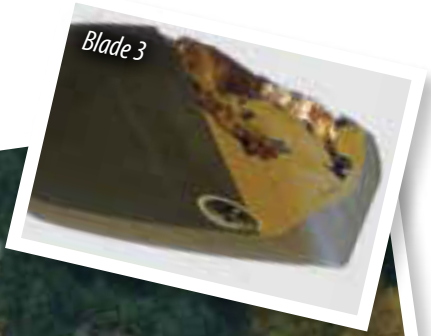
The flight was tasked as a Night Vision Goggle training and proficiency mission for the Aircraft Captain (AC). All three crewmembers were current and qualified. The incident occurred in a confined area located 8 nautical miles south of Gander International Airport.

Having initially approached an unsuitable position for landing within the confined area (CA), the AC decided to move the aircraft to where they could safely land. Although the AC confirmed obstacle clearance with the crew prior to proceeding with the landing, during the descent the rotor struck a tree located at their 8:30 position relative to the aircraft. Vibrations resulting from blade damage intensified, and the AC repositioned to a better spot and landed. The aircraft sustained serious damage to the main rotor blades. There were no injuries.

At the time of the occurrence, the Squadron (Sqn) SAR scheduling practices limited the Sqn's ability to schedule night training flights with full crews, so three-man crew trainers were the norm, vice a full crew of five. The CH149 SMM three-man CA procedure assigns sectors around the aircraft that each crew member is responsible to visually confirm as clear of obstacles. However, cabin configuration and equipment limitations result in blind spots within each sector, such that, once established in the hover, aircrew cannot possibly see all obstacles and smaller obstacles are easily missed on approach to the CA. This procedure had been amended, but the change had not been effectively communicated to the occurrence Squadron.

Of significant concern was the CH149 SMM amendment process and its distribution to CH149 units and aircrew. At the time of the occurrence, changes were sent via email to select unit personnel. This process did not ensure proper dissemination of information and was a contributing factor. The Sqn has since been briefed on the changes to the SMM and have adopted new scheduling practices that ensure night training is conducted with full five-man crews. TRSET has instituted SMM changes via Advance Change Notices that have significantly improved information passage throughout the CH149 community.

The recommended preventive measures will concentrate on amending the CH149 SMM CA procedures as well as the 1 Cdn Air Div Orders CH149 Safe Training Practices. ◆



Epilogue

TYPE: CT114 *Tutor* (114065)

LOCATION: Moose Jaw, Saskatchewan

DATE: 09 October 2008

The accident aircraft, crewed by a pilot in the right seat and an imagery technician in the left seat, was part of an approved four-plane dissimilar formation tasked with taking publicity pictures of aircraft based at 15 Wing. The accident aircraft was being used in a photo-chase role. Following a fly-past at Assiniboia and some photographic work south of the Moose Jaw airfield, the formation returned to Moose Jaw to take pictures of the formation against a background of the headquarters building and the control tower. To preclude a possible conflict with traffic on the southern runway, Lead restricted the photo-chase aircraft from manoeuvring left (south) of the formation's 6 o'clock position. Following a low altitude pass by the control tower the formation began a right turn to re-position for the next pass. As the formation turned right the photo-chase aircraft, initially several hundred feet above and to the right of the formation, was observed to descend and turn with the formation. This aircraft was in a descending right hand turn and beginning to close laterally with the formation when it impacted the ground in a right wing low, slightly nose low attitude with the speed brakes extended and the engine near flight idle. No radio calls were made and no ejection was attempted. Both occupants of the aircraft were killed instantly.

The investigation determined that the aircraft was airworthy and the environment was not a factor. The right hand turn created a problem for the pilot in that he had to stay visual with the main formation, stay in his assigned quadrant and not hit the main formation. It could not be determined why the pilot chose not to break out of his quadrant and then rejoin, but he must have believed he could safely remain in his assigned quadrant and remain clear of the main formation. In attempting to stay visual he may have reverted to techniques more applicable to higher altitude formation work and likely became fixated on the formation above and to his left, losing situational awareness with respect to his proximity to the ground.

Personnel involved in the planning and authorization of the mission focussed on the potential hazards of flying in a dissimilar formation but underestimated the inherent risks of an aircraft freely manoeuvring around a formation operating at low altitude. The pilot was briefed to stay above Lead at all times and was a very experienced and very well respected pilot and instructor; however, he had no experience flying photo-chase missions, had no experience in fluid manoeuvring around a formation at low altitude and had not received any formal low-level awareness training.

Safety recommendations include the promulgation of guidance for pilots on the conduct of photo-chase missions and a requirement for pilots involved in such missions to receive low level awareness training prior to flying the mission. ◆

Epilogue

TYPE: Royal Navy *Merlin* ZH837

LOCATION: At sea, HMCS *MONTRÉAL*

DATE: 14 October 2009

While participating in an anti-submarine warfare mission in Task Group Exercise 6-09 / Joint Warrior 092, a Royal Navy EH101*Merlin* helicopter, call sign Tiger-2, landed short of the flight deck while attempting to land onboard HMCS *MONTRÉAL*. Tiger-2 had departed its own ship at 1217Z, completed a training mission and then proceeded to HMCS *MONTRÉAL* to conduct a rotors running refuelling (RRR). As per normal procedures, the flying pilot positioned the aircraft over the flight deck using visual references and advisory calls from the non-flying pilot. The pilot approached the deck from the port side of the ship, moved laterally across and over the deck and went directly into a low hover position at approximately ten feet over the deck. Very quickly thereafter, the pilot initiated a descent for landing, but touched down well aft of the normal landing position, with the helicopter's right main landing gear on the quarter deck and the left main wheels on the flight deck. As the aircraft settled on the deck, it tilted back and to the right. Simultaneously, the Senior Fire Fighter, who was the Flying Coordinator (FLYCO) responsible for flight deck operations, realized that Tiger-2 was too far aft and ordered a "Wave-off" using visual and verbal signals. Although the pilot heard the "Wave- Off" transmission as he landed, once on deck with the aircraft in a seemingly stable position, and considering the possible damage to the aircraft, the pilot judged that a wave-off was not practical and remained on deck. The aircraft was lashed on deck and shutdown without further incident.

The Royal Navy Flight Safety Accident Investigation Center (RNFSAIC) conducted a separate investigation into this incident focussing on aircrew, human factors and internal RN processes. The DFS investigation focussed on the Canadian involvement and the CF procedures for cross deck operations. The investigation examined the NATO publication guiding helicopter operations at sea, namely the HELICOPTER OPERATIONS FROM SHIPS OTHER THAN AIRCRAFT CARRIERS (HOSTAC), and the CF publication, SHIPBORNE HELICOPTER OPERATING PROCEDURES (SHOPS). Additionally, the investigation focussed on ship and crew certifications, flight deck markings, operating procedures and the landing sequence.

The DFS investigation determined that inadequate technique was used while attempting the landing. Contributory factors included inadequate mission planning between the foreign helicopter and the ship as well as unclear procedures within the HOSTAC.

Safety recommendations are directed at amending procedures within the HOSTAC and SHOPS as well as increasing cross deck training opportunities for Ship's personnel. ◆

For Professionalism

For commendable performance in flight safety

Captain David McLeod

On 19 November 2009, Instructor pilot Capt McLeod was the flight lead of a two plane formation conducting an instructional sortie. Approximately 40 nautical miles from Cold Lake, the single engine CT155 *Hawk's* Central Warning System sounded and the oil caution light illuminated. During negative-g flight this caution can be expected but the caution light usually extinguishes quickly. This incident was different in that the aircraft was in straight and level flight and the oil caution light did not extinguish. This engine was running out of oil. Without oil, the *Hawk's* Adour engine would no longer be lubricated and would eventually grind to an untimely halt. Outside of gliding distance to an airfield, an engine seizure would have resulted in an ejection, crash and the loss of the aircraft.

Capt McLeod immediately turned the aircraft toward the Cold Lake airfield and coordinated with his wingman, Squadron Operations and Air Traffic Control. His quick response to set and maintain the engine RPM prevented the immediate seizure of the engine. Over the next 12 minutes the oil caution light remained illuminated. The Aircraft Operating Instructions do not indicate how long an engine will run without oil. Post flight examination revealed that 0.25 litres of oil remained in the system.

Capt McLeod remained calm under pressure and skilfully selected a course of action that averted the loss of the CT155 *Hawk*. Capt McLeod exhibited outstanding airmanship and tremendous skill; for this he is commended. His superb professionalism, expert competence in the face of a potentially catastrophic situation makes him fully deserving of this For Professionalism award. ◆

Capt McLeod is currently serving with 419 Tactical Fighter Training Squadron, 4 Wing Cold Lake.

Corporal Dan Ahlm and Private Frank Galetzka

On 14 May 2009, Cpl Ahlm and Pte Galetzka of 8 Air Maintenance Squadron were tasked as wing walkers to assist a civilian contractor Aircraft Maintenance Engineer (AME) to move a *King Air 200* aircraft into 4 bay of 10 Hangar at 8 Wing Trenton. A CC150 *Polaris* aircraft was undergoing maintenance in 4 bay and an assortment of maintenance equipment was stored between 4 and 5 bays.

A problem was encountered in opening the hangar doors and the AME released Cpl Ahlm and Pte Galetzka to carry on with their duties. Once the problem was rectified and the hangar doors were opened, the AME connected the tow-bar to the aircraft and proceeded to push the *King Air* back to the intended parking position by himself.

As the nose gear of the aircraft travelled over the hangar door rails, the tow-bar disconnected from the nose wheel and the aircraft continued to roll backwards heading for the maintenance equipment under the outer wing of the *Polaris* aircraft. There was no brakeman seated in the *King Air* during the towing sequence.

Despite having been released from the tow job, Cpl Ahlm and Pte Galetzka elected to return when they saw that the hangar doors had been opened and the aircraft pushback had again commenced. When they observed the tow-bar disconnect from the *King Air*, they rushed to a position behind the aircraft and exerted great physical effort on the trailing edge of the wings to stop the aircraft from impacting the stored maintenance equipment.

The immediate and selfless actions of Cpl Ahlm and Pte Galetzka were instrumental in preventing significant damage to a leased aircraft and equipment just prior to the launch of the Multi-Engine Utility Flight project. As a result of this incident, the units standard operating procedures now require a qualified individual in the cockpit during all aircraft towing operations. Their collective efforts, presence of mind and immediate actions are clearly indicative of them being worthy recipients of the For Professionalism Award. ◆

Corporal Ahlm (on deployment) and Private Galetzka are currently serving with 8 Air Maintenance Squadron, 8 Wing Trenton.

Corporal Cory Gallant

While completing a CF 543 Aircraft Unserviceability Record on a CF188 *Hornet* brake assembly, Cpl Gallant an Aviation technician at the 4 Wing Component Shop discovered that the brake torque tube had a duplicate serial number. He immediately informed his supervisor and the Life Cycle Material Manager of the discrepancy. Cpl Gallant independently initiated his own investigation and physically inspected all of the spare torque tubes held at the unit.

His investigation grew to encompass over 54 affected torque tubes across the CF, some with duplicate and even triplicate serial numbers. Several of these had component history records indicating they were scrapped, unserviceable and on an aircraft all at the same time. Due to the potential for catastrophic failure of a brake assembly with the inadvertent installation of a scrapped torque tube on a serviceable aircraft, Cpl Gallant initiated a Flight Safety Occurrence Report. This resulted in the torque tubes being quarantined for further investigation. Cpl Gallants efforts were recognized by the senior leadership within the engineering branch for his thoroughness, keen eye for detail and tenacity in going above and beyond what was required. Cpl Gallant demonstrated a truly professional attitude throughout this investigation.

His exceptional decision-making, timely actions and the many hours he unselfishly dedicated to researching and documenting this problem are a sterling example of due diligence in maintaining airworthiness compliance and he is truly deserving of this Flight Safety For Professionalism Award. ◆

Corporal Gallant is currently serving with 1 Air Maintenance Squadron, 4 Wing Cold Lake.

Corporal Crystal Lyon

On 12 March 2009, Cpl Lyon, an Aviation (AVN) Level A technician with 403 Squadron, was conducting a 25-hour Airframe/Engine inspection on a CH146 *Griffon*. While inspecting the pylon area she observed that the bolt and nut holding the upper rod end of the collective actuator input tube was missing the cotter pin. The area around the collective servo actuator and boost tube is difficult to access and not easy to observe. Cpl Lyon immediately notified her supervisor of the abnormality and upon further examination of the confined area, she found that the retaining nut was being held in place by only a few threads.

Subsequent investigation revealed that this nut was incorrectly installed during a Special Inspection (SI) that was carried out for the pilot and co-pilot collective stick tubes three months earlier. The aircraft had flown 36.6 hours in this condition. The bolt in question is part of the post maintenance action requirement for the rigging check of the collective hydraulic actuator. Had this condition continued to go unnoticed the nut may have come off. The bolt connecting the control rod to the collective actuator could have separated causing a catastrophic loss of aircraft control.

Cpl Lyon's professionalism, attention to detail and willingness to go beyond normal inspection requirements averted a potentially catastrophic loss of both aircrew and equipment. Cpl Lyon is truly deserving of this For Professionalism award. ◆

Corporal Lyon is currently serving with 440 Transport Squadron, Yellowknife.

For Professionalism

For commendable performance in flight safety

Corporal Zeb Salmaniw

While working on a hydraulic leak in the nose wheel of a CC130 *Hercules* at 8 Wing Trenton, Cpl Salmaniw, an Aviation Technician with 8 Air Maintenance Squadron, observed that the forward nose landing gear (NLG) door was in the lowered position. After crawling into the nose wheel well, he began work on the hydraulic snag. While cleaning residual fluid off the aircraft structure, he found that the right hand forward door actuator pushrod arm was missing a nut and washer and that the bolt was about to fall out. This particular aircraft had just come back from overseas, and was in the hangar for repair of the hydraulic leak.

Upon further inspection, it was noticed that the door had been actuated during gear retraction causing significant damage to the forward NLG door seal retainer. Due to its location, the seal retainer is not normally inspected and is difficult to see in its entirety during aircraft checks and routine inspections. Cpl Salmaniw contacted the aircraft structures technician supervisor to assess the damage and then submitted a flight safety occurrence report.

Had this observation gone unnoticed, the next time the nose landing gear actuated, the bolt could have fallen out, causing the door to possibly depart the aircraft or cause a serious accident or incident. Cpl Salmaniw's professionalism and attention to detail played a very important role in avoiding what could have been a catastrophic accident. His actions and professional attitude clearly display that he is deserving of this For Professionalism award. ◆

Cpl Salmaniw is currently serving with 436 Transport Squadron, 8 Wing Trenton.

Corporal Shawn Arsenault and Corporal Fréderic Savard

In November 2009, while assisting the towing operation of a CH146 *Griffon* helicopter to the flight-line, Cpl Arsenault and Cpl Savard discovered severe erosion on the leading-edge of a main rotor blade. Cpl Savard noticed the damaged blade and immediately brought it to the attention of Cpl Arsenault, who determined that the blade was unserviceable. Together they contacted their supervisor and the pilot to verify their assessment.

Further investigation revealed that the distortion to the main rotor blade was localized in an area that was extremely hard for the tow crew to detect from their positions. The damage was confined to an area of less than six inches on the leading edge of the blade immediately inboard of the main rotor blade tip-cap. Further examination revealed that the indentation was sharp-edged and had punctured the blade's leading edge thereby seriously affecting the structural integrity exposing the inner blade structure to the harmful effects of moisture through numerous freeze and thaw cycles. Evidence of wear in the vicinity of the abnormality indicated that the condition had remained undetected during numerous pre-flight inspections.

Together Cpl Savard and Cpl Arsenault demonstrated a level of expertise and competency well above expectations. Their prompt actions and superior attention to detail may well have prevented a catastrophic failure. By actively forestalling the departure of the helicopter with an unserviceable main rotor blade, they demonstrated genuine concern for flight safety and they are deserving of this For Professionalism award. ◆

Cpl Savard and Cpl Arsenault are both currently serving with 427 Special Operations Aviation Squadron in Petawawa.

Warrant Officer Pat Henry

Although not part of the normal Flight Engineer (FE) Pre-Flight Inspection (PFI) duties, WO Henry routinely conducts a careful inspection of the CP140 *Aurora* flight control hydraulic boost out rigging system. As part of this check the flight controls are exercised for normal range of travel and smooth movement. In November 2009, while conducting this inspection from the pilots seat he discovered the aileron boost handle was binding when it was extended to the "boost-out" position. Further investigation revealed that the the same boost handle would extend normally when actuated from the FE's seat. It appeared that the slight side pressure when extending the handle from the pilot's seat revealed a possible fault in the boost handle mechanism. WO Henry brought the suspected fault to the attention of his co-workers who initially came to the conclusion that normal operation of the aileron boost handle from the FE seat meant that the aircraft was fully serviceable. Not satisfied with this conclusion, he pushed for a more thorough investigation of the rigging mechanism. Following this investigation, technicians discovered that the aileron boost handle was in fact missing a roller and this had caused the boost handle to bind with the slightest side pressure. It is unknown how long the aircraft had flown in this condition as the boost out rigging check is usually carried out by both the pilot and a FE during the Pilot PFI with the FE actuating the boost handles from his crew seat. If required during a flight control related emergency, a binding aileron boost handle could have catastrophic consequences. WO Henry

is commended for his exemplary professionalism and perseverance in finding the mechanical fault thereby eliminating the possibility of a disastrous in-flight incident and is truly deserving of this For Professionalism award. ◆

Warrant Officer Henry is currently serving with the Maritime Proving and Evaluation Unit in 14 Wing Greenwood.

Mr Dave Fischer

In December 2009, Mr Dave Fischer, a highly regarded senior analyst with GasTOPS Ltd, was consulted during a formal 423 Maritime Helicopter Squadron Flight Safety (FS) investigation. The purpose of the investigation was to determine the cause of a fire that engulfed the rotor brake system of aircraft CH12436.

During the ensuing consultation Mr. Fisher had the opportunity to view numerous images taken as part of the FS investigation. During the review he astutely observed an inconsistency that had eluded other subject matter experts involved with this investigation, in that the grease plug that is normally threaded into the Main Gear Box's (MGB) "retainer seal" was missing. Advising the FS Investigation Team, Mr. Fisher's discovery provoked a detailed review of pre-existing vibration analysis (VA) records, and the dismantling of the number two engine's drive train. From these activities it was possible to establish a time-line as to when the grease plug came loose and recover the grease plug from within the interior of the high-speed shaft.

The retainer seal plug, encapsulated within the high-speed shaft, caused a significant imbalance of the shaft, which caused the MGB yoke bushing to disintegrate. This compromised the integrity of the MGB yoke. Had the rotor brake fire (a separate occurrence) not happen when it did, the detached plug would have remained undetected which would have eventually resulted in a catastrophic failure of the aircrafts drive train.

Mr. Fisher's outstanding attention to detail and extensive systems knowledge of the CH124 greatly enhanced the investigative process by exposing a clue that had otherwise gone unnoticed. His unyielding and enduring qualities as an aviation professional make him very deserving of this For Professionalism award. ◆

Mr Fischer works for GasTOPS Ltd based in Ottawa.

For Professionalism

For commendable performance in flight safety

Mr Thomas Mielken

In January 2010, Mr Mielken from Orenda Aerospace was asked to investigate the cause of two separate occurrences of apparent ice ingestion in the left hand engine of a CF188 *Hornet* aircraft. In the first occurrence, the left hand engine was replaced after what appeared to be an ingestion of a block of ice. Several first stage blades had curled tips but no airfoil material was missing. Twelve days and 2.6 flying hours later, the replacement engine again ingested another block of ice.

Using a Bottom Line Measures data base program, Mr Mielken discovered that the occurrence aircraft had 5 left hand engines damaged due to ice during the past three years. Drawing on his vast experience and technical knowledge, Mr Mielken speculated about an environmental control system (ECS) modification that had been carried out on all *Hornets* in the 1980's. Mr Mielken recommended that investigative maintenance be carried out on the ECS water drain lines to see if there was a recurring issue. The verification of lines located in the intake leading edge of the aircraft did not reveal any cracks, however during a ground run with the panels removed it was evident that an ECS line was leaking. The leak caused an ice build up at the entrance of the engine intake and once the ice reached a certain size it departed the aircraft and was ingested into the engine.

Without Mr. Mielkin's keen trouble-shooting ability this problem would have undoubtedly continued to go undetected, causing a significant setback for the 4 Wing maintenance team. Mr. Mielkin displayed outstanding initiative, professionalism and an innate

ability to look beyond the obvious while addressing this situation. Although the financial ramifications attributed to engine repair and overhaul are easily calculated, the future Flight Safety implications that may have been averted are difficult to measure. Mr Mielkin is very deserving of this For Professionalism award. ◆

Mr Mielkin works for Orenda Aerospace based in 4 Wing Cold Lake.

Mr Mike Lecours

Mr Lecours, a contracted civilian employee within DAEPM (TH) was asked to examine photographs of the ship-borne Hot Closed Circuit Refuelling (HCCR) operations that were conducted by CH146 *Griffon* helicopters during Op Hestia aboard Her Majesty's Canadian Ships. While examining the photographs, Mr Lecours questioned an aspect of the published refuelling procedure and decided to investigate further. He obtained the civilian publications outlining the procedures for commercial Bell 412 helicopters to follow when conducting refuelling on oilrigs. He noticed that the civilian manual called for the aircraft to be lashed to the deck by the skids while its rotor were turning and not by its fuselage attachment points as was evident in the photographs of the *Griffon* operation.

Mr Lecours determined that if the helicopter was to shift while attached to the deck by its fuselage mounts, the lashing lines could tighten causing a dangerous resonance, serious aircraft damage, and potentially a fire. When lashed to the deck by its skids the aircraft is free to rock on its landing gear thereby eliminating the effects of ground resonance. He promptly notified engineering authorities and the in-theatre ship-borne HCCR procedure was immediately amended.

Mr Lecours demonstrated outstanding attention to detail and a genuine concern for the safety of the operation. His actions resulted in the elimination of a significant flight safety hazard. He is very deserving of the For Professionalism award. ◆

Mr Lecours works for the Directorate of Aerospace Equipment Program Management (Transport and Helicopters) in Ottawa.