National Defence Défense nationale

Flight Comment

ISSUE 4, 2012

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SÉCURITÉ DES VOLS FLIGHT SAFETY

Canada

Views on Flight Safety

J.C.Y. Choinière, Colonel, Director of Flight Safety

Since taking over as the Director of Flight Safety in August 2011, I have been humbled by the dedication, loyalty and professionalism that I have seen across the Air Force. I have had the opportunity to meet many of the flight safety professionals throughout Canada and abroad at the annual DFS seminar. I am constantly amazed at how passionate and active all of you are in promoting flight safety. I am also very much looking forward to meeting the airmen, airwomen and others that support operations during the annual DFS briefing. It is each and every one of you who provide the key to the success of our Flight Safety Program.

Flight safety witnessed some challenges in 2011 due to personnel shortages at the supervisory level and the high operational tempo that resulted from our Air Force's deployment in two different theatres. While being very well supported by the chain of command, the Flight Safety Program felt the impact of increased workload due to domestic and theatre investigations and oversight of more organizations contracted to support CF flying operations. Our focus needs to remain on our activities to ensure that we capture the lessons that will help us to prevent accidental loss of personnel and critical resources.

In the last year, four points were observed from an analysis of the 2011 FS data. First, the CF and the Air Cadet Glider Program have seen a higher level of personnel injury and damage to aircraft in recent years. The Flight Safety team is exploring ways of identifying the associated hazards and addressing them to reduce these numbers. Second, the number of near mid-air collisions in training areas has increased, despite efforts to reduce them. There will be no easy solution for this complex problem, but a concerted effort by all is required before there is another accident. Third, the data for the 2011 report was hindered because more than 16% of reports were not completed on time. The release of preventive measures and their timely staffing by the chain of command is critical to an effective prevention program. DFS will endeavour to monitor this problem closely in the future, determine what is causing the delays and take steps to streamline our reporting processes. Finally, our Human Factors Analysis and Classification System (HFACS) for classifying human factors is being revised. Investigators have had difficulty assigning consistent cause factors resulting in less accurate data – a situation we are striving to remedy soon.

The 2011 DFS briefing focused on operational tempo, crew fatigue, automation and runway incursions. The reality of flying aircraft to their maximum operating limits, in hostile theatres, and with air and ground crews taxed to their limits, demands an alert and energetic Flight Safety Program. It seems to me that for the Canadian Forces, times are getting more and more interesting every day. Our flying operations face ever increasing challenges, as our operational tempo remains high and new demands appear almost daily. Procurement programs for new capabilities have been announced and some of these are already introduced to the flight line with a rapidity not seen since the 1950s. As if all that were not enough, the Air Force's direct support to operational theatres can increase at any time. While Canada has never been a neutral country, it has been quite a while since we have been so overtly engaged on the international scene, and there can be no doubt that Canadian airpower will figure more and more prominently in upcoming combat and security operations.

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Flight Comment


The Air to Air photo of CP140102 *Aurora* from CH149908 *Cormorant* was taken flying over the Bay of Fundy on 29 August 2011.

Photo: MCpl Johanie Maheu, 14 AMS Wing Imaging

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THE CANADIAN FORCES FLIGHT SAFETY MAGAZINE

Flight Comment is produced four times a year by the Directorate of Flight Safety. The contents do not necessarily reflect official policy and, unless otherwise stated, should not be construed as regulations, orders or directives. Contributions, comments and criticism are welcome. Contributions become the property of Flight Comment and may be edited for content, length or format.

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Subscription orders should be directed to: Publishing and Depository Services, PWGSC CGP/EGC, Ottawa, ON K1A 0S5
Telephone: 1-800-635-7943
Email: publications@pwgsc.gc.ca

Annual subscription rates: for Canada, $19.95, single issue, $7.95; for other countries, $19.95 US, single issue, $7.95 US. Prices do not include GST. Payment should be made to Receiver General for Canada.

To contact DFS personnel on an **URGENT** flight safety issue, please call an investigator who is available 24 hours a day at 1-888-927-6337 (WARN-DFS).

The DFS web page at www.airforce.forces.gc.ca/dfs offers other points of contact in the DFS organization or write to dfs.dsv@forces.gc.ca.

ISSN 0015-3702
A-JS-000-006/JP-000

For Professionalism

For commendable performance in flight safety

Corporal Dany Major

While Cpl Dany Major was preparing tools and components for the installation of a CP140 *Aurora* engine reduction gear box (RGB), he discovered that the weight scale was incorrectly graduated in five pound incriments instead of the required 50 pound incriments.

On his own initiative, Cpl Major investigated airworthiness documentation and discovered that the incorrectly graded scale had been used on eight separate RGB installations. Upon realizing that six of these eight quick engine change units (QECUs) were already installed on aircraft, he immediately informed his supervisor and recommended that the mounts be inspected. One CP140 aircraft was flying at the time, and a collaborative decision was made to recall it to inspect the engine mounts for premature cracking because of the improper rigging.

The inspection of the recalled aircraft, and the other five QECUs, revealed that the upper resilient engine mount assemblies were all rigged incorrectly, as suspected. Cpl Major's exceptional attention to detail, outstanding initiative, and timely actions were instrumental in preventing a possible catastrophic in-flight failure of the QECU mount system. For his extraordinary professionalism and exemplary actions, Cpl Major is most deserving of this For Professionalism award. ◆

Corporal Major currently serves with 440 Transport Squadron, Yellowknife.

Master Corporal (retired) Gerald Hebert

When tasked to perform Independent Checks on *Griffon* aircraft CH146433, MCpl Gerald Hebert showed great initiative and attention to detail by going above and beyond requirements to visually inspect all open assemblies. His inspection discovered previously undetected damage on the mast assembly, which led to similar damage being discovered on other CH146 aircraft.

CH146433 had recently completed a successful 3000-hour contractor inspection, had been accepted by the unit, and completed four additional 25-hour inspections. MCpl Hebert went beyond the scope of a 25-hour inspection and in leveraging his vast knowledge of CH146 aircraft, he subsequently found wear scratches on the mast assembly. These were in an area normally hidden by the swash plate. This damage was a potential indicator of wear in the Gimble Bearings which could have led to a catastrophic failure of the main rotor system.

Further investigation revealed that damage originated during the recent contract maintenance of the aircraft. The damage was not discovered during the acceptance check or on any of the follow-on inspections. In sharing this information with other CH146 units, one additional aircraft was found to have similar damage. MCpl Hebert's attention to detail and dedication to ensuring safety of flight through unwavering maintenance standards, make him deserving of this For Professionalism award. ◆

Prior to retirement, Mr Hebert served with the Aerospace Engineering Test Establishment, 4 Wing Cold Lake.

Views on Flight Safety

(continued from page 2)

The challenge this poses for the Flight Safety Program is to continue to contribute effectively to force protection and mission accomplishment. Some might question the utility of flight safety as we become more involved in direct support to combat operations, or indeed, in combat operations proper. This is certainly an area that I want to address, because there could be misconceptions about the role flight safety should play. To offset complacency with respect to old equipment, and to ensure safe handling of new equipment, a greater emphasis must be placed on supervision at all levels. This includes the person on the hangar floor, the servicing supervisor, the flying supervisor, unit and station commanders, command staffs and headquarters staffs – everyone who has a directing responsibility connected in any way with the safe and efficient operation of our aircraft, must make an extra effort. Studies point out the need for a new emphasis on supervision. They also suggest the need for a more efficient system of overcoming deficiencies in equipment and facilities and for an examination of aircrew standards with a view to increasing proficiency. Experience has shown that supervisors' personal attention is indispensable and that their increased effort is essential in reducing the unnecessary loss of personnel and equipment resulting from aircraft accidents. The challenge remains for supervisors at all levels to be vigilant for those circumstances that might give rise to the risk of personnel injury and aircraft damage.

DFS and the rest of the FS is not without its challenges! Although the RCAF's Flight Safety Program has been a world leader in the field for over 65 years, we are continually fine-tuning to ensure that the men and women of all environments who either conduct or support air operations do so within an acceptable level of risk. We all have a say – Flight Safety is everybody's business! ◆

The Editor's Corner

If you happen to be someone who regularly reads this column, or, like our own Sergeant Calderone, reads this page first, I would like to direct you to four items within this issue which pertain to our Flight Safety Program.

First, our "Views on Flight Safety" column returns with our Director, Colonel Choinière, writing on results from the 2011 Annual Report on Flight Safety and adding some insight on the future of our program and some of the associated inherent challenges. This is a must read, and I say this not because he's the boss, approves my PER and influences my next posting, but because it's particularly insightful!

Second, our Flight Safety Occurrence Management System (FSOMS) manager, Mr Pierre Sauvé, has a riveting summary of the CF 2011 Flight Safety Report – something available in its entirety on the DFS web site. Stay tuned next issue for a summary of what FSOMS is about and how it's used to contribute to the FS Program.

Third, have a look at the Dossier article "Being Predictive in a Reactive World" by Mr Jim Burin. This paper is probably among the best and most concise I have seen describing some of the difficulties, along with potential benefits, of a more predictive FS Program.

Fourth, if you want to put a face to those in headquarters flight safety staff positions, have a look at "The Back Page".

On behalf of everyone in the Directorate of Flight Safety, may I pass along our best wishes for a safe 2013.

Captain John W. Dixon
Editor, *Flight Comment*

From the

Flight Surgeon

Aeromedical Training:
Who Needs It?

By Master Warrant Officer Ed Lawrence, Director General Air Personnel, Ottawa

MWO Lawrence joined the CF in 1979 as a Medical Assistant and remustered to AeroMedical Technician in 1985. Postings include 2 tours at CF School of Survival & Aeromedical Trg, 404 Sqn AeroMedical Training Unit and CF Environmental Medicine Establishment in Toronto. He currently works for the C Air Force Med Advisor as the SO AMT and the MOSID Advisor for the Aeromed Tech Trade.


Photo: James Clark, DRDC

Who really needs aeromedical training anyway? Is it really all that important?

According to 1 CAD orders Vol 5, 5-301: "a. all aircrew members on CF registered or operated aircraft; and b. passengers in CF aircraft equipped with ejection seats" are required to complete aeromedical training. More specific directives are found in A-MD-214-000/PT-001. International documents such as NATO Standardization Agreements (STANAGs) and Air Standardization Coordinating Committee (ASCC), to which Canada is a signatory, exemplify the importance and requirement for aircrew to be trained and current with the aeromedical aspects of flight.

In today's more educated and inquisitive society, orders and directives sometimes aren't enough. The reasons "why" orders, directives and instructions are written, is essential for comprehension and compliance. The "why" is one thing none of these documents really answer. In order to do that, it would behoove us to look to the history of flight and the development of aviation physiology.

Since the first flight of the Wright brothers in 1903 and the Silver Dart in 1909 people have managed to place themselves in an environment they weren't designed for. Once in that environment, they began encountering phenomena they had never been exposed to before. As aircraft improved, moving farther, faster and higher, people had to find ways to cope with this new environment and its unknowns. According to Professor Jay Dean PhD, WWII was a "physiological war". Aviators flew unpressurized aircraft 18,000 feet to 40,000 feet. Above 18,000 feet, performance was impaired by hypoxia, decompression sickness (DCS), and hypothermia. Bailing out from these altitudes exposed aircrew to hypoxia, frostbite and parachute opening shock. The peak opening shock at 26,000 feet and 40,000 feet was +26.5G and +33G respectively.

In addition, the most advanced high performance pursuit aircraft of the time subjected allied pilots to centrifugal forces upwards of +5G or more. This resulted in limited mobility, temporary blindness, and in some cases unconsciousness, due to reduction of cerebral blood flow.

As a result of these potentially life threatening problems, unprecedented research was undertaken to find ways to adapt to this new environment and aviation physiology research and training were born. Groundbreaking research of the time yielded such aviation milestones as pressurized cabins (B-29 *Superfortress*, spring 1944), the G-suit (invented by Dr Wilber R Franks (a Canadian)), the first human centrifuge (in the allied countries (Canada)) and hypobaric (high altitude) chambers for research and training.

Because of the unforgiving nature of the flight environment, aircrew received practical and academic training to prepare them. Aircrew were subjected to flights in hypobaric chambers, at times in excess of 43,000 feet, which simulated the ambient atmospheric conditions of flight. This apparatus exposed aircrew to hypoxia, pressure and temperature changes, positive pressure breathing and dramatic loss of cabin pressurization. Repetitive procedures, equipment checks and usage were employed in this "controlled environment" to educate and prepare aircrew. Ejection towers were also utilized to prepare aircrew for the forces they would face in the event of an ejection. The human centrifuge was employed for both continued research and as a training tool for pilots of high performance aircraft. The ability to tolerate high gravitational forces afforded these aircrews the ability to conduct more aggressive aerial combat manoeuvres (ACM) thus providing an advantage over their

Photo: James Clark, DRDC

adversaries. The Barany chair, affectionately known as the "spin and puke", exposed aircrew to disorientation stimulation to help prepare them for the stresses of flight.

Today, the Canadian Aeromedical Training Program for aircrew differs from that of yesteryear and from that of a number of other countries. In order to reduce direct exposure to altitudes above 18,000 feet and avoid the risk of DCS, Canada now employs the reduced oxygen breathing device (ROBD) and combined altitude depleted oxygen (CADO) for hypoxia recognition training. The ROBD is a ground level interactive simulator allowing aircrew to fly a mission as hypoxia is induced through the mask. The pilot is then required to recognize the effects of hypoxia and take appropriate action. The CADO is installed in the hypobaric chamber and affords aircrew the opportunity to experience all aspects of hypobaric flights including hypoxia without having to venture above 10,000 feet. Contributing to the reduced altitude requirement is the positive pressure breathing bench. This ground level training device provides a more controlled environment allowing aircrew to experience and become proficient at positive pressure breathing. Academic computer based training (CBT) now makes aeromedical recertification training more convenient for aircrew.

New challenges continue to be discovered, such as transiting from negative to positive "G" in brisk ACM, and yields a phenomena know as the "push pull effect." Flying with night vision goggles produces an entire other gambit of potential visual and orientation problems.

Although humans have been operating in this environment for more than 100 years, they continue to remain as the "weak link". The insatiable human appetite for "pushing the envelope" continues to create more hurdles to overcome. ◆

Chafing and Stainless Steel

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

Year 2012 was very busy for the RCAF and as it comes to a close, some may whisper that we were lucky. One of the flight safety occurrences we faced, the fire that broke out on board a *Hercules* while operating in Key West, Florida, could have ended much worse. In keeping with the principles of flight safety, the investigation and analysis that ensued identified causes, preventive measures and generated fleet-wide special inspections to prevent reoccurrence. This accident reminded us of the dangers associated with pressurized lines carrying combustible or flammable fluids throughout an aircraft. Sadly, we have not always been this lucky. In 1994, a somewhat similar event had a much different outcome. When the main fuel line of a *Sea King* engine ruptured due to chafing, two of our own perished, two more were severely injured, and we lost the aircraft. While the investigation into the *Hercules* fire continues, some preliminary findings can and must be shared to increase community awareness and safety.

The Problem is abrasion or chafing and the following article is dedicated to its dangers and prevention. Vibration and gravitational forces exerted during flight are often severe and can bring components into contact with each other, resulting in chafing, a major aviation safety issue. Chafing is the deteriorated material state of a component that results when it rubs against another component. In the extreme, the result can be total component failure as its structural integrity degrades to the point of failure or, in the case of a high pressure hydraulic line, to the point of rupture.

Metal	Alloy and Temper	Rockwell Hardness B-Scale
Stainless Steel 304	temper pass	88
Titanium	annealed	80
Aluminum	A96061-T6	60
Steel-Low Carbon	cold rolled	60
Aluminum	A95005-H34	20-25

Table 1. Rockwell Hardness Comparison

The Causes of chafing are many and as introduced above, the aviation world faces unique challenges. We must contend with a large number of potentially dangerous substances in close proximity. Yet, thickness and material composition of structures, engines, reservoirs, lines, hoses and electrical wires necessary to operate all on board equipment and achieve flight must be carefully chosen to strike the best compromise between performance and weight. Finally, shape and space restrictions inherent to aircraft design often make it impossible to maintain ideal component separation and clearances in tightly packed spaces.

The Challenge is that safety is a balancing act and introducing a change to remedy a problem often introduces another somewhere else down the line. Let me introduce one such "improvement" – the stainless steel braid covered flexible line. Mostly used to carry pressurized flammable fluids, they were gradually introduced in aviation to replace older rubber or textile covered lines. They last longer and are lighter and stronger. So what is the problem you may ask? Referring to the attached metal hardness chart, Table 1, you will see that stainless is amongst the hardest metals found on an aircraft.

Figure 1

Figure 2

While this is great and stainless steel braided flexible lines are now much more durable, it also makes them **extremely dangerous** to everything coming in contact with them. Take a look at Figures 1 and 2 and judge for yourself. This illustrates what a stainless steel braided line is capable of when in contact with aluminum.

Concerning the previously mentioned *Sea King* accident, evidence strongly suggests that a stainless steel braided line wore through an engine main fuel line. In the recent *Hercules* accident, not only did a stainless steel braided line wear through the insulation of a heavy gauge electrical conductor, but also its property of electrical conductivity played a major role in the fire. While a stainless steel braided line in contact with another surface can chafe, when it wears through the insulation of an electrical conductor it can generate an arc. Given enough electrical power, the arc from the electrical wiring back to the stainless steel line can cause a pinprick hole in the line that then allows pressurized flammable fluid to atomize in the presence of an electrical arc and start a fire. This is a disastrous recipe better kept inside your furnace or a gas turbine engine, not in an aircraft fuselage!

The Reality is that it's never ideal to route electrical wires near lines that carry flammables such as fuel, hydraulics or oxygen, yet we all know that limitations involved in aircraft design make it necessary. The separation of wires, fluid lines or oxygen lines from each other and the aircraft structure is critical and when working on an aircraft or carrying out an inspection, you should always be on the lookout for any indication of wear or interference. In doing so, it is imperative that vibration and gravitational forces exerted during flight be taken into consideration.

The Defence is you. Only through awareness, knowledge, vigilance, professionalism and proper supervision, can we prevent faulty installation or identify and correct hazards early on to improve safety. To support us, the correct installation of flexible hoses is detailed in the Canadian Forces Technical Order (CFTO) C-12-010-040/TR-010 and minimum clearances of electrical wiring are explained in the C-17-010-002/ME-001. Both of these publications are readily available through your local technical library or on the DWAN at http://publications.mil.ca/pod/pubs/pubSearch.jsp. The information they contain is essential for anyone involved in aircraft inspections at all levels. It is our responsibility as aviation professionals to ensure that we know and understand the critical aspects of proper plumbing and electrical routing which may not be covered in detail in the specific aircraft type CFTO's. Take some time and review the valuable information provided in the CFTOs mentioned above. If you observe any interference issues, STOP, write it up immediately and bring it to the attention of your supervisors. This flight safety could be a fleet-wide issue and the SAMEO and/or the WFSO can inform the rest of the community if needed.

The Good News. While reading previous issues of *Flight Comment*, you saw that our men and women are finding some of these conditions before they develop into an accident and their professionalism is rightfully and duly recognized. One such event had a flex line chafe through a servo cylinder wall until only 0.015" remained to contain 1500 psi. 0.015" = 1/64 of an inch = 0.4 mm. That is the thickness of 4 sheets of paper.

OUR Challenge is simple – not easy but simple. We **MUST** find them all. A word of caution here, don't focus only on steel braided lines. Look at all lines and wires equally. Look at Figure 3 and question yourself. Obviously, this is not a steel braided line yet wear of the surrounding structure is evident. In fact, this line has been replaced several times over the years. Why was it not repositioned or clamped? How many have seen it? How few have recognized the danger? What should they have done?

But most importantly, what will you do? ◆

Figure 3. Wear caused by non-steel line

YOUR ATTITUDE > FLIGHT SAFETY > YOUR LIFE

Being Predictive

in a Reactive World

By Mr Jim Burin, Director of Technical Programs, Flight Safety Foundation

Jim Burin has 44 years of aviation experience and 36 years of experience in the aviation safety field. He is a retired Navy Captain, having commanded an attack squadron and a Carrier Air Wing during his 30-year career. Prior to joining the Flight Safety Foundation he was the Director of the School of Aviation Safety in Monterey, California. He is the chairman of the Foundation's international ALAR effort and led the Foundation's international efforts in smoke-fire-fumes, functional check flights, and runway safety.

The big push today is for safety to be more predictive instead of reactive, the theme of International Society of Air Safety Investigators (ISASI) 2012 conference being one example. This is a noble and worthwhile effort. However, regulators and safety investigation organizations are reactive by nature, so it is not an easy task. ISASI members are the ones who generate this reaction, since investigations are reactions to events. This will not and should not change. However, given our current "predictive" capabilities, and even more, given the reactive world we work in – particularly the safety world – is being predictive a realistic goal?

This really raises two primary questions: 1. Can we be predictive? and; 2. Would prediction be successful in reducing risk? We will attempt to answer those questions later. As some background to answering them, let's step back to the very basics of safety and safety 101.

Safety is risk management. You can talk about SMS, ATOS, GASP, TEM, IOSA, CAST, etc. – but safety comes down to this one very basic concept – you need to eliminate, reduce, or acknowledge the risks you face. The first (and most difficult) step in any listing of risk management procedures is identifying hazards.

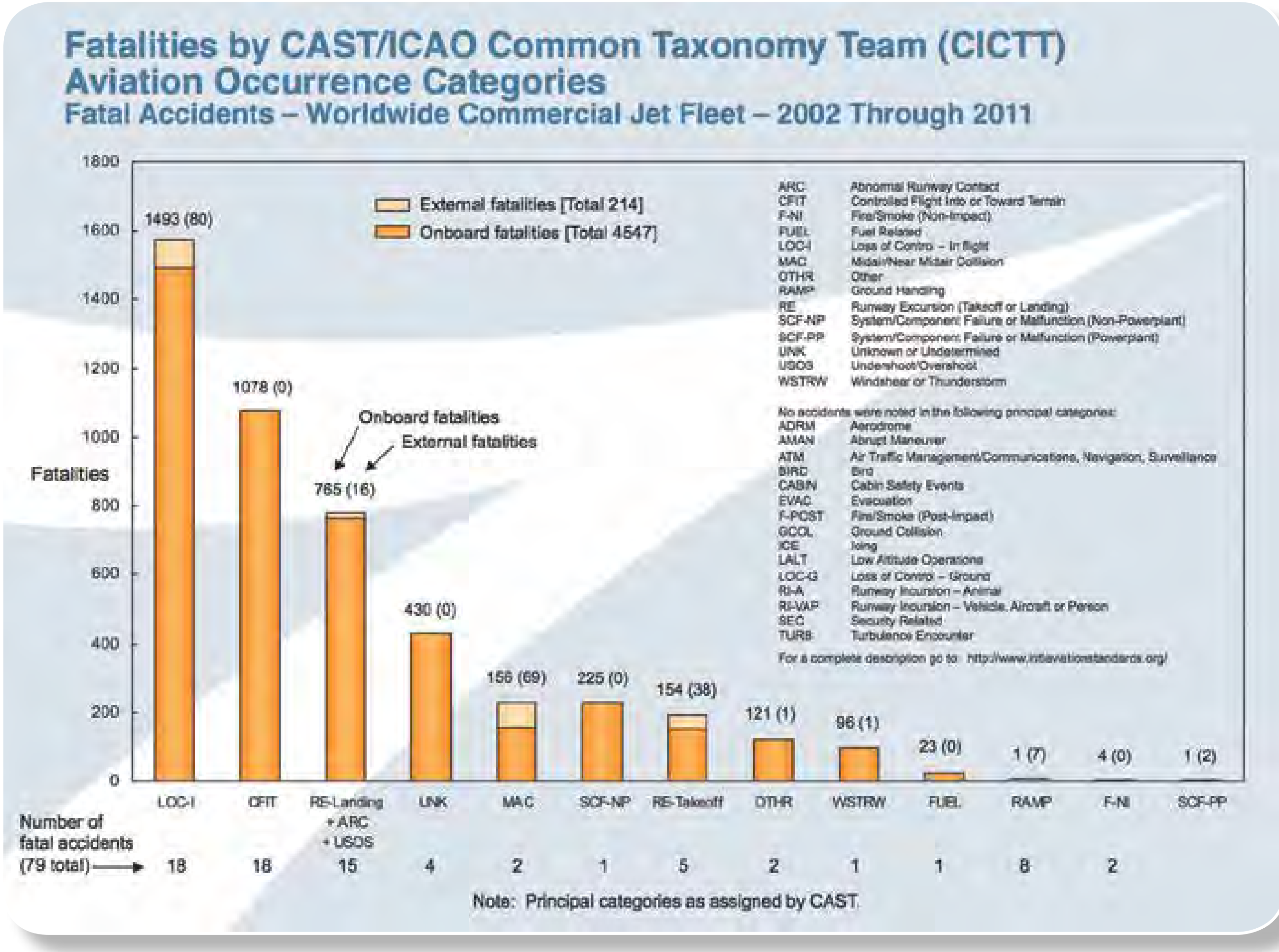


Figure 1

If you don't know them, it is difficult to address them and thus to reduce risk. To identify hazards, you need data – accident data, incident data, and other data. In addition, we not only want to just reduce risk, but we would like to reduce risk in the highest risk areas. It would be good to prevent one accident every 10 years, but even better to prevent 10 accidents every year. We have data that show us what the high risk areas are. Figure 1 is the annual Boeing accident summary for 2002-2011. You don't need to be a trained analyst to look at this chart and determine what the high risk areas are. So safety is essentially one thing – managing risk, and the key to managing risk is utilizing data to identify the hazards. All safety professionals know that risk equals probability times severity. We also know that everything in life has risk. Managing that risk is called safety. So, how do we manage risk? Well, you modify the probability or you modify the severity of a hazard. For example, for runway excursion risk, you can modify the severity by installing an engineered material arresting system (EMAS) bed at the end of a runway. This does not affect the probability of a runway excursion, but it does reduce the severity, and thus the overall risk of a runway excursion. Likewise, you can establish stabilized approach criteria and have a no fault go around policy. These will reduce the probability of a runway excursion, and again the risk. However, these will not affect the severity if an excursion occurs. Now some organizations operate in higher risk environments than others – i.e. they are high risk organizations. In other words, in their risk calculations, severity is a large number.

Due to the type of operations, and particularly the consequences of risk management failures, some organizations operate in high risk environments and risk management is not just important, it is critical. Examples of this type of organization are the nuclear industry, the oil and gas industry, the chemical industry, medical, and, of course, aviation. It turns out that these organizations have some common elements they use in managing risk successfully. These elements include: good procedures that are written, well developed, and kept current; investigation of risk management failures with the goal of preventing them from happening again; sharing of information on risk management successes and failures; being proactive when addressing risk; and utilizing data in their risk management efforts.

Let me provide definitions for some of the terms that have been used that will be helpful as we continue: **Reactive** – wait until an accident happens, then address the risks; **Proactive** – do something before an accident happens by utilizing history, data, etc. Safety has a well earned reputation for being a leader in risk management because of its proven ability to be proactive; **Predictive** – do something based on potential risk to avert an accident that has not happened (yet). Figure 2 depicts a scale of how these definitions might be viewed with reactive at one end of the spectrum and predictive at the other. Prediction is really not difficult when talking about the major risk areas identified earlier. For instance, we can all predict 90 percent of next year's major accidents. 50% will be approach and landing accidents, and half of those will be runway excursion accidents. There will be at least two turbojet and four turboprop controlled flight into terrain (CFIT) accidents, and there will be one or two upset aircraft accidents. A small percent of the accidents each year are what is now called "black swan" events. These are events that, by definition, cannot be predicted. These include accidents like TWA-800, QF-32, and BA-038. We may never be able to predict events like these, but perhaps we can predict other critical areas to reduce risk.

This brings us back to the two questions posed earlier: 1. Can we be predictive?; and 2. Will it reduce risk? The answer to both of these questions is based on one thing – data. All our risk management efforts today are based on data. If you don't have data, it is unlikely you can get support for any risk reduction effort. That is why the Flight Safety Foundation's approach and landing accident reduction (ALAR) and CFIT efforts were successful in the 1990's – they replaced a lot of qualitative ideas with quantitative facts, all based on data. Now the data we use can be from an accident investigation (i.e. reactive) or from a data study of previous accidents or incidents (i.e.) proactive, or from potential events that haven't even happened (i.e.) predictive. One word of caution about data, particularly in today's digital world. It is possible to have too much data. There are organizations that get so much data that just managing it on a day to day basis takes all their time, energy, and expertise, and the real value of the data is never fully exploited.

So back to the question of can we be predictive. The answer to this depends on what you want to predict. At this time, it is unlikely that being predictive will discover some new, unknown high risk area and prevent a "black swan" event. It is doubtful we will identify some new high risk area like CFIT or loss of control (LOC) by prediction – we have already identified the high risk areas. However, by using today's data collection and analysis capabilities, prediction may enable us to look deeper into the already identified high risk areas to gain more insight into how effective our risk reduction efforts are, and perhaps identify risk reduction gaps we have missed. So can we be predictive – yes.

Now to answer the question "will being predictive reduce risk?" I think the answer to this is again yes. Our wealth of data today enables us to not only look at past accidents and incidents, but to also see what is happening in normal day to day operations, and to identify what the trends are. This is where the real benefit of prediction will be found – using data to look at trends that point to things that have not happened yet. Data enables us to look at the known high risk areas and "predict" where we might look to reduce the risk even more – and without having an accident. Some examples are shown in the work Aviation Safety Information Analysis and Sharing (ASIAS) has done in identifying areas of multiple Terrain Awareness and Warning System (TAWS) alerts, Traffic Alert and Collision Avoidance System (TCAS) hot spots, and highlighting runway excursion risks before an excursion accident happens.

All this leads us to our reactive world and what support predictive efforts will get, i.e. what decision makers will do. This is probably our biggest challenge when it comes to making prediction successful. Just because we can predict does not mean prediction will be successful in reducing risk. Decision makers, particularly bureaucratic decision makers, are reactive by nature. The only way we can hope to influence them is by going back to the basics of risk management. We need to be able to show the risk, and show the ability to reduce the risk by addressing the probability or the severity. The only way we will be able to do that is with data. However, we must realize that even with data it may be difficult to get decision maker support due to the reactive nature of the system. Sometimes support is hard to get even when being reactive. For example, let's say we could have predicted TWA-800. What would have been the result? Remember, it has taken 15 years to start seeing the risk reduction actions identified in that accident, and this was not a predicted risk, this event happened! We knew that CFIT was the leading killer in the 90's, yet it took the Cali accident to make TAWS mandatory – and then only 7 years after the accident happened! The fact is, even being reactive has sometimes been difficult – or at best very slow.

There are two keys to being predictive in a reactive world: 1. Have the data to verify the risk and show it is worth addressing, and; 2. Have the support of the decision makers. The key to both of these is data. Data will enable us to use our predictive capabilities to further reduce risk. Decision makers, this includes individuals and the safety and regulatory systems themselves, are reactive by nature. However, with today's data capabilities we can hopefully use prediction to generate a risk reduction action *before* an accident. Data will also allow us to address the age old safety dilemma: how do you prove that you prevented an accident from happening if it doesn't happen? By utilizing incident and normal operational data in our prediction process we will be able to show that we reduced the risk of an accident and hopefully avoid having to react to one. ◆

Helicopter Wake Turbulence

By Lieutenant-Colonel (Retired) Larry McCurdy

Mr McCurdy served in the RCAF for over 32 years, completed four tours on the *Sea King*, two tours on the Jet Ranger and two tours in the Directorate of Flight Safety.

Schenectady County Air Show, New York, 04 Aug 1991

All aircraft, as a by-product of generating lift, develop wake turbulence – motherhood statement complete. However, most people associate wake turbulence with a departing 747, not with a helicopter, but they are the same and they behave in a similar manner; albeit perhaps more of a concern to the helicopter that made them, than to those in proximity.

To the general public, a helicopter's rotor wash is the issue; like when I delivered an appendicitis patient to the Cornerbrook hospital in a *Sea King*. I sand blasted several cars, sent the commissionaire's hat on a cross-country adventure, and woke every patient in the 5th floor cardiac wing. More recently, the downwash from a *Cormorant* doing a royal visit demonstration caused a sign to come off a security fence and strike a by-stander causing serious injuries. These things happen, but my discussion today is about the kind of turbulence, which is far less understood and much more insidious: vortex ring state (VRS).

Just like with any aircraft, any time lift is being generated, vortices spiral off the wing tips and descend. The most serious case is a large aircraft on takeoff causing grief for the smaller aircraft attempting to land too closely behind. But with a helicopter, unlike simpler fixed-wing craft, can actually encounter its own wake turbulence (for the more visual learners, it's kind of like flying up your own backside). Also, unlike its static compatriots, the altitude at which wake turbulence can ruin your day is limited only by the service ceiling of the aircraft in question.

VRS is a particular condition where a helicopter descends into its own wake turbulence while generating lift, which results in a self-perpetuating and continuously increasing bubble of turbulent air that can engulf the helicopter and cause it to descend uncontrollably to the ground (if left uncorrected). To correct it, you must first recognize it; that's the insidious part. The corrective action is counter-intuitive, and in close proximity to the ground it takes significant intestinal fortitude to accomplish.

There are certain parameters necessary for VRS to exist and subject to various opinions, I have found the following to be true for any helicopter. To generate vortices, you must have lift, so partial power is required. The vortices descend, so you must also be in descent (about 500 feet per minute will work). And finally, you must stay in the area where the vortex is present, so low speed is mandatory (15 knots indicated airspeed will work just fine). Take any helicopter, regardless of available power, mix in low speed, high rate of descent and partial power and you will start to vibrate uncomfortably. You will also notice that your rate of descent increases as you increase power and soon your VSI will be pegged down and, failing proper action, your remaining flight time will be severely limited.

Once full VRS has been allowed to develop, there are only three possible outcomes:

a. Lower collective, apply forward cyclic and, if altitude permits, fly out of the front of the vortices;

b. Lower collective fully and autorotate, eliminating lift and therefore killing the vortex. Mind you, you still have to deal with the rapidly approaching earth's crust; or

c. Increase collective as instinct demands and crash uncontrollably into whatever terrain is beneath you, as aptly demonstrated by a *Sea King* at the Schenectady Air Show a number of years ago.

Schenectady County Air Show, New York, 04 Aug 1991

Unlike wing tip vortices, which are virtually omnipresent, a pilot has to put his aircraft into a condition where VRS can exist. Unfortunately, the required profile looks an awful lot like a transition to the hover, and instrument meteorological conditions or degraded visual environment can make it easier to slip into someplace you really don't want to be. The answer is awareness and a good crosscheck of your airspeed and VSI. Use your good airmanship to avoid VRS before it happens, so you don't have to use you superior skill to survive.

Be careful out there, says the old guy from the cheap seats. ◆

Photo: Cpl Jessye Therrien

2011 Annual Report on Flight Safety – Summary

By Mr Pierre Sauvé, Directorate of Flight Safety, Ottawa

Mr Sauvé joined the CF in 1981 where he flew over 4800 hours on a variety of helicopters and served on exchange tours with both the RAF and the US Army. He has been involved in flight safety since 1983 and served as BFSO Gagetown for 3 years. In 2010, he joined DFS as the Flight Safety Occurrence Management System manager.

The 2011 Annual Report on Flight Safety provides a synopsis of the activities carried out by the Airworthiness Investigative Authority (AIA) and the Directorate of Flight Safety (DFS) in relation to the Flight Safety (FS) Program of the Canadian Forces. It also gives statistical details on FS occurrence data collected during the year in comparison with the last ten years and highlights areas of concerns.

Statistics and Data Analysis

Flying Hours and Reporting. Compared to 2010, the number of hours flown in the CF has increased by 1.9%, accompanied by a 4.2% reduction to the Air Cadet Glider Program (ACGP), and a 49% reduction of Unmanned Aerial Vehicles (UAV) due to a cessation of *Sperwer* operations. Personnel reported 3,149 occurrences, of which 56.27% were classified as Air occurrences. When compared to last year, the rate remains virtually unchanged (207.87 compared to 208.27 in 2010).

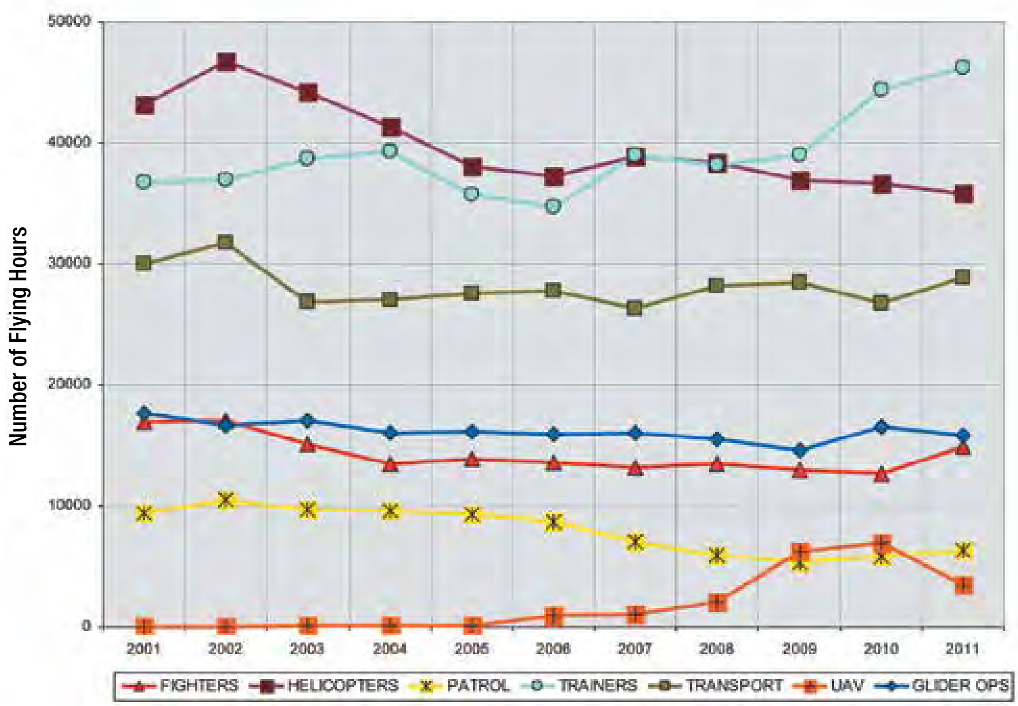
Occurrence Breakdown. The CF had a less than favourable FS record for 2011. Major and minor injuries have increased, (one fatal, six serious, and 49 minor), a total of two aircraft were destroyed (one CT155 and one CH147 *Chinook*). The air accident rate for the CF has increased for the third year in a row to 0.96. This was attributable to three category "A" accidents (one CT155 *Hawk*, one CH147 *Chinook* and one fatality) and 10 category "C" accidents (two CH146, one CH139, one CC138 and six personnel injuries). The major injuries are predominantly associated with SAR Tech operations. The serious injuries rate is above the 10-year mean and should be investigated further. The major injuries rate is greater than the 10-year average rate of 0.66, and marks the fourth consecutive year above the mean. Although statistical data for the Air Cadet program shows a decrease from last year's high (2.53 vs. 3.03) it remains above the previous 5-year mean (2.17) which is indicative of a negative tendency. The UAV accident rate was 0.0 and reportable UAV operations have now ceased.

Serial	Date	Occurrence Category	Damage	Injury	Aircraft	Event
CLASS I INVESTIGATIONS						
1	15 May 11	A	Destroyed	Minor	*Hawk*	Engine power loss
2	27 Oct 11	A	Nil	Fatality	SAR Tech	Attempted rescue at sea
CLASS II INVESTIGATIONS						
3	23 Feb 11	C	Serious	Nil	*Griffon*	Hard Landing in dustball
4	15 May 11	A	Destroyed	Serious	*Chinook*	Roll-over on landing
5	19 Apr 11	C	Nil	Serious	SAR Tech	Hard parachute landing
6	17 Jun 11	C	Serious	Nil	*Griffon*	Near CFIT / Overtorque
7	18 Jun 11	C	Minor	Serious	Glider	Hard landing
8	25 Jul 11	B	Very Serious	Minor	*Belanca Scout*	Nose-over on landing

Table 1. List of 2011 AIA Initiated Investigations

Flying Hours by Aircraft Family and Type

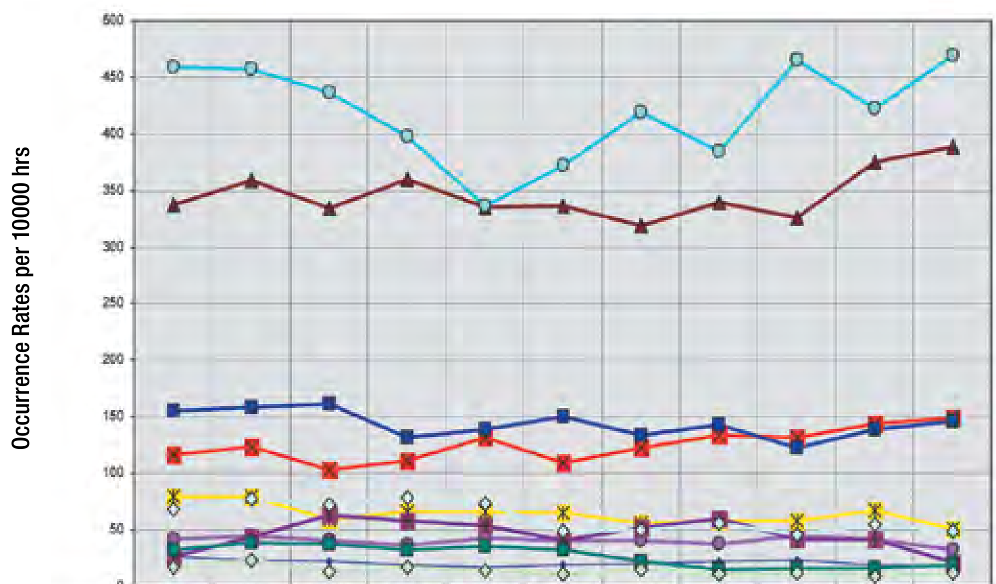
The overall flying hours indicate an increase from 149,613 to 151,485 compared to the previous year (a 1.25% increase). This was due mainly to an increase in some trainer hours (CT102, CT156), the fighters (CF18) and the transport fleets (decrease of CC130 hours and increase of CC130J and CC177 hours) which were offset by a reduction in the UAV hours. Graph 1 shows the flying hours by aircraft family.



Graph 1. Flying Hours by Aircraft Family

Occurrences by Stage of Operations

There are three stages of operations that have shown an increase with D (standard deviation) values above the normal variation, being Parked, Maintenance and In-flight. The Maintenance stage (D=2.7) remains elevated from the previous year and requires additional examination by maintenance staff. The Parked and In-flight stages will require close monitoring.

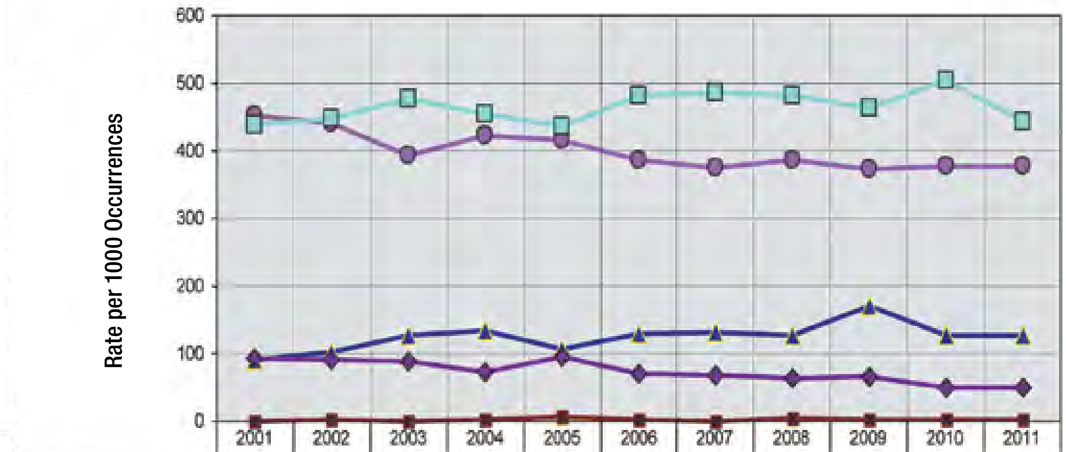


	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Towing	28.3	23.3	22.3	19.3	17.8	19.9	20.6	22.5	23.3	19.3	18.0
Taxi	41.7	44.7	41.3	36.8	42.6	41.1	41.2	37.5	45.2	41.5	32.3
Take-Off	79.9	79.6	59.3	66.3	66.9	65.0	56.0	57.9	57.9	67.0	51.2
Parked	116.3	123.3	103.5	111.2	132.2	109.2	122.7	134.1	132.2	144.5	149.7
Not Reported	28.8	44.2	63.1	57.8	54.0	41.1	52.4	60.4	42.3	41.5	21.4
Maintenance	337.9	359.2	334.2	359.4	335.5	336.2	318.9	339.5	326.1	374.8	388.3
Load/Unload/Weap	32.9	38.4	38.0	32.3	35.3	32.9	22.8	15.8	16.0	15.9	19.3
Landing	155.8	158.3	161.9	132.2	138.7	150.7	133.9	143.3	122.4	139.5	145.9
In-Flight	459.4	456.8	436.7	398.0	335.9	371.8	419.2	384.5	464.9	422.2	469.7
Ground Running	68.9	78.2	72.6	78.4	73.8	49.2	50.8	56.2	46.3	55.7	48.6
Go Around	17.6	23.8	13.3	17.0	14.6	11.7	15.7	10.8	12.4	9.2	12.2

Graph 2. Occurrence Rates by Stage of Operation – Air and Ground

Air Occurrences

Graph 3 provides a breakdown of the attribution of air occurrence cause factors for 2011. The data indicates a distinct decrease in the personnel cause factors.

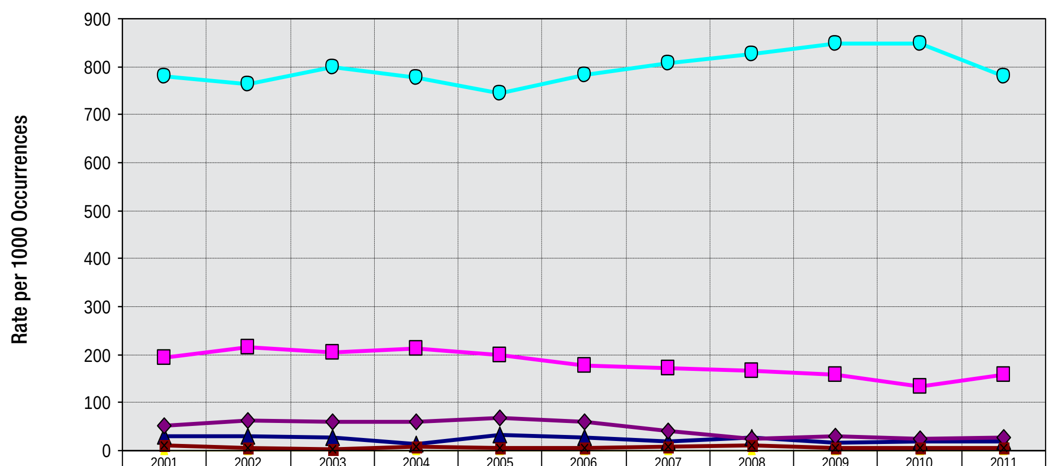


	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
ENVIRONMENT	91	102	127	135	106	129	133	128	170	128	128
MATERIEL	453	441	393	422	415	386	376	386	372	378	376
OPERATIONAL	0	0	0	1	0	1	1	1	1	1	0
PERSONNEL	439	448	478	455	437	483	485	481	463	505	442
UNDETERMINED	93	91	89	72	96	71	68	64	66	49	50
UNIDENTIFIED FOD	1	3	1	3	6	3	1	5	3	2	2

Graph 3. Distribution of Cause Factors in Air Occurrences

Ground Occurrences

Graph 4 provides a breakdown of the attribution of ground occurrence cause factors for 2011. The data indicates a distinct decrease in the personnel and a slight increase in the materiel cause factors assigned in occurrence reports.

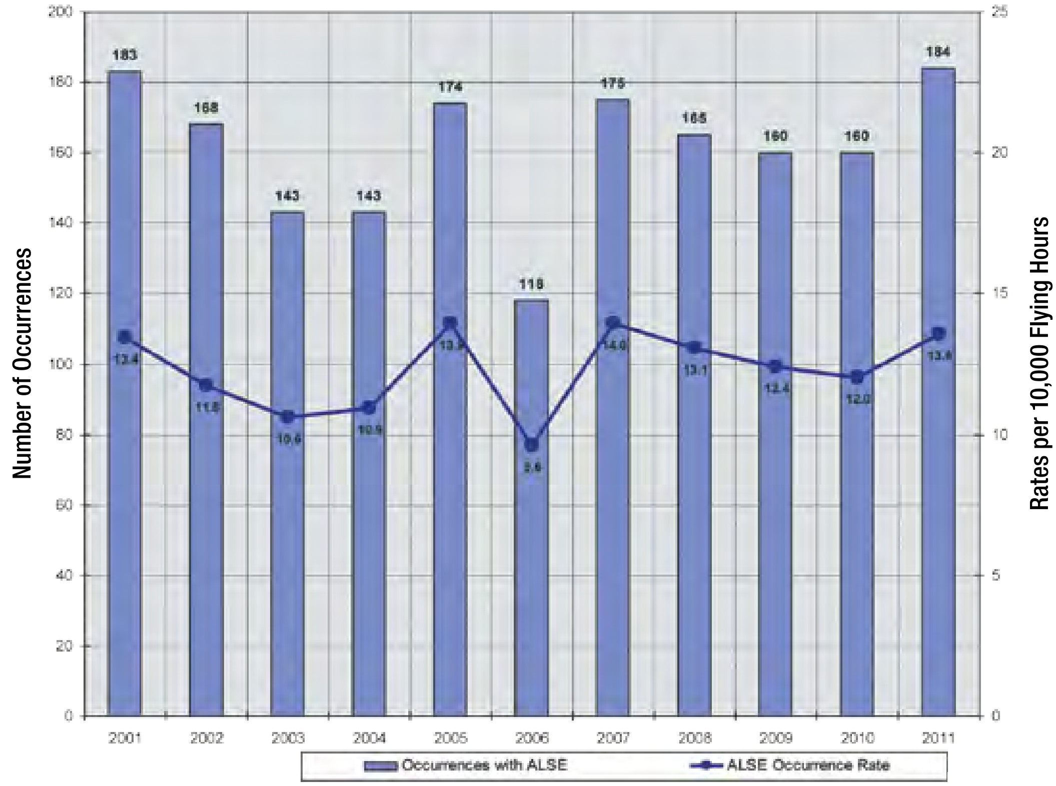


	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
ENVIRONMENT	29	30	26	14	32	27	18	27	16	18	18
MATERIEL	194	214	206	212	199	177	172	167	158	133	158
OPERATIONAL	0	0	0	0	0	0	0	0	0	1	0
PERSONNEL	779	764	800	776	745	782	808	825	847	848	780
UNDETERMINED	53	62	59	61	68	61	41	25	30	25	28
UNIDENTIFIED FOD	11	4	3	8	6	5	7	10	5	4	6

Graph 4. Distribution of Cause Factors in Ground Occurrences

Aircrew Life Support Equipment (ALSE)

The number of occurrences related to survival and safety equipment has increased from 160 in 2010 to 184 in 2011. The rate also increased to 13.6, although the rate is within one SD, we are at the highest level in the past 11 years.



Graph 5. ALSE Occurrence Volume and Rate

Open PMs from Accident Investigations

The development of effective PMs through FS investigations and their timely staffing/implementation by the chain of command is critical to an effective prevention program. Improvements to the staffing of PMs in terms of time to implement and record management of measures taken or decisions made have reduced the number of outstanding PMs. Still, some 28 PMs recommended remain outstanding from 2007 or earlier. This value is slightly lower compared to last years report. It is believed that the PM tracking process is helping the CoC process the proposed measures and prevent reoccurrence.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
PM Outstanding	1	6	3	4	0	7	7	10	7	13	38
PM Recommended	74	60	136	101	74	135	95	119	79	39	53

Graph 6. Outstanding and Recommended Preventive Measures from Accidents

We have included a portion of the 2011 report here to insure its widest distribution. For further information, The Executive Summary for this report is available online at http://www.rcaf-arc.forces.gc.ca/vital/dfs-dsv/nr-sp/docs/S/annual-annuel/2011-exesum-eng.pdf and the full report is available on the Defence Information Network at http://airforce.mil.ca/fltsafety/reports/Annual/2011-report-rapport-eng.pdf.

Laser Illumination *of Aircraft*

Information provided by The International Federation of Air Line Pilot's Association's Medical Briefing Leaflet 02 April 2012 with additional input by Mr Patrick Murphy, International Laser Display Association/ www.LaserPointerSafety.com

Laser illuminations of aircraft have become increasingly common since the mid-2000s. Almost all recent incidents are from persons with handheld lasers that have become more powerful and less expensive over the last decade. Most persons aiming at aircraft are ordinary citizens – usually male, often young – who do not understand that their laser beam can reach to the aircraft and can distract pilots or even temporarily block their vision. More worrisome, some incidents are caused by persons deliberately harassing aircraft (for example, in response to aircraft noise) or even causing police helicopters to break off their missions.

The Effects of Exposure to Laser Beams

For pilots, the most significant hazard of direct exposure to laser light is temporary vision loss. Flashblindness is the greatest concern, since the light is so strong as to leave a slowly fading afterimage. Glare is a less-intense blockage of vision as long as light stays in the eyes. Even beams that do not directly shine into pilots' eyes can cause potentially hazardous distraction and/or disruption of normal cockpit tasks.

It should be noted that, at aviation distances and conditions, the chance of these lasers causing permanent eye damage is extremely low. This is in part because laser beams spread out with distance, lessening the amount of light that can enter a person's pupil. Also, even direct illumination of pilots comes in the form of brief flashes of light, because it is very difficult to hand hold a laser on a moving target. This lessens any heat build up on the retina. Finally, there is a built-in safety factor for scientists' "Nominal Ocular Hazard Distance" meaning that even if a pilot is exposed within the NOHD, the chance of injury is small except at very close – almost point blank – ranges. Because of these factors, neither the US FAA nor the UK CAA have any documented cases of permanent eye injuries to pilots in over 15,000 incidents going back to 2004. (In fact, there are very few reports of eye injuries from pointers and handhelds even on the ground, at close range. The rate in the U.S. is on the order of 5 or less per year; most of these are self-inflicted by youths deliberately staring into the beam).

The US FAA has conducted a simulator study about the effects of laser illumination during final approach. Using lasers of varying power, the illumination of a legal 5 mW laser pointer in a cockpit could be established at a range of distances (Figures 1 and 2).

There are some reports of pilots suffering "corneal abrasions" after laser exposure. Since the transparent cornea does not absorb laser light, the cause of these painful but temporary injuries is the pilot rubbing his or her eyes overly vigorously after an incident. Therefore, if you are exposed, avoid rubbing your eyes.

Almost all lasers misused against aircraft have been ordinary laser pointers and handheld lasers. Because it is very hard for the perpetrator to acquire and maintain steady tracking of a moving target (the aircraft or cockpit), the illumination will appear as a series of flashes. Although the risk of permanent eye injuries under aviation conditions is very low, what can be extremely dangerous is visual interference and distraction during critical phases of flight. Pilots may be temporarily flashblinded, or have glare blocking their vision while the laser is on them. The light may be distracting or disruptive to vital tasks. Crews should therefore be aware of the threat and consider how they will react in the event that they see, or are directly illuminated by, a laser beam.

Example view from aircraft cockpit (in FAA flight simulator) during laser illumination flash.
The simulator is showing the aircraft on the ground, at the takeoff position. The laser is steady for the photo, however, in the actual FAA simulator tests, pilots were exposed to a single flash lasting 1 second. So you can imagine pilots see this for 1 second (the laser flashes because in real life a handheld laser would not be held steady on target. The light would flash instead of remaining steady).

1. View from the simulator cockpit. No laser illumination. **Runway fully visible**.

2. FAA Simulator Study, level 1 (10 times greater than FAA Laser-Free Zone level). Roughly equal to bright startle or distraction. 5mW laser pointer at 3,700 ft. **Runway partially obscured**.

3. FAA Simulator Study, level 2 (FAA Critical Flight Zone), where glare is the primary hazard. 5 mW pointer at 1,200 ft. **Runway mostly obscured**.

4. FAA Simulator Study, level 3 (10 times less than FAA Sensitive Zone level), temporary flashblindness begins. 5 mW pointer at 350 ft. **Runway completely obscured**.

Figure 1: *A view from the cockpit when the aircraft is illuminated by a 5mW laser from a variety of distances. Images are copyright with permission of Pangolin laser systems.*

All photos taken with the same setting: Kodak DC240 digital camera, aperture #2.8, shutter speed 1/6 second.

As can be seen, a 5mW laser can easily cause glare and distract pilots up to 3700 feet and an FAA safe distance is considered to be 11,700 feet (<0,05µW/cm2). The surface layer of the cornea may suffer from burn and the superficial cells shed off. This is called a corneal abrasion. Usually, the corneal abrasion is caused or at least exacerbated by rubbing of the eyes and is thus more or less "self-induced". Thankfully, retinal damage due to laser exposure is rare. It is estimated that fewer than 15 retinal injuries worldwide each year are caused by industrial and military lasers. Ordinary laser pointers of energy less than 5mW require more than 10 seconds of staring at close range (Mainster et al, 2004). This, however, has to be deliberate, because it is normally terminated in less than 0.25 seconds by blinking the eye. The retina also seems to be more sensitive to the shorter wavelengths, i.e. green lasers are more harmful than the red ones. Thus, fortunately, it is very unlikely that laser incidents in aviation would cause retinal damage.

Classification of Lasers

Lasers can be classified to five different classes according to their ability to damage eye or skin (U.S. Center for Devices and Radiological Health (CDRH))

Class I: Power level less than 0.39 mW. No capability for eye or skin damage. For example, CD players or laser printers belong to Class I laser devices.

Class II: Power level less than 1 mW. Safe for momentary exposure, but prolonged (over 10 seconds) may cause eye damage. No skin damage. Some of the laser pointers belong to Class II devices.

Class IIIa: Power level less than 5 mW. Safe for momentary exposure, but prolonged (over 10 seconds) may cause eye damage. No skin damage. Most laser pointers belong to Class IIIa devices.

Class IIIb: Power level less than 500 mW. Momentary exposure may cause eye damage. No skin damage. Some laser pointers fall into Class IIIb devices.

Class IV: Power level more than 500 mW. May cause eye and skin damage even from reflected laser beams. Most of the outdoor, military, and industrial lasers belong to this category.

During the 2000's, lasers became smaller, more powerful, and much less costly. Their widespread availability led to increasing misuse. Almost all lasers aimed at aircraft are pointers or battery-powered handheld lasers. "Pointers" refers to lasers that are below the legal limit in their country for lasers sold for pointing purposes. For example, in the UK pointers must be below 1 milliwatt; in the US the limit is 5 milliwatts.

Handheld lasers are similar to pointers but are above the 1 or 5 mW limit. In some countries such as the US, it is legal to sell such a laser as long as it meets safety requirements and is not marketed or sold as a "pointer". Also, under US federal law, it is legal to own and responsibly use a laser of any power.

Factors Affecting Lasers in Aviation

Weather: Clouds inhibit laser beams.

Time of day: Eyes adapt to the darkness separately, and it may take time up to 30 minutes. When the adapted eye is hit by light, it loses its adaptation, and in turn, it takes several seconds for the eye to adapt to bright light. During this adaptation phase vision is distracted. This why the problems with lasers occur mainly during the hours of darkness.

Power of the laser: The more powerful the laser is, the more distraction and damage it can cause.

Colour of the laser beam: The retina is most sensitive to green light wavelengths.

Distance and relative angle of the laser and aircraft: The closer the laser is from the aircraft the more powerful it is and the lower the relative angle of the beam the more dangerous it is (a laser beam from straight ahead is the worst case).

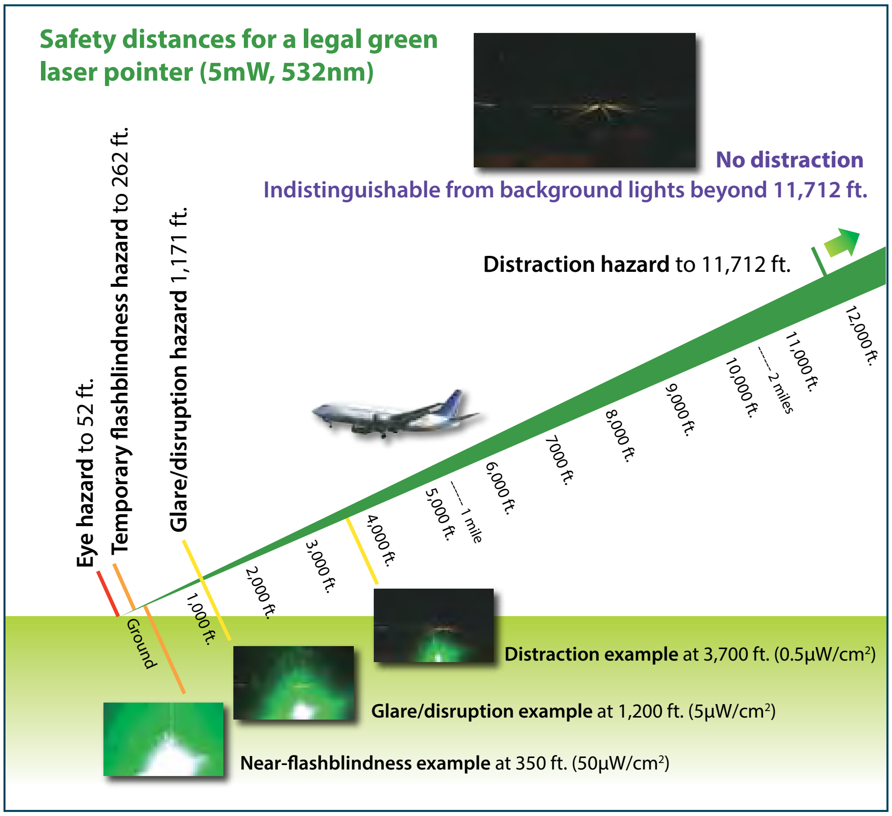


Figure 2: Safety distances for a legal green laser pointer (5mW, 532nm)

Speed of the aircraft: The higher speed the aircraft has, the more difficult it is for the perpetrator to hit the aircraft and so exposure risk will be reduced.

Exposure time: The longer the exposure time, the more dangerous it is. Fortunately, aircraft speed and the fact that most of the laser pointers are handheld will reduce exposure time.

Recommended Actions in the Event of Laser Illuminations

- Look away from the laser beam and shield your eyes if possible.
- Avoid rubbing of eyes so as to reduce the potential for corneal abrasion.
- Determine if other crew members are also exposed. If not, consider handing over the control of the aircraft to the non-exposed crewmember.
- Depending upon the situation and ATC clearance, maneuver to avoid the laser beam. (For instance, if on an approach the commencement of a missed approach may be appropriate.)
- Consider engaging the autopilot and other relevant flight modes.
- Turn up the cockpit lights to minimize any further illumination effects.
- As soon as flight safety allows, check for dark/disturbed areas in vision, one eye at a time. If either pilot is incapacitated to a degree that may affect the safety of the aircraft, declare an emergency (PAN or MAYDAY as appropriate).
- Inform ATC and, if the situation allows, provide as much information as possible (laser direction, colour, length of exposure, flash or intentional tracking, etc.). The use of the "IDENT" button may assist ATC and authorities in pin pointing the location of origin of a laser attack.
- Fill in an Air Safety Report (ASR).
- If any visual symptoms persist after landing, get an ophthalmologic examination.
- For more information, refer to ICAO Document 9815 "Manual on Laser Emitters."

Conclusions

Most of the lasers used in illumination seem to have been ordinary handheld laser pointers. Because it is very hard for the perpetrator to acquire and maintain steady illumination of a moving target, in the cockpit, the illumination will appear as a series of flashes. During these illumination incidents, fortunately, the risk of permanent damage to the eye is very small, however when the event occurs at low altitude it can be extremely dangerous because of the glare, flash blindness and afterimages. Crews should therefore be aware of the threat and consider how they will react in the event that they are targeted. ◆

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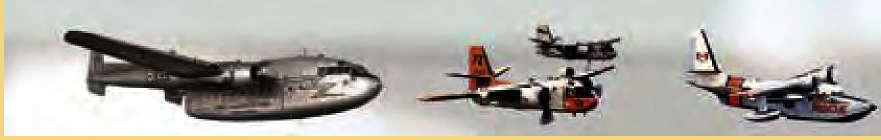


Are you really an *INSTRUCTOR?*

Article published in *Flight Comment* No 2, 1979 and was adapted from *FlightFax*, a former US Army aviation flight safety magazine.

Intentionally or unintentionally, we all influence others, and they, in turn, influence us. A student pilot will develop safe habits and attitudes while in flight school based on his experiences there and the kind of influence exerted upon him. And the individual who will influence him the most is the instructor. For the most part, the instructor's role in a formal school environment appears to be cut and dried. All facets of training are organized and all activities planned and supervised from start to finish. In performing his job, he follows an established curriculum sequentially from one phase to the next. This, coupled with by-the-book regimentation, leaves the student little chance to acquire unsafe habits. Yet, despite these safeguards, unsafe habits can be transmitted to the student and done so by the least likely of all individuals – the instructor himself.

Photo: DND

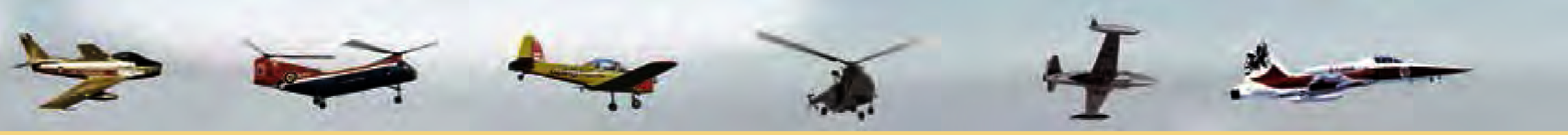
In one instance, following numerous reports of students buzzing local lake and land areas, spotter planes were dispatched to identify violators. Embarrassingly, the first to be caught was an instructor on a proficiency flight. No, he wasn't doing it for thrills. He was an avid fisherman who, by his own admission, often used the aircraft as a means for checking the condition of area lakes. But despite his intentions, not only were his actions in violation of regulations but they also served to entice others to follow suit.

Sometimes, even the best intentions can backfire where safety is concerned. One such case involved an instructor who, in an effort to promote safety consciousness among his students, embarked on a procedure that almost produced the opposite results. It all started when a student questioned him intently as to the turbulence associated with thunderclouds and its severity. After describing the hazardous winds associated with thunderclouds as well as he could, he proceeded to skirt around the edges of a relatively small, billowy cloud. His intent was to implant in the student's mind that if the amount of turbulence they encountered, could be found outside a small inactive cloud, the student might well imagine the devastating forces present within a towering cumulonimbus.

The demonstration proved so effective the instructor unofficially adopted it as a part of the curriculum. And all went well until one day, while rounding a cloud in a similar demonstration, he met a solo student skirting the same cloud from the opposite direction. Needless to say, the near miss put a stop to this practice. However, this experience does point out how fast word can travel and the vast amount of influence that rests in the hands of the instructors.

JUDGMENTAL ERRORS

Unfortunately, instructors are sometimes guilty of initiating unsafe acts by exercising poor judgment. Basically, it involves "taking chances," especially with respect to inclement weather. It usually works this way. The instructor and his student are operating out of an auxiliary field away from their home station when the weather begins to deteriorate. Suddenly, the instructor must make a decision to either land and remain at the auxiliary site until the weather conditions improve or head for home. If he elects to land, it may mean a delay of several hours before flight can be safely resumed. Consequently, the decision "to get home" is commonly made. All too often this results in their encountering weather more severe than anticipated, and sometimes, in an accident. But even when the flight terminates safely, as is more often the case, what effect does such a decision have on the student? Someday, will he be entitled into making a similar choice – and maybe guess wrong?



SPECIAL SET OF PROBLEMS

Unlike the instructor in a formal school environment, the squadron instructor faces a special set of problems. Here he is dealing with other professional pilots who are his peers. Is he going to give in to any pressure for leniency or is he going to demand professionalism? Is he going to be Mr Nice Guy or Mr Bad? While this, of course, is an exaggeration, every newly assigned squadron instructor has to face this question in some form.

PSYCHOLOGIST AND FRIEND

Being knowledgeable and able to communicate is not enough. The instructor must also be a psychologist and friend as well as judge and jury. Different instructors will handle this type of problem in different ways, and do so with equal success. One squadron instructor did it this way. In his words (paraphrased): "… in my case, it really wasn't difficult. The worst part was that I was new – from another unit – so I had to feel my way around a bit. Actually, the group was a good one. They took their flying seriously, and there was no horsing around. This made my job easy.

"I had respect for the responsibilities each had, and I felt they, in turn, would respect mine. Consequently, regardless of who the individual was, when we climbed into the cockpit, I suddenly acquired a case of amnesia. I didn't remember his face, rank, or title; and his name rang no bell. He became another individual who was to demonstrate his ability to fly a particular aircraft. But one thing I never forgot was that he was a person – with feelings – just like me. And that's how it was. If he was proficient, he passed. If I felt he needed more work, we scheduled additional training flights until I knew he was ready for the big one …"

SET THE EXAMPLE

No instructor can afford to act in any unsafe manner. He must set an example. As a matter of fact, under no conditions can such personnel as commanders, key supervisors, safety officers, and especially instructors afford to perform any unsafe acts related to flying.

An instructor, then, is much more than a teacher. He is a leader who established guideposts, setting standards by example. He is a policeman who insures our pilots measure up to standards. He is an enforcer responsible for upgrading pilots to professional standards. He motivates pilots to abide by regulations and SOPs, and monitors their actions. He is in effect, an unofficial Flight Safety Officer.

To accomplish his job, he must not only be knowledgeable and skilled in all aspects of flying but also must possess additional skills needed to work effectively with others. He must be understanding, patient, tactful yet firm, and possess the ability to communicate with others. He must be confident in his own abilities and capable of helping others develop confidence in themselves. Most of all, he must be dedicated to his job.

Yet, the instructor is not an island unto himself. He needs support. Further, he is not infallible. Consequently, he, in turn, must be monitored. This is where the commander comes in. It is not enough for him to select the proper individual for instructor duties. He must constantly monitor him for any weaknesses and support him in his responsibilities.

Along with the commander, safety officer, and other key supervisors, the instructor is not merely an aid in the unit safety effort. He is especially vested with the responsibility for promoting safety consciousness among pilots.

How do you stack up? On a scale from one to ten, how would you rate yourself? Are you really an instructor? ◆

Photo: MCpl Pierre Thériault

Photo: MCpl Danielle Michaud

I Can Do This!

By Warrant Officer Ben Fortier, 19 Air Maintenance Squadron, 19 Wing Comox

It should have been a typical snag. Go out to one of our CF188s and carry out a bore sight, as is periodically required. The procedure called for several "platforms" to be measured so that the weapons systems, inertial navigation system and heads up display all relate accurate information. On this day we were shorthanded armourers and they usually carry out the bore sighting of the gun and weapons systems. As all the procedures were detailed in appropriate CFTOs, I decided to carry out this bore sighting myself.

I conferred with an armourer to verify that the gun was in fact downloaded and asked how to rotate the barrel so that 3 out of the 5 barrels could be checked. This is where I should have paused and asked myself "Should I be doing this?" What happened next happened quickly and prevented this aircraft from flying for several days.

The procedure called for a rod containing a laser to be placed into the barrel, up to a certain point. The first barrel was uneventful. I rotated the barrel as I thought I had been shown (first hole in the Swiss cheese). I then tried to place the laser in the barrel, but it wouldn't fit in all the way (second hole in the Swiss cheese). I then sought assistance from a qualified armourer. He couldn't believe what had happened.

First, the gun I had been poking at was actually still loaded with hundreds of rounds of ammunition. Second, the way I was rotating the barrels caused the loaded gun to jam.

Several things came from all this. The gun was rendered unservicable and had to be replaced, grounding the aircraft for several days. Also, I found out that I had been poking the tip of ammunition with my laser probe. Not on my list of favourite things to do.

What I learned:

- never think you can do something you are not qualified to do, regardless of how simple it seems;
- always review the servicing set prior to commencing any work on an aircraft.

Suffice to say that this was not the first time (but definitely the last!) that I agreed to do a job on an aircraft without adequate training or supervision. I have repeated this story to apprentices countless times in the hopes that my day of shame would prevent them from having their own. ◆

Photo: MCpl Pier-Adam Turcotte

Something doesn't *Feel Right*

By Captain Kristian Provan, 443 Maritime Helicopter Squadron, Patricia Bay

It was the summer of 2011 and our *Sea King* detachment was nearing the end of our deployment on HMCS *Algonquin*. We had been at sea for almost two months and we were starting to feel frustrated with how the operation was progressing. The mission took place during the fourth day of an encounter exercise and we felt like we weren't being used to our full potential. Additionally, flying at night without NVGs is taxing and can be very exhausting. These factors resulted in low morale which in turn made our crew less than sharp, to say the least.

We took off on our second mission of the night. The sky was clear and the moon was rising nicely for the flight. Our mission was Over-the-Horizon Targeting (OTHT) which can involve a constant stream of communication reports back to our ship. It was a covert mission so normal communications and radar were restricted until just before recovery. The mission started without a hitch and we took off and headed out. Approximately one hour into the flight our Tactical Coordinator (TACCO) was less than enthused when he had to start reporting targets. This meant that he would essentially have to speak without stopping for as long as the ship wanted. You could tell that the frustration level was rising. The ship was making incorrect calls, as were we, and things were starting to go sideways. Instead of working with the ship and understanding that we were all in a training environment, we started to complain about them internally. This constant back and forth with the ship went on for the remainder of the mission. Again, the entire crew was frustrated and simply wanted the night to end. That's when things went from bad to worse.

As planned we arrived at the rendezvous (RV) point on time, even though the ship had changed the RV point twice during our mission. We saw a large vessel in the dark and established communications with our mother war ship. Everything was going smoothly. We could see the ship doing their lighting checks and watched them turn onto the flying course as per standard procedures. We were going to fly a Helicopter Controlled Approach (HCA) where the TACCO or the Airborne Electronic Sensor Operator (AESOP) guides the pilots using radar headings on the approach to the stern of the ship by using the radar. The night was clear and the communications were excellent. We flew outbound to about 5 miles from the ship, turned inbound and began our approach.

The initial height and altitude when we began our approach was 200 feet and 90 knots. At the final approach fix (FAF) at 2 miles back from the ship, we descended to 100 feet and 70 knots. We hit the FAF and began our descent. Everything was going fine, except that the ship hadn't turned on their 2 mile lighting. The TACCO was on the radio so I told him to ask for two mile lighting. The response from the ship was that the lighting was turned on. At this point, about a mile and a quarter, I started to sense something was wrong. However, I didn't mention it since I simply wasn't sure of what I was seeing. I could see a ship in front of us, rather dark, but with two lights that could easily be seen. It didn't seem right that a red light was on the starboard (right) side and that a green light was on the port (left) side. One mile now, slowing to 50 knots and maintaining 100 feet. Again, the lighting from the ship was improper and I told him to ask for 1 mile lighting. The ship responded saying that one mile lighting was on. This did not seem right at all and at ¾ of a mile we all thought the same thing. The co-pilot said "that is not mom"; I called for the overshoot.

As we flew by the bow of an American replenishment ship at 100 feet and 50 knots in a climb we all took a breath and realized what had happened. We had attempted an approach to the bow of the wrong ship. We later found out that HMCS *Algonquin* was actually 30 miles away. How could this have happened?

There were many factors that contributed to this incident. I think complacency and over confidence are two of the ones that stand out. We were bored, tired and frustrated with how the missions were being played out. We had an egotistical attitude of invulnerability. Our crew always thought that it was the ships fault. We assumed that all errors were on the ships shoulders since we were perfect. Of course that isn't the case, ever.

Personally I learned many things from this flight. "Trust but verify" is one of them, but above all, never fly frustrated. If you are climbing into the cockpit thinking that the next mission is going to be a joke, get out and let someone else fly. Each mission is for training and people are always learning. The key is to have patience with everyone involved. This was a very humbling experience. ◆

DFS Comment:

We would like to add a special thanks to Captain Provan and crew for sharing this experience in the interest of promoting flight safety. This incident is not the first instance of a *Sea King* flying an approach to the wrong ship and it will not likely be the last. It is also not the first incident resulting from poor communication between ship and helicopter, not the first to experience frustration between ship's crew and flight crew and certainly not the first time that a ship was not found at the predetermined rendezvous point. It is important for flight crews to recognize these causes and work to minimize their effects. Once again, our thanks to Captain Provan for highlighting how fatigue, frustration and complacency can quickly undermine flight safety.

Photo: Cpl Malcolm Byers

Photo: Cpl Piotr Figiel

The Canadian Forces Flight Safety Program and a *JUST CULTURE*

By Flora Heller, Allied Wings / 3 Canadian Forces Flying Training School, Portage La Prairie

You mean I'm not in trouble? That was my reaction at the end of my first discussion with a Flight Safety team member. I was focused on what my student was doing and did not pay attention to the aircraft being refuelled as we parked right beside it. I had been an instructor at Allied Wings for 6 months but the concept of Flight Safety was still foreign to me. I did not understand the program, the aim and the attitude.

Coming from the civilian aviation world, we were governed by Transport Canada. They regulate, assess and monitor. In the past, they have temporarily closed businesses that do not pass audits. Those involved in flight safety incidents are often punished, and in the civilian world, the result could be job loss.

During my Canadian Forces training, I was told that there was a Flight Safety Program and the Flight Safety Team was responsible for investigating occurrences. I equated them to the military version of Transport Canada. It was only during my first occurrence when I started to read, learn and pay attention to the program. Terms such as just culture and "preventive measures" started appearing. Open reporting was a fairly new concept. This is when I started to understand the program.

It has been a bit of an adjustment. Flight Safety is an attitude. It is very different from what I had known before. It has taken a while for me to adjust my attitude and I know I am not the only one. There are those who still do not understand or do not care to understand. They get defensive when questions are asked.

I believe it is important to show people what the Flight Safety Program is all about, immediately when they walk through the door. Even a half hour discussion with the Flight Safety Officer will help explain the program and clear up any misconceptions. It gives them the opportunity to get to know their Flight Safety Officer and to be comfortable approaching any member of the team if they have questions. ◆

Photo: Cpl Piotr Figiel

Photo: MCpl Marc-Andre Gaudreault

Supervision – *It's Not a Race*

By Sergeant (Retired) Bernard Girard, Cold Lake

After having been in Cold Lake for over 12 years and working on the CF188 for 7 years with 441 Tactical Fighter Squadron "Checker Checker", getting promoted to MCpl was the recognition that I have been waiting for. Additionally, I was staying in Cold Lake and posted across the ramp to 410 Tactical Training Squadron. I couldn't wait to start working in my new unit. I was going to be the one showing them how to do it RIGHT!

I started working at my new squadron on a Monday and it didn't take me long to get involved. I worked 15 hours that first day and felt pretty good about it. I had 8 Corporals working for me that had just been posted to the unit, none of whom had a CF188 back ground. Therefore, I was the only Level "A" and Engine Run-up qualified individual on the crew. I was all over the place fixing 3 to 4 aircraft at the same time, telling guys what and how to do the task – sometimes without even opening the book. I knew it all. I was bouncing back and forth from job to job and signing all of the paper work.

Sometime Wednesday afternoon, the Sergeant behind the desk said to me "Hey, you don't have to fix *all* the aircraft, you know." I replied "I know, but I am and I can." I laughed and carried on. By the end of Thursday, I felt like we had done so much work that nothing could of stop ME and my team. I felt like I was once again on top of my game. When I arrived to work on Friday, the MWO called me into his office. He said "MCpl, there were two Flight Safety incidents last night on engines." I said "What are they about? I can probably fix those pretty quickly, Sir." He replied "Well, they are on the work *you* did yesterday." I was shocked. I said to myself, "Me causing Flight Safety incidents – that's impossible. I usually find them." So I said "Sir, are you sure it was me?" he replied "Oh YES, it was you".

I spent several hours talking with the Flight Safety NCM. Even though these incidents were minor, he had talked with the desk Sgt and the MWO. They expressed their concern with me trying to do too much at the same time and not taking the required time to properly supervise my inexperienced crew.

Later that evening, I began to realize that I needed to slow down and re-think how I was going to become more effective as a supervisor. My crew needed to learn how to do their tasks properly and safely, not to race to see how many aircraft they could fix in one night. So I went to work the next week and started something new. I sent some of the Corporals with the servicing crew and split the rest of them in groups of 2 to 3. I only took 2 jobs at a time. It took us a bit longer to complete the tasks, but I was able to provide my crew with a better learning environment and much better supervision. ◆

Photo: Sgt Frank Hudec

Those towers are HUGE! *How could we not see them?*

By Captain Jayson Gordy, 408 Tactical Helicopter Squadron, Edmonton

408 Squadron had deployed to Yellowknife the week before in February to support Exercise *ARCTIC RAM* 12. My task was to give a fellow Aircraft Commander (AC) an Area of Operations (AO) familiarization (famil) both day and night. The day trip had been combined with a reconnaissance (Recce) task and had been completed without incident. The night trip was to be conducted solely to give the other AC the AO famil at night; conduct night approaches to nearby Forward Operating Base (FOB) landing zones (LZ) and practice the local radio telecommunication (RT) procedures of the exercise. The day trip had gone well and everyone on the crew had a lot of flying experience with each other. Everyone in the crew was current, qualified and had completed similar trips several times in the past both domestic and overseas. It's important in aviation to be relaxed; at this point, however, I had become complacent. This was the first hole in the swiss cheese model.

When I briefed the Duty Officer my plan was to fly to two FOBs, complete approaches at both, and then head home. When I briefed my crew, however, I added that I wanted to fly "at least an hour of night", which I would utilize for my currency requirements. Having flown this exact same route the night before, I knew it would take about 0.8, however, I did not make a plan of what I would do with the other 12 minutes of additional flying. With no plan, no route map, and the idea I wanted more NVG hours for the semi, we launched off. This was the second hole. I had stopped asking myself "what's next". As the AC of any trip, you have to know where you are, what you will do, and consider contingencies, regardless of how benign the task.

After completing the second approach in the AO, we fatefully decided to conduct some 50 foot site picture training. Tactical aviators train at this altitude and everyone in the crew was comfortable in this environment. The AO for this type of training was great – heavily treed with gently rolling terrain and quite unlike the farmer's fields back home in Edmonton. My hasty plan was simply to fly low level for a few minutes before heading back. I had not conducted a route recce or even taken out the map to put a line on it.

I knew there were some large high power tension lines to the East, but they were several miles away and I didn't plan to go that far. Wires are always a hazard when flying in the low level environment, but these wires were huge! How could we NOT see them or the towers miles away?

After my Flight Engineer (FE) yelled "WIRES! UP UP UP!" it only took a few seconds before the power lines struck the aircraft. I had not seen the wires miles away. I had not seen the large towers spaced on either side of the lake we had just flown over. I had, in fact, seen them only as they passed over the nose of the aircraft. The results of my unconcerned attitude resulted in my upper windshield literally falling on my head, major structural damage to the aircraft, and the removal of power to the territorial capital of Yellowknife.

My first thought after the strike echoed my first words – "Are we flying?" The answer was yes: the rotor was at 100% and the engines appeared nominal. I instructed the flying pilot (FP) to climb away. I was in a textbook "land as soon as possible" situation. My choices were snow covered lakes or keep flying to the nearest airport. I elected the airport, some 6 miles to the south. My thought process was this: the aircraft was flying and I wanted to conduct the easiest approach I could make. The FP was essentially single pilot as the hole in my windscreen and debris on my head precluded me from taking effective control in the event of lost references or NVG failure. Landing on the lakes would mean a snowball/obscuring phenomena situation and if the FP needed help, I was not in a position to do so.

In retrospect, after climbing away, my second thought should have been to look for an open area on one of those snow covered lakes. The area north of Yellowknife is littered with lakes and selecting a long skinny lake would have been relatively easy. Conducting a run-on landing would have mitigated any snowball issues, keeping the snowball behind the helicopter until we were safely on the lake.

No one in the crew was hurt and we were able to land safely. Also, I am eternally grateful to the engineer who designed the *Griffon's* Wire Strike Protection System!

In short:

- Always have a plan.
- It's never just a training trip.
- Don't expose yourself to more risk than is required.
- Just because you can doesn't mean you should. ◆

Photo: DND

Photo: Sgt Matthew McGregor

Is That ICE?

By Captain Jamie O'Leary, Unit Flight Safety Officer, 427 Special Operations Aviation Squadron, Petawawa

While participating in an exercise, I was part of a crew that was tasked with a notional troop insert into a local confined area. This was to be part of a rather standard trip that has been done numerous times throughout the *Griffon* community. Like all trips, we were given a weather brief and there was a chance of rain after midnight, and being late fall, this meant the potential for icing. The crew double checked the weather and knowing that the launch time was only until 2200 hours, the decision was made to launch and monitor the weather throughout the trip.

The launch time was 1900 hours and the weather was overcast at approximately 2000 feet with the freezing level at the surface and no precipitation. During the crew brief, risks to the crew were assessed to be circulating snow in a confined area and potential for icing, but because it was forecasted to be after our return, we only briefly spoke about it and would return if we started to encounter freezing rain.

The beginning of the trip went according to plan and forecast. About an hour into the flight, we began the low level navigation portion which would take us about 20 km southwest of our aerodrome. As we descended to approximately 50 feet above the highest obstacle, we noted that the visibility had lowered, but was still within our flying limits. We decided to continue with the trip and would monitor the weather. We continued on to our first troop insert location 20 km south of the aerodrome. The landing zone was a tight confined area surrounded by tall trees. As the flying pilot, I set up on a long final to enter the confined area. During final approach I noticed that the image looking through my goggles was out of focus. I spoke up and told the Aircraft Captain (AC) that my goggles were fuzzy. We then noticed there was what looked to be a combination of snow and rain on the windscreen. At this point we were still about 100 meters from descending into the confined area. The non-flying pilot turned on the windshield wipers as the flying pilot started a descent into the confined area. As we were beginning to enter into the confined area, the flight engineer said "WAIT!!" and grabbed a white flash light and shined it on the window.

As we were now looking more through the crew door windows versus the windscreen, we had not noticed that what we thought was snow, was actually ice forming on the windscreen. Immediately the AC called for an overshoot. During the time it had taken for the flight engineer to shine the white light on the windscreen to when the AC called for the overshoot, the windscreen was completely covered in ice and the pilots could no longer see out the front of the aircraft. The pilots could see out of the side windows, but nothing to the front. The aircraft heating was turned onto the windscreen and the AC took control, climbed to 1500 feet, turned the autopilot ON and turned to a direct course back to the aerodrome while the non-flying pilot and the flight engineer maintained a lookout through the side windows. We contacted flight advisory and informed them of our situation and our intentions.

During the ten minute flight back to the aerodrome, the heat on the windscreen had not been effective in clearing off the ice. During this time, I enquired about landing immediately in the ranges. The AC explained that since we were unable to see to the front and could not tell if the area we were landing was clear, that it would be better to transit back to the aerodrome. The decision was made to conduct an approach to the grass strip at the Petawawa aerodrome. The AC was calm throughout and this being my first encounter with icing, I was a little more concerned. Having someone who had been through this before certainly helped reduce the stress of the situation. As we reached the aerodrome, a small but comforting hole had begun to clear in the ice on the windscreen. The AC then began a setup for a left hand circuit to land at the grass strip. While we were in the circuit, there had been sufficient ice cleared from the windscreen to complete a normal approach to the grass strip. Once we shut down, we were able to still see a thin layer of ice covering the nose of the aircraft and a small portion of the windscreen. We noticed post shutdown that it was not raining on the aerodrome and what we had passed through was a band of freezing rain in the southern area of the ranges.

When looking back on this event, there are only a few minor things which I would have done differently. Although we did discuss it, a more thorough briefing on what we would do if we encountered icing and how would we recover if we picked up icing. Secondly, to have the defrost on the windscreen at the beginning of the trip would have helped. This system takes a while to become effective and the earlier it is engaged the better. The biggest take away from this event, for me, is the way the AC handled the situation and the crew. He was able to provide clear and concise direction to the crew, in a calm manner. Although I am sure that he was not comfortable with our icing problem, he did not let this show through in the way he handled the crew or the aircraft. ◆

Photo: Sgt Matthew McGregor

Distraction and the "SACRED WHITE COW"

By Sergeant Malcom Richards, 409 Tactical Fighter Squadron, 4 Wing Cold Lake

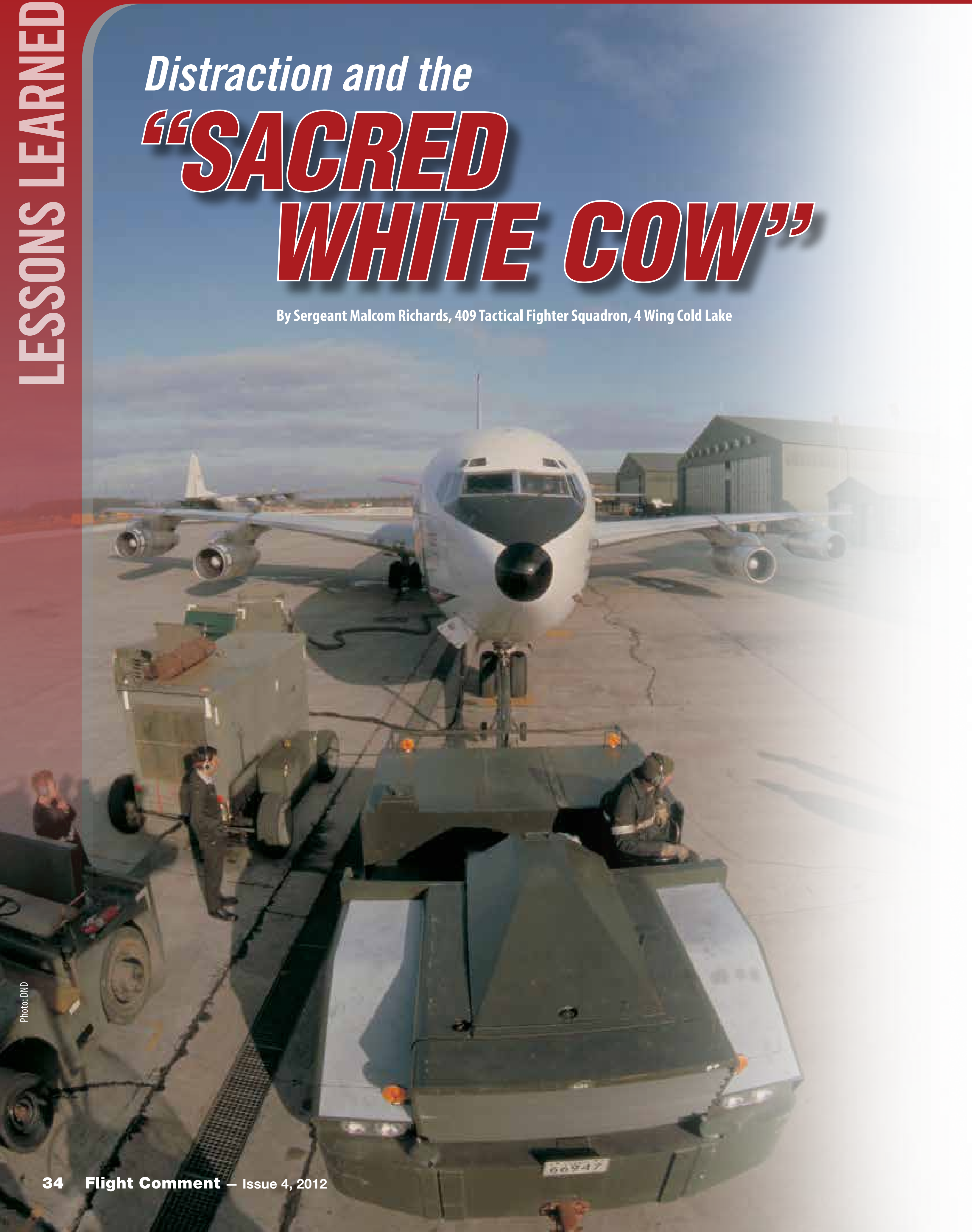


Photo: DND

Anyone who has been around the Airforce long enough will remember the "sacred white cow" (SWC), aka the Boeing 707. When the SWC came to town, the world stopped. It was just that simple.

For those who don't know, I'll give an overview. The Boeings flew the service flights of the day, and skipped back and forth across Canada. Servicing them required pretty much the whole crew for its arrival, servicing and departure. There were two men per wing for refuelling, using two fuel bowsers. Two people for the huffer (air start unit (ASU) or combined start unit (CSU), depending), plus the Stewart Stevenson ground power unit, marshaller and of course the I/C. Transport supplied the air stair and driver.

The routine was always the same. The I/C and marshaller bring the screeching cow in; we chocked, plugged in ground power and fuelled her. Sounds simple. Once all the gas is loaded, refuelling panels shut and the passengers on board, the huffer would be started up and we would wait. There was always lots of noise and activity.

This particular day, I was the person responsible for the ground power electrical plug and huffer hose. And this day, as soon as the signal "air on" was given . . . the huffer died and wouldn't restart (we did start it well prior to the arrival of the SWC and it worked fine). Panic stations! We fly into action to get another one into position, which involves towing the dead huffer out, finding the replacement, starting it, functioning it (blow the airline clear) and re-hooking it to the aircraft. The pilot was starting to lose patience as he was behind schedule. Finally the huffer was reconnected, air on, and the SWC engines start. Disconnect the huffer hose, disconnect the ground power cable, close the hatch, and get the huffer and SS cart out of there. Thumbs up and all good. Or was it?

We watched the SWC waddle out down the taxiway and onto the runway. Something was bugging me . . . and it was bad! I hadn't closed the hatch for the huffer port on the cow! The hatch is directly in front of #3 engine and if it tore off, it would most likely fly directly into #3! The cow was running up! I ran into servicing and called the tower to let them know . . . the cow was starting its takeoff roll!

Soon we hear the engines spool down, and the cow trundled back into position (I was sure glad I couldn't hear the pilot). I took the walk of shame down the right side of the fuselage and sure enough the huffer port door was (still) there, open and undamaged. I locked it up and the I/C came over to double check and then it was all good. The cow waddled back out and left. Afterwards, the MCpl wanted to talk to me. We discussed a few things like focussing more when something, like a huffer failure, causes distractions.

So that's the point. Don't be distracted from the complete job when something goes wrong. Stay focussed. I was lucky that day. It could have been much worse. ◆

DFS Comment:

Thank you Sgt Richards for sharing this incident illustrating how a last minute equipment failure in a pressure situation can easily distract from the required task – even a task some might consider routine.

There is perhaps another valid flight safety message here that should be highlighted – the importance of speaking up. If you had not reacted in a timely manner to correct the situation, the result could have been much worse than an aircraft delay and some embarrassment. I would hope that the post incident discussion with the MCpl on distraction also included a "bravo zulu" for speaking up.

Photo: DND

Wrong Turn

By Captain Stephen Buckley, 21 Aerospace Control and Warning Squadron, 22 Wing North Bay

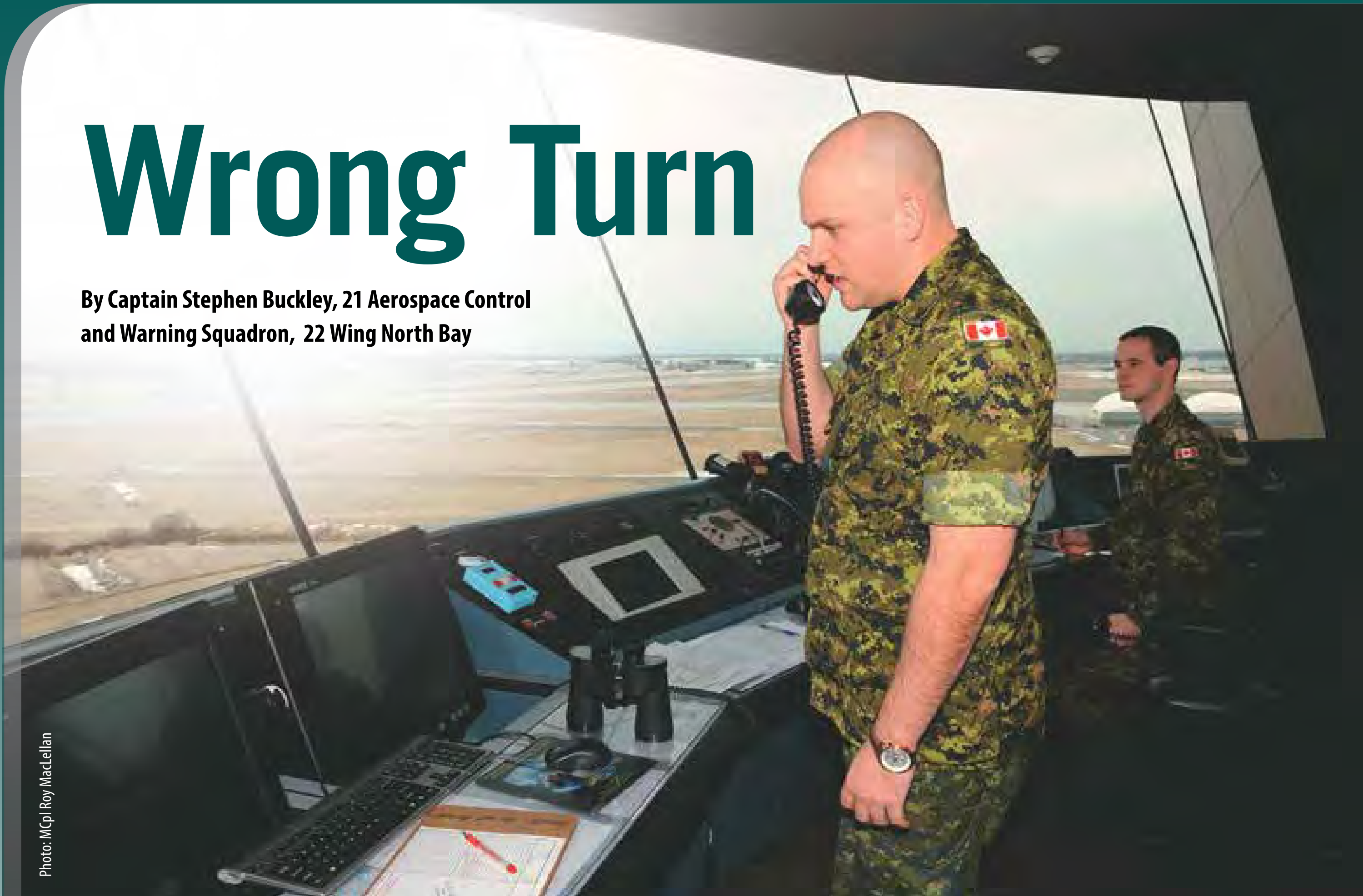


Photo: MCpl Roy MacLellan

Here is an example of how two relatively simple tasks, performed concurrently and without careful consideration, created a task saturated environment that could have ended with a flight safety incident.

Throughout our daily operations here in 21 Squadron, we often find ourselves conducting simulated exercises to prepare for the different types of missions we face. During one such simulated exercise, we were short on manning and were unable to support the exercise as well as concurrently flight follow a cross country familiarization flight for some CF18s. As the aim of that particular exercise was to train a junior weapons assistant, I volunteered to play my role within the exercise while at the same time flight follow the live aircraft. Although not ideal, this seemed to be a viable option because we would not be taking control of the aircraft. It also allowed us to complete the days training while fulfilling our live requirements. Unfortunately, the live communications were acting up and the offsite radios were having difficulty remaining connected. As such, I was required to periodically switch between simulated and live communications to check on the live radios.

As the exercise kicked off I was assigned the control of a simulated group of fighters that had a similar callsign to the live aircraft I was flight following. At this point, I should have recognized that the similarity between callsigns and the requirement to switch between simulated and live radios created a strong possibility of confusion. Unfortunately, this realization came only after voicing a "turn over" what I thought was the simulated radio only to hear a response from the live radio, "Sidecar . . . confirm that turn is for us?" I was not actively controlling the live aircraft, and was not responsible for their separation. The turn, if it had been accepted by the pilot, could have caused a loss of separation for the controller at the enroute centre.

In the end, the fallout from this mix-up was nothing more than a red face, a quick apology, and in the interest of flight safety, a hasty withdrawal from the simulated exercise. Although no incident actually occurred, thanks to the pilots query, the encounter highlighted in my mind just how quickly a series of seemingly small actions when done concurrently created a potentially dangerous situation. ◆

From the Investigator

TYPE: CC138 *Twin Otter* (138804)
LOCATION: Near Inuvik, Northwest Territories
DATE: 23 August 2012

The *Twin Otter* aircraft with a crew of three and three military passengers were conducting austere airfield training on the tundra (near Horn Lake) southwest of Inuvik, NT. Austere airfields consist of semi-prepared runways and unprepared surfaces such as sandbars, shorelines, eskers and plateaus.

In order to conduct an austere airfield landing, the crew flies a number of low passes to evaluate the suitability of the site and then a "drag" manoeuvre is flown to assess the landing area's surface condition. During the drag manoeuvre, the main wheels lightly touch the landing surface while a speed of 50 to 60 knots is maintained until reaching the end of the landing area where a normal takeoff is completed.

At the site of the occurrence, the drag manoeuvre indicated the terrain was rough but suitable, so the crew conducted a full stop landing. An inspection of the landing area following the stop showed that the surface was covered with tundra hummocks and that the wheels had sunk into gaps between individual hummocks. Tundra hummocks are small mounds of soil and vegetation and are a feature of the tundra related to the presence of permafrost.

During the takeoff attempt, the aircraft was stuck and would not move under the application of full power. The crew shutdown the aircraft, dug out the hummocks in front of each wheel and inserted plywood ramps to facilitate rolling the aircraft over the top of the hummocks for takeoff.

This procedure was effective; however, during the takeoff roll, as the aircraft was approaching flying speed, the nose wheel sunk into soft ground and the nose landing gear strut sheared off just above the wheel yoke. The nose then dropped to the ground and the aircraft skidded forward as the crew aborted the takeoff. The investigation determined the aircraft had sustained serious damage and that there were no injuries.

The investigation is focusing on the structural integrity of the nose landing gear strut, the austere airfield operating procedures and the austere airfield training program. ◆

From the Investigator

TYPE: Schweizer 2-33A Glider C-GFMC
Schweizer 2-33A Glider C-FQMH

LOCATION: Netook Airport, Alberta

DATE: 14 August 2012

Region Gliding School (Prairie) was conducting Air Cadet glider familiarization flights from the Netook airfield. On the day of the occurrence, flights were commencing from the button of runway 32, approximately one kilometre south of the hangar. The hangar was the only permanent location on the airfield to secure the gliders.

When the weather showed signs of deteriorating, the Site Commander decided to winch launch and recover each glider near the hangar to substantially reduce the towing distance to the hangar and to expeditiously secure the gliders. While attempting to launch the first glider, the launch rope broke. A team was dispatched to repair the rope; however, it began to rain and the plan to conduct launches was abandoned. The gliders were secured to the ground by one flight-line tie-down at each right wing strut and another at each glider's tail in order to wait out the rain. Each flight-line tie-down was screwed into the ground about six inches.

Over the next 40 minutes, the rain increased and the wind became gusty. To help stabilize the gliders, personnel entered the cockpit of each glider while others held onto the wings and tail. An attempt was made to install another flight-line tie-down to the left wing strut of each glider; however, a strong gust of wind sent the lead glider (C-GFMC) airborne, pulling the flight-line tie-downs out of the ground. C-GFMC nosed up and rolled right while drifting downwind. It impacted the ground in an inverted attitude, 80 feet from its initial location before continuing to drift an additional 100 feet. The occupant of the glider was injured when he was ejected from the cockpit and during this process two others were injured.

When the first glider went airborne, the occupant of the second glider (C-FQMH) climbed out of the cockpit and minutes later, this glider also became airborne in a gust of wind. C-FQMH impacted the ground in an inverted attitude 75 feet from its initial location before continuing to drift an additional 65 feet.

The three injured personnel were transported to hospital. They were treated for minor injuries and released later that evening. Both gliders sustained very serious damage.

The investigation is focusing on weather factors, tie-down equipment and other procedures associated with securing the gliders in high wind conditions. ◆

THE BACK PAGE

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1 CANADIAN AIR DIVISION FLIGHT SAFETY (Winnipeg)

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CT114


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CP140, CC150,
CC115, CC138,


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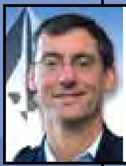
Maj J. Regnier

CH124, CT139,
CH148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Capt S. Roberts

CT102, CT155, CT156,
CF188


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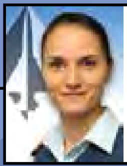
Maj P. Daunais

CC130, CC130J,
CC144, CC177, MEUF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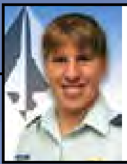
CH147D, Cadets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