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Flight Comment

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Views on Flight Safety

By Major-General J.Y. Blondin, Commander 1 Canadian Air Division

The Air Force finds itself in a time of operational tempo not seen since the Korean War. We have deployed an Air Wing to Afghanistan, introduced new tactical aviation capabilities while in theatre, and increased our contribution in unmanned air vehicles, tactical and strategic transport. Our renewed presence in the North has increased our efforts in fighter and air-to-air refuelling operations. Our maritime capabilities are battling piracy off the Horn of Africa or mapping Afghanistan in support to NATO troops. Meanwhile, support to Army training at home is at its highest in decades. This level of activity is likely to continue for the foreseeable future and coincides with a period of heavy attrition in personnel caused by unbalanced demographics in the CF. While our robust CF recruitment campaign is paying dividends, it also brings many new challenges in training requirements and decreasing levels of experience in our operational units. Timely absorption and qualification of a much higher number of air force personnel becomes the key to maintaining continued air power in this turbulent period.

Aircraft acquisition has been both a boon and complication. These new aircraft mean new and better capabilities, but they also require new crews, new training and new procedures. More personnel are required to keep operating old fleets while new fleet personnel are getting qualified. We can ill afford operational pauses to introduce these new fleets and are therefore planning as much as possible to find ways for these transitions to be transparent in Force Employment effect.

Any one of these challenges, increased operations, personnel absorption, or new fleet transitions, brings its share of risk; our task is to handle the risk of all three challenges combined through the next five years. The Air Standards, Training, Readiness and Automation Project (ASTRA) and the creation of an Air Force Standard group in the Air Division is an excellent initiative to review, optimize and formalize our in-flight procedures in a much more advanced technological environment. Under the ASTRA umbrella, increased simulation training should increase training quality, especially in a crew environment, reduce our dependence on in-flight training, and maximize Force Employment resources.

While I am happy with the new capabilities and willing to accept a level of inexperience and risk, our Flight Safety program becomes paramount in the continued delivery of Air Power and cannot falter in its aim. I am counting on first-line supervisors to manage this risk and act appropriately in accordance with our Flight Safety culture. Our decision making processes have always been based on providing the maximum air capabilities within an acceptable level of risk. Let us be clear: the varying level of risk that I am willing to consider and direct you to manage concerns the mission and its degree of difficulty, not the safe return of man and machine on the ground. While I will accept being able to do not as much as before or the increased risk of not being successful as often as in the past, I will not accept safety being jeopardized for our personnel. This is my line in the sand.

In spite of the challenges, this is a truly exciting time to be in the Air Force. You are living the "good old times" today. You are the builders of a younger, better equipped and much more capable Canadian Air Force. Let's ensure we build it on our strongest foundation, our trademark throughout the world, our flight safety program. ◆

Cover Page: "Hawk One" of the Centennial Heritage Flight. The refurbished classic RCAF F-86 Sabre 5 aircraft.

Photo: MCpl Robert Bothwell

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Good Show

For Excellence in Flight Safety

Master Corporal Hamel is currently serving with the Canadian Forces School of Aerospace Technology and Engineering, Borden.

Master Corporal Francois Hamel

On 06 February 2009, a CC138 *Twin Otter* aircraft was undergoing maintenance for a scheduled Periodic Inspection. During the survey stage of the inspection, MCpl Hamel was responsible for carrying out visual and borescope inspections of the aircraft wings. There are specific access points which require borescope checks and other access points that only necessitate a visual inspection. MCpl Hamel demonstrated dedication and meticulous work habits by initiating borescope inspections to access points that only required a visual inspection. It was during this action that MCpl Hamel discovered that the left hand trailing edge wing shroud bracket at wing station 235 was buckled and cracked. This serious Flight Safety concern would not have been detected by a visual inspection alone. His findings were immediately brought forward to his supervisors where it was determined that a similar inspection was to be carried out on the remainder of the CC138 fleet. These inspections revealed that buckles and cracks were evident on all of the airframes in various stages of material breakdown ranging from minor to major. This led to the CC138 *Twin Otter* fleet being operationally paused until Non-Standard Repairs were initiated and approved. MCpl Hamel's actions have led to a re-evaluation of the life expectancy of the *Twin Otter* airframe and a worldwide inspection has been initiated by civilian *Twin Otter* aircraft operators.

MCpl Hamel's outstanding attention to detail and unmatched willingness to go above and beyond the required maintenance actions exemplify his dedication and professionalism.
MCpl Hamel's actions averted a potentially very serious Flight Safety occurrence and he is deserving of this Good Show award. ◆

Good Show

For Excellence in Flight Safety

Corporal Todd Osmond

On 8 May 2009, Corporal Todd Osmond, an Aviation (AVN) Level A technician employed with 410 Tactical Fighter Operational Training Squadron was assisting a pilot with his front seat cockpit strap-in. While conducting this procedure he observed that the right hand parachute riser did not appear to be routed correctly. He immediately informed the pilot who then inspected the rear seat for comparison and found that its riser was also incorrectly installed.

An AVN level C specialist was then contacted and he confirmed that both seats were unserviceable. A Flight Safety Occurrence was initiated and the remaining CF-188 *Hornet* aircraft seats were inspected with no faults found. Further investigation revealed that the two occurrence seats had been configured incorrectly for several weeks. If an in-flight ejection was initiated, the pilot would have been subjected to significant "riser slap" which possesses the potential to inflict very serious injury.

An inspection of the parachute risers was not part of Cpl Osmond's responsibilities during the strap-in procedure nor was the knowledge of its correct routing part of his trade specialty. His meticulous attention to detail and presence of mind to bring the observation forward is considered even more significant considering the anomaly was missed by numerous experienced personnel during several previous missions.

Cpl Osmond's actions were instrumental in preventing a substantial injury to the pilot had an ejection occurred. His highly developed professional manner and dedication to Flight Safety make him most deserving of this Good Show award. ◆

Corporal Osmond is currently serving with 410 Tactical Fighter Operational Training Squadron, 4 Wing Cold Lake.

On the Dials

Air Traffic Management

By David Bjellos

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

Following announcement of its selection earlier this year as the prime contractor for automatic dependent surveillance–broadcast (ADS-B) and NextGen integration, ITT Corp has been aggressively pursuing the timeline set forth by former FAA Administrator Marion Blakey. Her successor, Acting Administrator Bobby Sturgell, has championed NextGen as a key element for easing congestion in the US National Airspace System (NAS). ADS-B ground components are beginning to be placed in the Gulf of Mexico and new installations have begun in Florida. This new framework for civil and military aviation is slated for operational readiness by 2020, and perhaps sooner.

ADS-B as a concept is now known to most aviators—a shift from the traditional ground-based radar and tracking system of enroute and terminal controllers (ARTCC) to a satellite-based structure that gives flight crews a real-time view of proximate traffic. The change from an air traffic control (ATC) environment to a more encompassing air traffic management (ATM) scenario will provide airmen with a greater role (and responsibility) to manage their flight proactively. This subtle yet crucial shift is key to the success and effectiveness of NextGen.

Components of NextGen include additional equipment for the cockpit, including an upgrade to current transponders (for most large aircraft and all turbojets) and the new equipment for smaller GA aircraft. Current Mode S transponders (under TSO C112) emit, or "squitter," data for ATC use and communication for other TCAS/ACAS equipped aircraft. Upgrading the system to include a 1090ES, or "extended squitter" (modified to TSO C166A), will enable the ADS-B function for ground controllers and, eventually, other ADS-B equipped aircraft. (This transmission is called ADS-B Out, and on receiving aircraft ADS-B In.)

Smaller GA aircraft will use a universal access transceiver (UAT) designed for low-level operations. 1090ESand UAT will transmit position, velocity, time, course and, eventually, intent. When OEMs upgrade current flight management system (FMS) capabilities to support intended flight path, ADS-B will become an active ATM tool, "communicating" trajectory change points to proximate aircraft. This is the final step for ADS-B integration. The 1090ES high-speed communications will review other aircraft trajectory change points and adjust speed or course (or alert the pilot to other options and actions). This shift of ATM responsibility to the pilot will require training and contingencies, all of which have been tested during the Capstone trials in Alaska.

4D trajectories and arrival spacing

Many remote areas will benefit from ADS-B as it will provide for 4D trajectories (the 4th dimension being time) to manage traffic flow better. Enroute separation—sometimes as much as 15 min in-trail—can now be reduced without compromising safety. The benefit for terminal operations is that aircraft can adjust speeds enroute to allow for precise arrival at approach/initial fixes without the need for costly vectoring (and manpower) in ATM ground facilities.

Public comment on NextGen/ADS-B

FAA opened the proposal for ADS-B for public comment under a notice of proposed rule making (NPRM). Significant opposition to the NPRM was received for failing to include that all aircraft be equipped with both ADSB Out and In. The proposal only mandated ADS-B Out with no timeline for the ADS-B In requirement—lacking the communication feature to broadcast (and receive) intent, industry opposed the plan vigorously. The overwhelming majority of respondents noted that the scheme was flawed and would not provide any tangible benefits, but all agreed that ADS-B in its final form should be implemented.

SESAR—coordinating ADS-B with Western Europe

Some of the busiest airspace in the world exists in Europe, primarily within the EU states. ATM has been a problem for decades, and the inability to build new airfields due to environmental issues has exacerbated the problem. Slot allocations and ground congestion are common, and airmen who frequent the EU find the delays annoying and troublesome for rushed corporate missions. The timeline for implementation of Single European Sky ATM Research (SESAR) roughly parallels the US efforts. Euro control supports a system called Link 2000+ which uses features of controller–pilot data link communication (CPDLC) and ADS-B to control the flow of traffic better across disparate nations. Using existing infrastructure (Mode S extended surveillance) and a terrestrial electronics platform called VDL2/ATN, Euro control ATM is preparing for SESAR implementation. ICAO, Euro control, FAA, Mitre Corp and others have agreed to cooperate closely to ensure that seamless transitions will exist for operators on both sides of the Atlantic. However, Asia, Russia and the Middle East have agreed proactively to participate to ensure their flag carriers and non-commercial operators have a role. These economies and sovereign entities are growing quickly and their aviation infrastructure is booming. Europe is actively pushing for ADS-B Out implementation by 2015—5 years ahead of the US date of 2020.

SAMM- onboard assistance for flight crews

Surface area movement management (SAMM) will help reduce runway incursions—the most important safety topic for NTSB in 2008. SAMM will provide an accurate depiction of other aircraft, both on the ground and airborne, in any weather conditions. Active runways will be displayed in red, and arriving aircraft will be shown clearly. Currently, many OEMs are providing Class 2 and 3 EFBs to display the information. Soon, primary displays will be upgraded to allow cockpit display of traffic information (CDTI).

Partnerships with FAA

FAA funded Embry-Riddle Aeronautical University (ERAU) recently to assist in NextGen goals. Florida was the first state to implement ADS-B coverage (from early 2009 to include continuous descent arrivals at selected airports) and ERAU Daytona Beach was a natural choice. Its training fleet is ADS-B equipped and students are learning early how politics, industry and education can produce a national transportation benefit through collaboration. FAA's legacy host computer is slated to be replaced by enroute automation modernization (ERAM)—with input from the NextGen team at ERAU—as well as a software upgrade called traffic management advisor (TMA). ERAU will contribute significantly toward the NextGen product and effectiveness. Recently, fractional provider NetJets signed an agreement with FAA which provides for its corporate aircraft fleet to install and gather data with ADS-B equipment. With nearly 600 aircraft, NetJets is perfectly suited to assist FAA. Some aircraft are already capable of flying RNP SAAAR approaches, and they are expected to spearhead the effort toward WAAS-enabled avionics and additional RNP approaches.

Saferoute-adding flexibility for flightcrews

Saferoute will allow pilots to maneuver their aircraft with precise control behind another aircraft and match groundspeed to maintain whatever spacing ATM requires (5 or 6 miles) in the terminal area. UPS is the only user in the NAS with SAMM/ Saferoute. Its aircraft display CDTI information via Class 3 EFBs, available to each pilot.

Photo : Pte Nedia Coutinho

Summary

As ADS-B becomes reality, cost will play a significant role, as it does with all enormous technical endeavours. The precarious nature of airline profits and the growth of corporate aircraft worldwide will place these disparate entities at odds over how much each will pay. While the auto and banking industries struggle to survive the effects of their ineptitude—and receive bridge loans and political incentives to stay afloat—corporate aviation continues to pay its way or suffer the consequences. Survival of the fittest and best funded will be revealed some years from now, but there is no question corporate aviation will survive. NextGen will be a quantum leap from the current ATM system and is certain to improve an already sterling safety record. This technology, in whatever form it ultimately takes, will change the landscape for the better for all airspace users.

About the Author

David Bjellos is the aviation manager for a private corporation whose flight department was the first in south Florida to achieve IS-BAO certification. The company operates a Gulfstream IVSP, a Dassault Falcon 2000, 2 Bell 407s and a Eurocopter EC120.

Rising fuel prices, the drive to reduce emissions and razor thin profit margins (if there is any profit at all) are making new technology more desirable.

Mitigating exposure to midair collisions, beyond TCAS/ACAS

The controversial midair collision between an Embraer Legacy 600 and a Gol Boeing 737 over the Amazon underscores the need for effective management of aircraft in non radar environments. NTSB recently released its findings on the Sep 29, 2006 accident, and placed blame on loss of "effective air traffic control" between the 2 aircraft, both of which were cleared to fly on the same airway at the same altitude, albeit in opposite directions. Also cited were the management and institutional concepts of the Brazilian ATC system, whose alleged systemic shortcomings were deemed contributory to the disaster. ADS-B, if installed, would have alerted both flight crews of the airspace intrusion and allowed sufficient time for resolution. Ironically, both aircraft were new and had state-of-the art avionics, including TCAS, which ceased to function properly at some point during the flight.

Photo: MCpl Robert Bottrill

ICP Comments

The restructuring of air space and Air Traffic Management (ATM) is now a high priority for governments and operators throughout the world - and it may happen sooner rather than later. Rising fuel prices, the drive to reduce emissions and razor thin profit margins (if there is any profit at all) are making new technology more desirable. ADS-B is a vital component of the technology mix that will change the way we move around in the world. From this fairly recent article originally published in *Professional Pilot*, it will be seen that there is a desire from governments and operators to implement this new technology. Not only will it help the bottom line post-economic recovery, but it is expected to be greener, safer, more flexible and able to handle higher traffic volumes than the current ATM systems throughout the world. Emerging economies and developing countries can by-pass costly legacy navigation aids such as VOR, ILS, and RADARS and move right into space-based navigation and dependent surveillance systems. They could have safer and more efficient air space for less cost than what Europe and North America are spending now. Due to the drastic changes that are forecast to occur within the next 10 to 20 years, it will be necessary for military operators and Weapon Systems Managers to research and monitor the requirements for avionics, including certification and approval processes. This would place Canada's Airforce in the best position to acquire and use this new gear in a cost-efficient and timely manner. For more information on Performance Based Navigation (PBN), RNP and RNAV, visit the ICAO, FAA and Eurocontrol web-sites. You can visit www.icpschool.com to find some helpful links.

Capt Scott Anningson
ICP Flight, Central Flying School

The Editor's Corner

Welcome to Issue 2 of Flight Comment! I hope you have had a chance to read our recent On Target magazine which focused on Human Factors. We are going to concentrate on one particular human factor in this issue called *Distraction*. Distractions seem to be part of our everyday life with cell phones, blackberry's, noise, media, and electronic gadgets, just to name a few. When distractions are mixed with aircraft operations, whether on the hangar floor or in the cockpit, the results can be deadly. The Maintainer's Corner features an article discussing the use of cell phones by aircraft technicians on the hangar floor. Distractions are believed to be a causal factor in 15% of all aircraft maintenance flight safety occurrences. We felt this fact was so significant that we produced a poster to highlight this alarming statistic. Another area of concern for distractions is in the cockpit. An article titled "Human Error - a Stubborn Snag in Airline Safety" makes reference to several occurrences where aircrew have attempted to take-off with the incorrect flap setting as a result of distractions in the cockpit. We have a Lessons Learned article written by a Flight Engineer who was distracted during a slinging sequence and had forgot to secure himself inside the aircraft. In another article, a Firefighter witnessed very obvious items being missed by aircrew during the pre-flight walk around due to the ubiquitous human factor Distraction. The variety of the authors and circumstances discussing the theme of Distraction in this issue highlights the fact that no one is immune and we all must foster good working habits and working conditions in order to mitigate the risks of this human factor.

A positive distraction this summer has been the continued celebration of Canada's Centennial of Flight. We are delighted to feature the F-86 Sabre *Hawk* One aircraft on the front cover. The flight safety considerations that have gone into the refurbishment, planning, training, and success of the Centennial Heritage Flights is tremendous and Major (Retired) Mary Lee of the Centennial of Flight Public Affairs office has written two excellent articles discussing the Flight Safety issues involved with these enormously successful projects.

In conclusion, we would love to have some feedback regarding the content of the magazine. Please email dfs.dsv@forces.gc.ca to submit your comments or suggestions for future articles. ◆

Think Safety, Fly Safe!

Capt Kathy Ashton
Editor Flight Comment

Fatigue – A Problem for

By Captain J.M. Gibson (retired) 437 Transport Squadron, 8 Wing Trenton

Every heavy transport aircraft has over a hundred gauges and lights that quantify the aircraft's performance. But what about the crew's performance? One of the most important factors in a safe and effective mission is FATIGUE. It shows up as the inability to react physically and mentally to cues inside and outside the aircraft. Approximately 80% of post-accident investigations have identified human factors as a cause of the mishap and, as the following chart illustrates, the majority of accidents (55.8%) happen in the last 15% of the flight.

Photo: MCpl Robert Bottrill

That last 15% of the flight typically arrives at the end of a 10 to 12 hour crew day. The crew has spent about eight hours seated in a dry, noisy, confined aircraft at a cabin altitude of 6000 feet. Their body rhythms are at their lowest ebb (between 0300 and 0600 hours departure base local time). In addition, the trip is often conducted through the night and into the morning with a glaring dose of rising sun just to enhance that "sand in the eyeballs" effect.

Like hypoxia, fatigue is insidious and every crew member must recognize the symptoms. The aircraft commander must be acutely aware not only of his own fatigue but that of the entire crew. The most visible clue is a change in behaviour. Most people can probably describe the "who" they change into when they're tired. Unfortunately, this change doesn't always head in the same direction. That congenial, co-operative sort of fellow can run the behavioural gamut from becoming positively comatose to a testy, monosyllabic person you wouldn't trust with anything sharper than a Flight Comment magazine. In effect, fatigue becomes a mood altering drug that no flight surgeon would prescribe. Fortunately, there are things aircrew can do to counter the effects of fatigue on their minds and bodies and the mission.

Fatigue is primarily due to a lack or disruption of normal sleep patterns but it can be mitigated through proper pre-flight rest. To gear up for a night mission, a nap is in order. It isn't easy to snooze from 1300 to 1600 while the rest of the world is going about mowing lawns or building a new deck right outside your bedroom window. Foam earplugs and a sleeping mask can help. So does an understanding mate who can field phone calls and intercept the kid's enroute to your room to show you a new toy. Studies have shown that the average sleep cycle runs about ninety minutes with the beneficial REM state at the end of this period. If you can, try multiples of this and if you wake up with less than ninety minutes remaining; walk, run or play with aforementioned new toy.

All long haul drivers have their own enroute maintenance techniques and should continue with what works best for them. Current research indicates that small snacks rich in complex carbohydrates (fruit, salad and grains) are beneficial. Coffee and tea are initially stimulating but, being diuretics; they eventually rob the body of water. Drinking water or fruit juice instead will reduce this problem and help counteract the dry cabin air. A few minutes of stretching or isometrics are also worthwhile. Such actions assist the movement of blood out of the lower body back to the head. Performed regularly, or at least once prior to the top of descent, will help keep that tired ol'body alert for the last 15% of the flight. The cobwebs are sometimes difficult to shake, though,

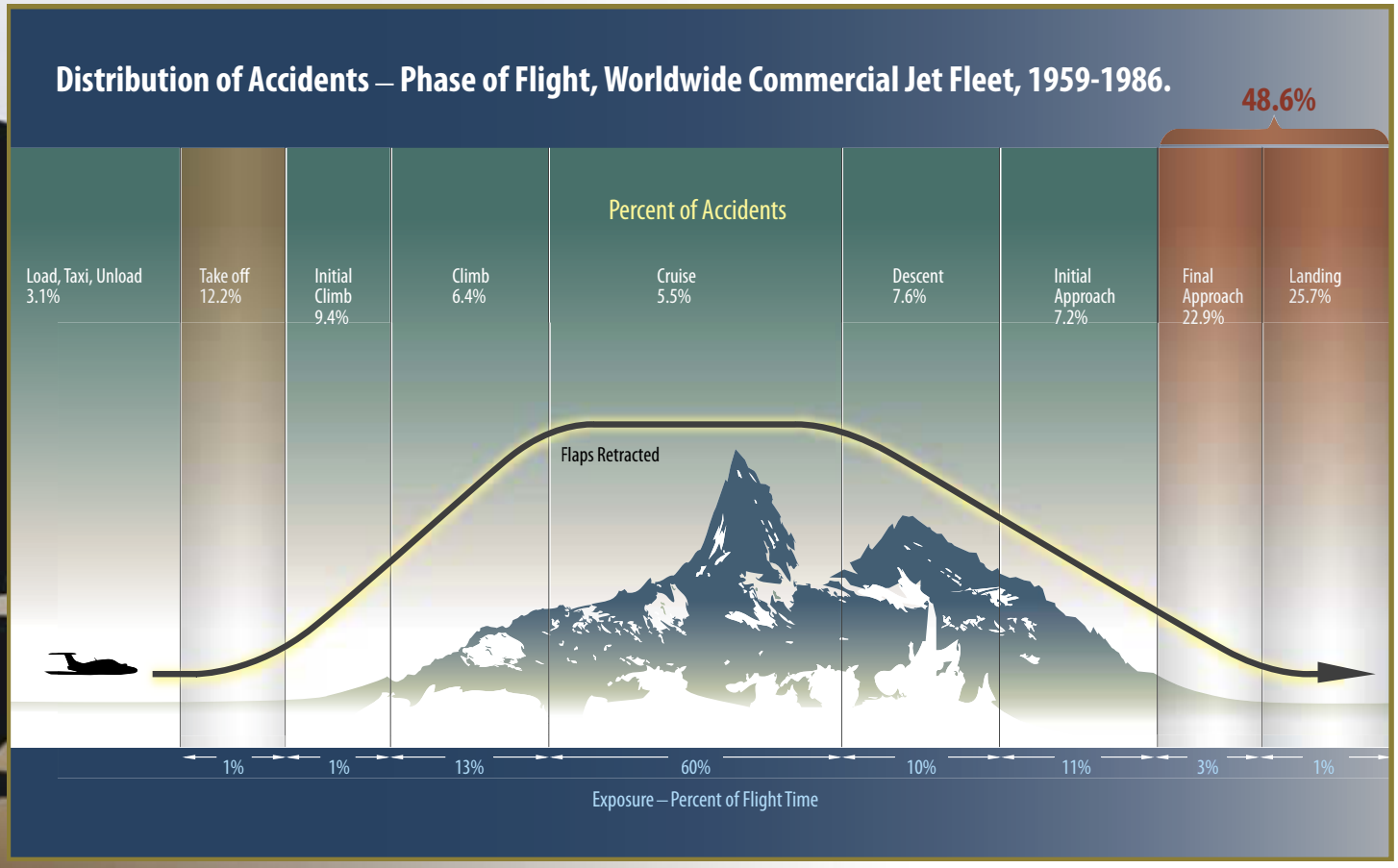
Heavy Airlifters

as performance during this time period (0300 – 0600 hrs local time at the departure base) has been estimated to be at the same level as someone having a blood alcohol level of .09%. Incidentally, that would provoke an impaired driving charge in most provinces.

Normally, getting eight hours of sleep after a flight is not a problem. However, if scheduled ground time between missions is 24 hours the benefits of that sleep will be wearing thin by departure time. Your departure will be, once again, smack in the middle of your biorhythmic low. "High to Low, lookout below. . ."

Fatigue can, and does, accumulate, not only throughout each mission, but also from flying several missions over a certain period of time. Each day (and night) brings increasingly challenging demands to perform safely. Cockpit discipline and professionalism will help but, with a biorhythmic clock that's gone digital, aircrew must learn to gauge their fatigue to ensure performance levels remain within safe parameters. ◆

This article was first published in 1990 - Issue 4 of Flight Comment. This issue as well as all other issues of Flight Comment can be viewed on the DFS website: www.airforce.forces.gc.ca/dfs.



Centennial Heritage Flight

Precision and Flight Safety

By Mary Lee, Hawk One and Centennial of Flight Public Affairs Officer, Ottawa

During the Royal Canadian Air Force's (RCAF) glory days of demonstration flying when the legendary Golden Hawks graced the skies with their aerial ballet, precision was the name of the game. The Golden Hawks with their sleek golden F-86 Sabres were once revered as the best aerobatic team in the world; momentous of distinguished flight in Canada.

Photo : Capt Steve Neta

Flying in a ceremonial flypast, as with any formation flying, takes precision, intensive training and rehearsal. Not much has changed since that period in the late 1950s with the Golden Hawks through to today with the acclaimed Canadian Forces Snowbirds. Precision can only be achieved through constant practice and superb flying skills that is demanded of the Centennial Heritage Flight formation.

The Centennial Heritage Flight is a three-plane team that has been formed to supplement the Snowbirds in celebrating 100 years of powered flight in Canada. Lead by the CF-18 Century Demonstration *Hornet* from 410 Squadron in Cold Lake, Alberta, the formation also consists of a CT-114 *Tutor* repainted as a Golden Centennaire provided by 431 Air Demonstration Squadron, Moose Jaw, Saskatchewan and the famous F-86 Sabre known as Hawk One from Vintage Wings of Canada in Gatineau, Quebec.

Formation flying with these dissimilar jets is a spectacular and highly demanding display that can truly cement our national pride, particularly when it is as unique in composition and purpose as the Centennial Heritage Flight. To minimize the risk of flying these aircraft a few feet apart, precise positioning, thorough training and a commitment to the CF Flight Safety program is required. This is the discipline behind Centennial Heritage Flight.

The aerial display format was developed by the Hawk One team led by LCol (ret'd) Steve Will, a former CF-18 pilot and Snowbird lead; Capt Tim Woods, the 2009 CF-18 Demo pilot; and Capt Dave Boudreau, Snowbirds Standards Officer in conjunction with LCol Daryl Shyiak, Commandant of Central Flying School, Winnipeg. During the Snowbirds annual spring work-up training in Comox, B.C., the routine was practiced over a two-week period in April before being submitted to 1 Canadian Air Division for final approval.

The greatest flight safety concerns for the Centennial Heritage Flight formation is flying at an operating speed that is appropriate for all three aircraft and maintaining it for the duration of the display sequence. With a supersonic jet able to perform at speeds of Mach 1.8 (1,814 km/h) the CF-18 has to power back to 520 to 550 km/h in order to accommodate for the *Tutor*. The same challenge is encountered for the Sabre. Known as one of the greatest fighters in NATO due, in part, to the Orenda engine, flying the Sabre in this formation requires a low power setting, which increases the required throttle movements for relatively small corrections in aircraft positioning.

Although the display sequence is a fairly simple, non-aerobatic profile, the spacing is tight at just one wingspan of separation. Precise positioning is critical for dissimilar aircraft in close formation. Both wingmen piloting the Sabre and the *Tutor* must line up their reference off the CF-18 using the missile rail with the Air Force roundel. Meanwhile, the CF-18's role is to lead the formation through the display sequence by lining up the passes and keeping the formation in the right speed margin at an altitude as low as 300 feet except when passing overhead spectators.

The Centennial Heritage Flight is nothing short of an aerial masterpiece. For what makes this formation truly spectacular is the colour combination of the three uniquely painted jets that are symbolic of the Canadian Centennial of Flight celebrations.

The 2009 CF-18 demonstration *Hornet* features a "once in a century" paint design. The full-body paint scheme incorporates the classic RCAF roundels with the Air Force blue and an iridescent gold that is complimentary to the Hawk One Sabre and Golden Centennaire *Tutor*. It is considered the most brilliant and ambitious paint scheme applied to any demonstration *Hornet*. The pattern, created by Jim Belliveau of 410 Sqn, is specific for Canada's Centennial of Flight commemorations as it also features the names of 100 great men and women in military and civilian aviation.

And at the cornerstone of Centennial of Flight is the Hawk One Sabre. Hawk One constitutes a highly visible tribute to 100 years of powered flight in Canada – a tribute made possible by a unique partnership between Vintage Wings of Canada and the Department of National Defence with financial assistance from donations from the private sector including principal sponsor Discovery Air. The resurrection of a Golden Hawk Sabre represents an elegant salute to Canada's rich aviation heritage. Formed in 1959 to celebrate 50 years of powered flight, the Golden Hawks came to epitomize the outstanding accomplishments of the RCAF.

The direct lineage to the Golden Hawks and the Golden Centennaire *Tutor* in the Centennial Heritage Flight offers a rare opportunity to link the past to the present and a rare opportunity to any pilots who performs it.

"The realization of all three aircraft actually being painted in the Centennial of Flight colours is significant in that this was all just a pipe dream two years ago, said Steve Will. "To fly alongside the stunning creation on the Century *Hornet* and to see the Centennaire *Tutor* on the other wing is still somewhat surreal to me. Bringing the Centennial Heritage Flight to the stage in front of millions of Canadians in 2009 is nothing short of an honour."

The Centennial Heritage Flight is one of sophisticated beauty, skillfully flown for the purpose of commemorating a century of aviation in Canada. Even if displayed for just one year, its image will imprint itself on our nation's memory like the great aerobatic demonstration teams that came before it.

Photo : Capt Steve Neta

Cell Phone : *Weapon of Mass Distraction*

By Major Sylvain Giguère, Directorate of Flight Safety, Ottawa

The other day, I was stopped at the traffic lights and when the lights turned green, the car in front of me would not go. I didn't honk, I just used my inside voice and waited. When the car finally went, I passed it and realized that the driver was talking on a cell phone. I told myself that the driver must have been distracted and had not realized that the traffic lights had changed. This incident may be mundane; however, if you Google the Web to find hazards related to the use of cell phones, you will find hundreds of websites talking about health and safety issues. A majority of the websites relate to new legislations banning the use of cell phones when driving cars. Those dealing with aviation almost exclusively relate to the restrictions in the use of cell phones by passengers. Surprisingly there was very little published on the use of cell phones during aircraft maintenance.

I scoured the Canadian Forces (CF) publications to find out if we had any specific policies and started to ask questions. I did not find a "cell phone policy" but I was advised that cell phones fall into the Foreign Object Damage (FOD) category. That makes sense; however, I was still not convinced that a cell phone is limited FOD. When I think of FOD, I think of an inanimate object. A cell phone is different; it has a ring to it. So I got in touch with Transport Canada to find out if there was a civilian regulation pertaining to the use of cell phones during aircraft maintenance. The answer was straightforward. The use of cell phones in a maintenance environment falls in the category of distraction or interruption: a common cause for maintenance errors. The idea is that, when responding to a cell phone, a person leaves the task (both physically and/or mentally) and returns' thinking that he/she is further along with the task. I also learned that interruptions are thought to be responsible for about 15% of all maintenance errors.

Photo : Cpl Kevin Sauvé

So cell phones are more than FOD, they are considered a distraction. When you come to think of it, we are all conditioned to answer the cell phone. Just as Pavlov's dogs. . . The ringing or vibration of a telephone has become one of our currently most powerful interrupters. You see it everywhere – drivers will answer the phone while speeding along in five o'clock traffic, technicians will climb down from work stands to take a call. Even when we have no intention of answering, the urge to look at the "caller-ID", just a quick peek, can be very distracting and lead to errors even for the most meticulous and experienced technician. An interruption can attract our attention away from any form of activity. In aircraft maintenance, this can result in disaster.

Distractions and interruptions are a normal part of our everyday life. In the aircraft maintenance environment, it is paramount to develop ways to mitigate and minimize the risks that may be induced by them. Well-written, detailed work procedures, and checklists are a

great tool for keeping track of where we are, or where we were, on a given task when the interruption occurred. Training can help you remember to keep your mind on the task at hand. Treat all distractions and interruptions as red flags. In fact, knowing that we are all vulnerable to interruptions can help reduce that vulnerability.

Implementing a cell phone use policy could address the problems linked with their use during maintenance (i.e., interruptions). Such a policy could be considered a novel idea but it already exists within the United States Air Force Material Command (AFMC). AFMC Instruction 21-122 states that:

- Cell phones will not be used while driving any vehicle.
- Personnel are prohibited to use cell phones while performing any type of aircraft maintenance operations.
- Cell phones will not be used in production areas, around active maintenance, or at any time around flammable liquid or fumes, cartridge-activated devices, propellant-activated devices, or any armed component to include ejection seats.
- Cell phones will be stored in personal lockers while not in use.

Should the CF implement a similar policy? There may be some value. For one thing, it does not leave much to interpretation. It also addresses other known technical hazards. For example, it prohibits the use of cell phones in and around cartridge-activated devices and armed components.

The reason for this decision is related to the fact that the electro-magnetic emission of a cell phones can interfere with aircraft systems and Electro-Explosive Device (EED) such as rocket fuses, explosive detonators, missiles and similar ordnance, on or off aircraft. Although many efforts are made to protect EEDs against all sorts of radiations, no system is completely immune (C-09-153-003/TS-000). The AFMC policy also prohibits the use of cell phones near flammable liquid or fumes. While there appears to be no documented cases linking cell phone use to explosions at gas stations (Safety Digest, 4/2007), the prohibition likely stems from the potential for distraction in a dangerous environment.

What is the urgency for implementing such a policy? The fact that technicians are bringing "live" cell phones to the servicing line is a concern that needs to be addressed by the maintenance leadership. An example to illustrate the point is the case where a technician lost his cell phone and decided to dial the number in an attempt to locate it. Sure enough, a CP-140 *Aurora* pilot found the "ringing" phone under his seat during the start-up procedure. Beyond the obvious FOD hazard, the "ringing" could have occurred during a critical phase of flight leading to much worst consequences.

Cell phones have become an integral part of our lives, and are often used as a lifeline for our loved ones to reach us. But these phones are beasts that we need to tame. To reduce the risks, we need to be pro-active and address the potential hazards by building defences. Until a pan-CF policy is issued, the best thing to do is to leave your cell phone in your locker (or your car).

Photo: Cpl Dany Veillette

While at work, rather than relying on your cell phone for home-emergencies, simply leave another phone number (i.e. servicing desk) where a message can be taken and relayed to you. This way you and your co-workers will be able to focus on the job without interruptions that can induce errors with serious consequences.

Acknowledgement: Special thanks to Master Warrant Officer Vincent Bolduc and Mr. Jean Brosseau both from the Directorate of Flight Safety for their contribution to this article.

Circuit Breakers

Every Trip Has a Story

By Mark Lacagnina

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Circuit Breakers – In. Most general aviation pilots react to that ubiquitous pre-flight checklist item by hunting down any open circuit breakers (CBs) and dutifully pushing them back in. Similarly, there is the old saw about a CB that trips in flight: Reset it once; if it trips again, leave it alone.

These are dangerous habits, according to the U.S. National Transportation Safety Board (NTSB), which has pointed to a recent in-flight fire and fatal crash in calling for education and training of general aviation pilots and maintenance personnel on the hazards of resetting CBs without knowing why they tripped. The crash also exemplifies the potential consequences of not following required procedures when maintenance is deferred and of operating an aircraft with a known discrepancy, according to the board's final report on the accident.[1] The accident occurred the morning of July 10, 2007, and involved a Cessna 310R — one of nine airplanes operated by the National Association for Stock Car Auto Racing (NASCAR). The company used the light piston twin primarily to transport equipment and documents but occasionally allowed its medical officer to conduct personal flights in the airplane with a company pilot aboard as a safety pilot.

The medical officer, 53, held a commercial pilot certificate and had 276 flight hours, including 26 hours in the 310. He was the pilot-in-command (PIC) of the accident flight. The safety pilot, 56, held an airline transport pilot certificate with several type ratings and had 10,580 flight hours, including 67 hours in the 310. Both pilots had completed 310 proficiency training at a commercial flight-training facility in January 2007.

Smoke in the Cockpit

The airplane departed from Daytona Beach, Florida, at 0822 local time for a flight to Lakeland, about 80 nm (148 km) southwest. Shortly after the 310 reached its cruise altitude, 6,000 ft, the safety pilot declared an emergency and told air traffic control (ATC) that there was smoke in the cockpit and that they were diverting to Sanford International Airport.

ATC radio contact and radar contact with the airplane was lost when it was about 8 nm (15 km) northwest of the airport and descending rapidly. Witnesses saw the 310 trailing smoke as it made a steep turn to the west shortly before striking trees and crashing in a residential area. The pilots and three people on the ground were killed, and four people on the ground were seriously injured. The airplane and two houses were destroyed by the impact and post-crash fire.

Examination of the wreckage revealed signs of an in-flight fire. Thermal damage and soot deposits were found on components that came to rest outside the area of the post-crash fire. The cabin door, for example, was found relatively intact about 60 ft (18 m) from the main wreckage. "The undamaged latching pins and the location and existence of the observed trailing soot deposit are consistent with the pilots having opened the cabin door to vent smoke during an in-flight fire," the report said.

Most of the recovered electrical system components and wiring were severely damaged or destroyed. However, markings on some wiring indicated that it had polyvinyl

chloride (PVC) insulation, which produces toxic hydrogen chloride gas when heated. "PVC-insulated wiring has not been used as a general-purpose wire in new airplane designs by Cessna and other manufacturers since the early 1970s," the report said. "However, the FAA [U.S. Federal Aviation Administration] permitted the continued use of PVC-insulated wiring in airplanes in which it was already being installed, including Cessna 310s, which Cessna had been manufacturing since 1953."

'Don't Turn it On'

Investigators also found a maintenance discrepancy report that had been filed by another company pilot who flew the 310 the day before the accident. The discrepancy report said that the pilot smelled electrical components burning shortly after the weather radar display "went blank" during cruise flight and that the odor ceased after he turned off the unit and pulled its 5-ampere CB. The pilot left one copy of the discrepancy report in the maintenance binder, which he placed on the airplane's throttle quadrant, and gave the other copy to the director of maintenance.

The accident report said that an in-flight fire could have occurred during the previous day's flight if the pilot had not pulled the CB: "Pulling the circuit breaker for the weather radar stopped a symptom — the burning smell — of the problem by removing electrical power from the circuit. However, it did not correct the underlying problem."

NASCAR's aviation department did not have documented guidance for scheduling and tracking airplane maintenance, or for communicating the maintenance status of its airplanes to maintenance technicians and pilots. "Further, NASCAR had no system through which any individual, including the director of maintenance, could remove an airplane from the flight schedule because of airworthiness concerns," the report said.[2]

The weather radar maintenance discrepancy report was discussed by the aviation director, chief pilot and director of maintenance, who agreed that the 310 could be flown the next day. "According to the chief pilot, the director of maintenance told him: 'It will be okay. Just tell [the safety pilot] not to turn it on,'" the report said.

Not Airworthy

The reported maintenance discrepancy was not investigated before the accident flight, no corrective maintenance was performed, and none of the required actions for continued operation of the 310 were taken. "Without examining the weather radar system and then either removing the airplane from service or collaring the circuit breaker, as well as making a maintenance records entry, it was not permissible to fly the airplane under federal regulations," the report said. A CB is "collared" with a tie wrap or similar device to prevent it from being reset.

Both pilots had access to information that would have alerted them to the unresolved maintenance discrepancy and the hazard that it presented, the report said. The safety pilot had been told about the weather radar discrepancy during a telephone call from the chief pilot and during a conversation with a maintenance technician. "On both occasions, the [safety pilot] dismissed the issue as unimportant," the report said. The safety pilot's reaction likely was based on the perception that the weather radar system would not be needed because visual meteorological conditions prevailed along the planned route.

Apparently, no one told the PIC about the maintenance discrepancy; but the write-up by the pilot who had flown the airplane the previous day was available for review. "The maintenance discrepancy binder was prominently placed on the throttle quadrant and would have been easy to review during the pre-flight inspection or before the airplane departed," the report said.

CC-144 *Challenger* circuit breaker panel

Routine Reset

The 310 had been flown without further event for about an hour after the pilot pulled the weather radar CB the previous day. The next day, the airplane had been aloft about 10 minutes when the safety pilot declared an emergency, and it crashed two minutes later. Examination of the wreckage indicated that the in-flight fire likely began in the left cockpit sidewall, which houses a dense collection of electrical wiring for various components as well as fuel lines for gauges in the instrument panel.

"The most likely reason for the rapid onset of the problem is that one of the pilots reset the radar circuit breaker, thus reinitiating the development of the problem encountered on the previous flight," the report said.

A firm conclusion could not be made, but it is likely that the CB was reset by the PIC. The CB panel was near the PIC's left leg and would have been difficult for the safety pilot to reach.

"General aviation pilots often reset circuit breakers during pre-flight preparations unless the circuit breakers are placarded or collared to show that the associated system is to remain unpowered," the report said, noting that the 310's "Before Starting Engines" checklist included the item: "Circuit Breakers — In."

The report also cited potentially hazardous guidance in the pilot's operating handbook for the 310 — and in many other general aviation aircraft handbooks — that a tripped CB can be reset once after allowing it to cool for a specific period. "The rationale behind this one-time reset practice is that if the circuit breaker tripped because of anything other than a transient or nuisance event and if the triggering condition was still present, the circuit breaker would trip again shortly after being reset," the report said.

Spreading the Word

NTSB's warnings about resetting CBs echoed those in the final report by the Transportation Safety Board of Canada (TSB) on the 1998 crash near Peggy's Cove, Nova Scotia. The TSB report said that resetting even a low-ampere CB can be dangerous, especially if the initiating event is electrical arcing.[3] "A tripped CB should not be reset before any associated fault is located and eliminated," the report said.

The Peggy's Cove accident and others involving in-flight fires prompted the FAA in 2004 to issue Advisory Circular (AC) 120-80, In-Flight Fires. The AC says that even if there is no hidden fire that causes a CB to trip, "the resetting of a tripped circuit breaker can overheat wiring, ultimately leading to failure and arcing."

Noting that some aircraft electrical components are critical to safe flight and must remain powered, AC 120-80 provides the following guidance about resetting tripped CBs:

- Crewmembers may create a potentially hazardous situation if they reset a CB without knowing what caused it to trip.

- A tripped CB should not be reset in flight unless doing so is consistent with explicit procedures specified in the approved operating manual used by the flight crew or unless, in the judgment of the captain, resetting a CB is necessary for the safe completion of the flight.

In its report on the 310 accident, NTSB said that most air carriers operating under U.S. Federal Aviation Regulations Part 121 have used information from the AC to revise their manuals and checklists to specify CBs that are essential and may be reset. "Moreover, aircraft operated under Part 121 commonly have indicators, such as circuit breaker markings or coloring, or segregated placement of specific circuit breakers in the cockpit, showing which circuit breakers are critical," the report said.

However, many corporate/business aircraft operators and private pilots operating under the general flight rules of Part 91 have not changed their operating procedures. "One reason might be that individuals operating airplanes under Part 91 are less likely to have a formal system for addressing AC guidance," the report said. "As a result, many general aviation pilots, mechanics and operators may not have reviewed AC 120-80. Even if [they] have reviewed the AC, the guidance contained in manuals provided by general aviation airplane manufacturers often directly conflicts with the guidance contained in AC 120-80."

Based on the findings of the 310 accident investigation, NTSB called on the FAA to inform general aviation aircraft operators, pilots and maintenance technicians about the guidance provided by the AC and to require that the information be included in initial and recurrent training. "If general aviation pilots, maintenance personnel and operators had a more thorough understanding of the potential hazards of a reset circuit breaker — as outlined in AC 120-80 — they would be less likely to reset a tripped circuit breaker without knowing what caused that circuit breaker to trip," the report said.

NTSB also recommended that the FAA require general aviation aircraft manufacturers and aftermarket-equipment suppliers to either improve or create guidance "regarding which circuit breakers pilots should and should not attempt to reset before or during flight." ◆

Editors Note: The Canadian Forces circuit breaker reset policy is found in the 1 Canadian Air Division Orders Volume 2, 2-003 and states the following: Tripped circuit breakers are an indication of abnormal operation of the associated electrical system. Therefore, unless a greater emergency exists and in the absence of Aircraft Operating Instructions (AOI) direction, tripped circuit breakers may be reset only once pending corrective maintenance.

Notes

1. NTSB Aircraft Accident Summary Report NTSB/AAR-09/01/SUM, In-Flight Fire, Emergency Descent and Crash in a Residential Area; Cessna 310R, N501N; Sanford, Florida; July 10, 2007.
2. The report said that NASCAR made many changes after the accident to improve the maintenance policies and procedures.
3. TSB Accident Investigation Report A98H0003, In-Flight Fire Leading to Collision with Water: Swissair Transport Limited; McDonnell Douglas MD-11, HB-IWF; Peggy's Cove, Nova Scotia, 5 nm SW, 2 September 1998.

Directorate of Flight Safety (DFS) and Transportation Safety Board (TSB) Agreement

On 09 April 2009, a working agreement was signed between the TSB Air Operations Branch and the DFS.
This working agreement was produced to address the mutual flight safety investigation needs between DFS and the TSB. If a flight safety occurrence involves a combination of military or civilian aircraft at a military or non-military location, then a combined investigation involving both DFS and the TSB may be required.
The working agreement addresses all concerns with respect to the notification and conduct of such investigations.
To view the official working agreement, please go to the DND website http://airforce.mil.ca/fltsafety/admin/MOU/TSB2009.pdf or email dfs.dsv@forces.gc.ca to request a copy.

The director of Air Investigation for the Transportation Safety Board, Mr Mark Clitsome and Colonel Gary Doiron, the Director of Flight Safety sign the working agreement between DFS and TSB.

Human Error

A Stubborn Snag in Airline Safety

By Alan Levin

This article was originally published in the Australian Aviation Safety Feedback magazine, October 2008. It is reproduced with the kind permission of the Australian Directorate of Defence Aviation and Air Force Safety.

As the jet roared toward takeoff, it seemed sluggish and struggled to lift off, the captain said later. It climbed only 100 feet before the control column started shaking violently, a warning that the jet was on the verge of plummeting to the ground. Only then did the crew of the Boeing 737-800 head off tragedy. The co-pilot pulled a lever to extend flaps and slats, critical devices that add lift to the wings and must be used on take-off. The pilots had forgotten to set them.

This incident, in May 2005 at Reagan Washington National Airport, and recounted in a NASA database of pilot reports, is eerily similar to a crash in Madrid that killed 154 people.

The pilots of a Spanair Boeing MD-80 filled with holiday travelers also did not extend the flaps, according to a preliminary report by Spanish investigators. The jet lifted off briefly before striking the ground tail-first and bursting into flames.

Just as in the Washington flight, the warning horn designed to prevent such accidents did not sound, according to the report. The captain on the Washington flight said a circuit breaker on the warning horn had tripped, preventing it from working.

Despite a string of fatal crashes because of failure to set flaps, including two in the US in the late 1980s, such incidents continue, according to the NASA Aviation Safety Reporting System.

From 2000 to the present, pilots reported 55 cases in which they attempted to take off without properly extending the flaps, according to the data. In nearly all cases, the warning horn functioned normally and prevented tragedy.

But pilots – many surprised that they made such a critical error – say that stress, fatigue or interruptions to their routines caused them to make big mistakes.

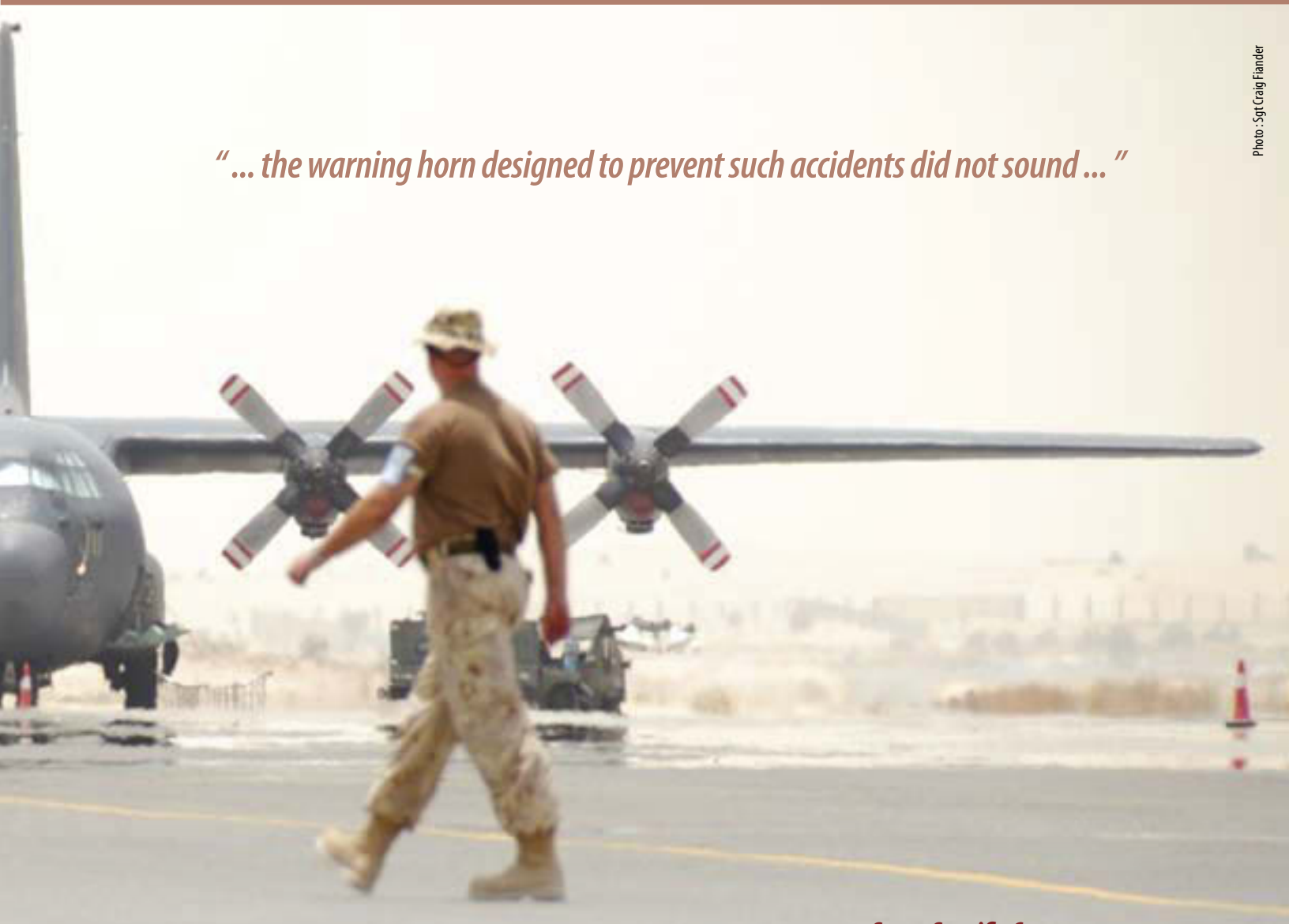


Photo : Sgt Craig Fiander

" ... the warning horn designed to prevent such accidents did not sound ... "

"The cause of this potentially dangerous situation was a breakdown in checklist discipline attributable to cockpit disruptions," said the captain of the Washington incident. Pilots and airlines are not identified in the reports.

Pilots thrown off track

Safety has improved dramatically in the airline industry in recent decades. But the human mind remains a stubborn impediment to wiping out crashes altogether.

"You'll do the same thing correctly a million times and then not do it correctly one time," says Ben Berman, a former National Transportation Safety Board (NTSB) investigator who has studied human behaviour for NASA. "Things like a moment of stress, a spike in workload, a change in routine – all these things can throw humans off track."

Distractions played a role in fatal accidents in Detroit and Dallas blamed on flaps and slats, the NTSB ruled. They were often cited in the NASA reports.

"It's a good reminder for crews to understand that you've got to be following your procedures," says Terry McVenes, an accident investigator, safety expert and airline pilot. "And if there are interruptions while you are doing your checklists, you've got to stop and be vigilant to make sure you don't miss anything."

Some Specific Cases

Distractions similar to those documented in previous accidents – including a handful of cases in which pilots also may have sidestepped procedures intentionally – dominated the cases in the NASA data:

- **In September 2003**, an airline pilot riding in a jet's passenger section noticed that the 737-200 did not have flaps extended as the jet reached the runway at Cincinnati/Northern Kentucky International Airport. Only when the jet accelerated toward take-off did the flaps begin to come down, the pilot said. "Obviously, the take-off warning horn saved all aboard from a terrible mishap," the pilot said. "It's pretty difficult to believe an event like this would take place."

- **In October 2000**, a captain of a flight in St. Louis acknowledged forgetting to set the flaps until the warning horn sounded. The captain said that issues with congestion at the airport, restarting an engine and dealing with an unruly passenger caused the crew to forget a checklist. "it is very sobering to realise that only a small warning horn kept my flight from being a replay of the . . . MD-80 crash (in Detroit in 1978)," the pilot said.

- **In January 2007**, a co-pilot recalled having to repeatedly shout at the captain before the senior pilot ordered the flaps extended after they had reached the runway – a violation of the airline's procedures. ◆

Editors Note

Distractions in the cockpit remain a source of human factors concern for Canadian Forces aircrew. Here are two recent examples of Flight Safety occurrences involving improper flap settings during take-off where the investigations revealed that distractions were a causal factor in the occurrence.

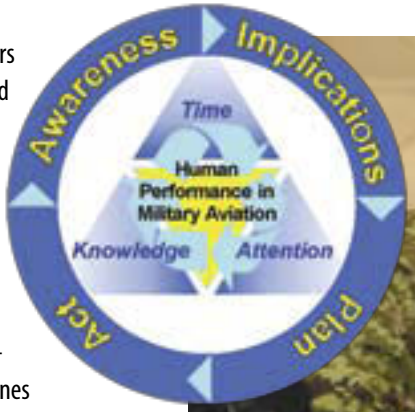
- **14 September 2006** – A CC-138 *Twin Otter* aircraft took off without the flaps being set to 20 degrees as per the normal Short Take-Off and Landing (STOL) procedures. The aircraft returned for landing and it was discovered that some paint had scraped off the tail skid. This incident occurred during a training flight during the second take-off of the mission. The flying pilot reported that everything seemed similar to a normal STOL take-off until they became airborne. The pilot noticed that a significant nose high attitude was required to remain airborne. The stall warning light and tone flickered intermittently and the pilot felt slight vibrations in the yoke. Once the safety speed was obtained, a normal climb out was commenced and the pilot requested flaps. It was then realized by the crew that the aircraft took off without flaps. The investigation revealed that the flying pilot was DISTRACTED with the take-off brief and failed to recognize that the non-flying pilot did not set the flaps to the correct setting.

- **07 September 2007** – A CC-130 *Hercules* took off with flaps set to 100% during a training flight. The previous landing was completed with flaps set at 100% and the intention was to complete a 'stop and go' performance take-off with the flaps set at 50%. Immediately after take-off, the lack of acceleration was apparent and the crew corrected the position of the flaps. The investigation revealed numerous causal factors including DISTRACTION. The pilot had not been flying regularly and became distracted with the need to review the performance take-off numbers, omitting the completion of the stop and go checklist.

Photo: Sgt Errol Morel

Let's Clear the Air

By anonymous Canadian Forces pilot



Most military aviators have been exposed to the Human Performance in Military Aviation (HPMA) material at some point in their career. Recall the HPMA model for decision-making: Awareness – Implications – Plan – Act. This model outlines the logical flow of careful decision-making. First, we must be aware of an issue that may require action. Next, we deduce the possible implications, or consequences, that may arise; and then we determine a plan - or several plans - to resolve the problem. Lastly, after choosing the most appropriate plan we must act, or execute the best plan.

Photo : WO Serge Peters

The AIPA model is a very useful decision-making tool because it applies not only to cockpit decisions, but to almost any on or off-duty situation. Sometimes we have plenty of time to follow the AIPA model, while at other times we must decide quickly – perhaps almost instantaneously - in certain situations or conditions. Now I'll bring the subject of this article into focus by relating my personal story about a regrettable decision-making scenario that occurred while off-duty. I'm a pilot, and basically, I ignored the AIPA model and it led to me being suspected of illicit drug use in a Flight Safety incident no less! Here's what happened: During a period of routine local operations, I stopped to visit a former neighbour on my way home from work. Instead of a brief, casual social visit, I was greeted by a woman in the midst of an apparent mental breakdown. I was deeply concerned about her safety and felt obliged to help, so I asked what had happened. What followed was a continuation of her mental anguish, which she was apparently trying to self-medicate with marijuana. In fact, while I sat with her in her kitchen and offered a sympathetic ear, she chain-smoked four marijuana cigarettes in a small room. After about an hour of this, and confident by then that she wasn't going to harm herself, I managed to withdraw and return home. It wasn't until after the aircraft incident that occurred within 48 hours of being exposed to marijuana smoke that I gave a second thought to that situation. As I filled out the post incident medical questionnaire at the MIR, I was obliged to mention my second-hand marijuana smoke exposure. By then I had already submitted my blood and urine samples as part of the routine post-incident medical investigation, and I had no reason to doubt that anything would turn up on my tests. Well, it wasn't quite so straight-forward. The Flight Surgeon was immediately concerned that my exposure to second-hand marijuana smoke may have affected my role in the incident. This was a bit of a shock, since it wasn't like I'd smoked the joints myself, right? But then, and even more of a shock, he explained that he was obliged to consider the possibility that my story of second-hand marijuana exposure may have been just that a story concocted to cover active drug use on my part. Whoa! Suddenly, the full implications of this situation really dawned on me and my stress levels just skyrocketed. He told me that he had to make sure that I wasn't using illegal substances before he could return me to flying duty. At that point my stress was pretty obvious and I just


Photo : WO Serge Peters

wouldn't have been safe to fly anyway. The Flight Surgeon was careful to inform me that my medical information is protected and cannot be disclosed to the chain of command. It was made clear, and I understood, that this was a medical, not legal issue. So, I was asked to consent to a session with an Addictions Counsellor, including a urine screening test for illegal substances. The purpose of the urine test was to provide a quick screening result that could exclude recent active drug use on my part while we waited for the formal toxicology analysis results to come back from the lab - which could take weeks or months. Of course, I consented to everything since I just wanted to clear the air (pardon the pun) as quickly as possible and get back in the cockpit. I was also relieved when the Flight Surgeon explained that this counselling session and the urine test were strictly voluntary on my part and that any results would be held in strict medical confidence and could not be discussed with my boss or anyone else in my chain of command. The very professional and confidential Addictions Counsellor's assessment included an interview, a barrage of multiple-choice questions and, of course, the urine test. My assessment indicated that I was not at risk of abuse or addiction, and my urine test was completely negative for drugs, including THC (the active metabolite of marijuana). What a relief that was. So finally, after a great deal of stress and anxiety over a few days, I was ungrounded and went back to my normal flying duties. As far as the Flight Safety investigation went, the local Flight Safety Officer determined that I was not a contributing factor in the incident. Everything seemed fine and I felt that I had put this episode behind me. Well, not quite, as it turned out. Remember those blood and urine samples drawn right after the flight? Well, several weeks later the Flight Surgeon finally tracked down the long-delayed results. So, he invited me down to his office for a follow-up chat. I was absolutely stunned to learn that my blood samples were actually *positive* for THC metabolites (i.e. the 'active' ingredient of marijuana). How could this be???

So, even though I didn't actively *smoke* any marijuana, I had received sufficient *exposure* to register a positive result, even 48 hours later. In fact, I learned that my THC levels were actually far enough above the detection threshold to raise the question yet again as to whether I might even be a regular user! My Flight Surgeon explained that he had no choice from a medical/Flight Safety perspective but to re-evaluate me for drug use. Again, I consented, as I just wanted this monkey off my back for good. So, it was back to the Addictions Counsellor for Round Two and yet another urine test. Of course, this assessment and test were also normal, and I was ungrounded immediately. Currently I continue my aviation career. But now I have a new eye for putting myself in situations that are less than ideal. I also have a new respect for toxic environments. As my Flight Surgeon put it, although I'd been cleared of active drug use, I was guilty of spectacularly bad judgment. Since he didn't want to let me off the hook completely for this, he suggested we make a learning opportunity out of my experience - hence the article you're reading now. So, I think at this point we should look closely at the AIPA model and explore how my experience could be a lesson for all.

Let's begin with ***Awareness:*** in this situation I was in a relatively familiar environment (my home town, not deployed in a foreign country) and I let my guard down, resulting in a degradation of situational awareness in a scenario that definitely required further thought and better judgment. I've been in foreign countries where a very high level of situational awareness and appreciation of one's surroundings is required to avoid things like petty theft or major crime, and where illegal, or questionable, "recreational activities" are much more common than at home. So, it was at this first stage of decision making that I definitely failed. Next is ***Implications:*** clearly, by not being fully aware of the circumstances regarding marijuana smoke exposure, I couldn't truly understand the implications of this decision. However, it's pretty clear to me now that even casual exposure to marijuana smoke can lead to detectable levels in your system. Aside from this point, what would have happened if for some reason the police had become involved? Or what if my squadron mates suspected that I was involved in using illegal drugs? And what if this person having a mental breakdown had hurt herself, and I was investigated? There are a myriad of unfavourable implications

and outcomes from this particular situation. The third point is *Plan*: when you find yourself in a questionable situation, make a plan to get out of it. Have an exit strategy. You can make any excuse to get away if you really need to.

Lastly *Act*: execute your plan. Get the heck out of there! And ensure that you don't find yourself in a similar situation in the future. The lessons learned here are very clear to me now. Primarily, aircrew must avoid second-hand marijuana smoke. As I can attest, even this kind of exposure can result in detectable levels of metabolites in the body. This means that there could be some degree of physiologic or cognitive impairment too. Therefore, the potential exists for a flight safety hazard if we've been around the stuff. Finally, although I made a poor decision to hang around that dangerous environment, the best decision I made was to come clean about the incident. So, if you are innocently/unwittingly exposed to a toxic environment, then take the initiative and report it, rather than risk it being discovered (and probably misinterpreted) in some far less than desirable way.

My final comment is this: as CF members we are always in the public eye, whether in uniform or not. That means we have an ethical and moral code to live up to. Hanging around watching an illegal activity is pretty much condoning that illegal activity; indeed, it might even be considered participating in it. And that's just not consistent with our military values. Also, as military aviators, not only are we subject to the Criminal Code of Canada and the Code of Service Discipline, but we are also accountable to the Aeronautics Act. Aviation professionals are held to an elevated standard and we must conduct ourselves appropriately both on and off the job. Although my experience is related to the medical aspect of illegal drugs, it applies to many other situations as well. Therefore, if you find yourself in a questionable situation, the AIPA model can be invaluable in guiding you out. ◆

Photo : W.O. Serge Peters

Flight Comment

Flight Comment would like to hear from you!

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

The Flight Comment editor can be reached at dfs.dvs@forces.gc.ca.

Let's hear from you!

The Silver Dart

Flight Safety Then and Now

By Mary Lee, Hawk One and Centennial of Flight Public Affairs Officer, Ottawa and Mr Doug Jermyn, President Aerial Experiment Association 2005.

In 2005, a group of aviation enthusiasts began the recreation of a Silver Dart to replicate the famous aircraft design of the Aerial Experiment Association (AEA) of 1909. Known as the *Aerial Experiment Association 2005 Inc.* this small group of about 25 volunteers dedicated their efforts to flying a replica of Canada's first airplane. The original Silver Dart, flown by John Alexander Douglas McCurdy in Baddeck NS on February 23, 1909, was the fourth aircraft of the AEA.

But what has 100 years of aviation taught us about the dynamics of flight? Using the lessons learned from the 1909 Silver Dart flights, here is a look at the Flight Safety considerations the AEA 2005 used during the construction of the most recent Silver Dart replica. These considerations resulted in a successful and safe flight for the Silver Dart and no doubt a little bit more comfortable for the pilot, Astronaut Bjarni Tryggvason. ◆

Flight Safety consideration	1909 Silver Dart	2009 Silver Dart replica
Ailerons	Aircraft roll was considered to be an adverse condition rather than beneficial for turning the aircraft. As such they devised a shoulder yoke for the pilot which was connected to the ailerons. The theory was that if a gust of wind caused the aircraft to start a roll, the pilot would instinctively lean in the opposite direction. This action would move the shoulder yoke which in turn would move the ailerons to correct the roll. This is fine in theory but totally foreign to a modern day pilot.	The ailerons are controlled by rotating the control wheel, as per modern aircraft practise. This change was made to lessen considerably the learning curve required by the pilot in controlling the aircraft.
Braking	No braking system.	Master brake cylinders were installed which were connected to disc brake callipers on the rear wheels. This proved to be a wise decision due to the limited steering angle on the nose wheel resulting in a rather large turning radius. The brakes came in handy during the early taxi tests when the aircraft manoeuvred into tight areas that the pilot could not steer out of.

Flight Safety consideration	1909 Silver Dart	2009 Silver Dart replica
Safety harness	The pilot sat on a plank of wood with NO seat belt or shoulder harness!	The biggest safety consideration would be the installation of a proper 5 G capable pilot's seat and a four point attachment seat belt with shoulder harness.
Fuselage structure	A bamboo structure that was subjected to buckling due to high compression loads while in flight.	Extra stiffening was added to the two longitudinal bamboo struts above the pilot in order to prevent buckling of the forward fuselage structure.
Tension cables	Limited to 200lbs maximum tension.	Increased the tension in the critical high stressed areas in the wing roots and central fuselage area up to 580 – 880 lbs maximum tension.
Cable tensioning turnbuckles	Constructed using a motorcycle spoke design.	90 percent of the turnbuckles are of original design except in 20 critical areas where they used modern aircraft turnbuckles in order to maintain proper tensioning in the wing root area.
Load capability	550 lb test cable was used through out the aircraft.	880 lb test cable was used in the first inboard wing bays to add extra margin for lifting loads.
Instrument panel	No instrument panel.	A small instrument panel was added for the pilot. It contained a tachometer, engine oil pressure and temperature gauges and an air speed indicator. In addition, a slip indicator ribbon was added to the nose structure and a vertical graduated stick behind the elevator so the pilot could read the elevator angle of attack.


Photo : Capt Doug Kerstead

Lt Meagan McCurdy, an Air Cadet Glider Instructor, and distant relative of J.A.D. McCurdy, the first pilot of the Silver Dart in 1909.


Photo : Slt Adam Martin


Photo used with permission by Marian Bell Whitcomb

The Life of a Flight Plan

By the Safety Management Planning and Analysis Division, Operational Support, NAV CANADA.

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A flight plan (or itinerary) serves two main purposes. First, it provides information to NAV CANADA, which facilitates planning for the provision of air traffic control (ATC) services. Second, and most important, it is the basis on which alerting service is provided to pilots. A host of air traffic service (ATS) units are involved in the provision of alerting service, including flight service stations (FSS), flight information centres (FIC), control towers, and area control centres (ACC). Community aerodrome radio stations (CARS), which are not ATS units, are also involved in the provision of alerting service. The transfer of information between these units is seamless to pilots. But to ATS, it is vitally important to know which unit is responsible for providing alerting service at a given point in time. Just as pilots have procedures for the safe transfer of control of the aircraft between crew members ("I have control" or "you have control"), ATS has procedures for ensuring that one unit has responsibility for alerting service. The purpose of this article is to provide pilots with an overview of what happens to their flight plan at each stage of its life. Understanding how the system works can help pilots make it work better for them!

Over the course of its life, a flight plan can be filed, amended, cancelled, activated, changed (IFR vs. VFR), updated, closed, or it can become overdue.

Filed

To facilitate planning by ATS, pilots are requested to file their flight plan at least 30 min prior to their proposed departure time. Once filed, flight plan messages are transmitted via the aeronautical fixed telecommunications network (AFTN) to units that will be providing advisory, control and alerting services. The AFTN interconnects Canadian ACCs, control towers, FSSs and FICs and other aeronautical facilities around the world. IFR flight plans are transmitted to the ACC in the flight information region (FIR) where the departure aerodrome is located, so that the ACC can provide control and alerting services. They are then transmitted from one ACC to the next as the flight progresses, and each new ACC assumes responsibility for alerting service. VFR flight plans are held by the FIC in the area of responsibility where the departure aerodrome is located, so that the FIC can provide alerting service. Then, when activated, they are transmitted to the FIC in the area of responsibility where the destination aerodrome is located. The receiving FIC assumes responsibility for alerting service when the activated flight plan is received. When filing a flight plan electronically, it is expected that the person filing will be contactable by phone for 30 min after NAV CANADA receives the flight plan, in order to clarify any information.

Flight Safety occurrence 21 March 1995

A CT145 *King Air* was on an IFR flight plan from Winnipeg to Brandon. 50 DME from Brandon, ATC informed the pilot that he was flying the incorrect routing. It was determined that a breakdown in communications occurred when the Ops Center amended the flight plan without advising the flight crew.

Amended or cancelled

In Canada, a VFR flight plan is activated automatically at the proposed departure time or actual departure time when reported to an ATS unit, whichever is earlier. To avoid an unnecessary search, it is very important for pilots to notify ATS when their proposed flight is delayed or cancelled. This is particularly true at aerodromes where no ATS or CARS service is provided, as there is no way for ATS to know if the aircraft has departed. Flight plans filed through a computer system (e.g. NAV CANADA's Internet Flight Planning System, or the Direct User Access Terminal System [DUATS]) can only be cancelled or amended by phone call to or radio contact with an ATS unit.

Activated

As stated above, in Canada, a VFR flight plan is activated automatically at the proposed departure time unless ATS knows that the aircraft has not departed. It is good practice, however, for VFR pilots to contact the appropriate ATS unit and request that their flight plan be activated. An accurate departure time facilitates planning of ATS and ensures more timely alerting service, if required. As things work a little bit differently in the U.S., pilots flying VFR from the U.S. to Canada should be aware that they must contact an American automated flight service station (AFSS) to have their flight plan activated. Federal Aviation Administration (FAA) control towers and air route traffic control centers (ARTCC) do not

pass VFR departure times or position reports on to the AFSS. Many VFR pilots have unwittingly violated the *Canadian Aviation Regulations* (CARs) by crossing the border without an active flight plan. In the U.S., filing a VFR flight plan does not mean it has been activated!

Flight Safety occurrence 13 March 2003
Due to miscommunications, a CH146 *Griffon* flew from St Leonard to Fredericton NB without an active flight plan.

Changed (IFR vs. VFR)

ACCs provide alerting services to all IFR aircraft and to the VFR aircraft for which they are responsible. FICs provide alerting services for all other VFR aircraft. In Canada, when an aircraft "cancels IFR," it means cancelling IFR control service. It does not automatically cancel alerting services. The controller or specialist should inquire whether the pilot also intends to close the flight plan. If so, the pilot will be advised, "alerting services terminated," and the flight plan will be closed. If the pilot wishes to keep the flight plan (and associated alerting services) open, the ACC will retain alerting services. Pilots should be reminded that an arrival report would then be required to close their flight plan. In general, when cancelling IFR, it is advisable to keep the flight plan open to take advantage of alerting services—just don't forget to file an arrival report! This is another example of where things work a little differently in the U.S. If IFR is cancelled in the U.S., or in Canadian airspace delegated to the FAA, alerting service may not follow the pilot into Canada. In such circumstances, the pilot is required to file a new VFR flight plan before crossing the border in order to comply with the regulations and to ensure that alerting service continues to be provided. Aircraft on composite flight plans (e.g. part VFR, part IFR) have their alerting service managed by different units during the various parts of their flights. The ACC is responsible for the IFR portion, while the FIC is responsible for the VFR portion. What this means for pilots is that, in circumstances where the flight is terminating with a VFR portion, they should be sure to keep the FIC advised of any delays or revised arrival times. In accordance with VFR procedures, pilots should also be sure to file an arrival report with the appropriate ATS unit. The above also applies to aircraft flying controlled VFR (CVFR) (VFR in Class B airspace). While a flight plan and departure message is sent to the appropriate ACC to allow control service to be provided, alerting service is provided in the same way as for a VFR flight. This means that updates and arrival reports should be provided to the appropriate ATS unit.

Updated

Since alerting service is based on information provided by the pilot, it is critically important for pilots to keep the ATS unit or CARS up to date regarding changes to their flight plan. Section RAC 3.7 of the *Transport Canada Aeronautical Information Manual* (TC AIM) outlines the specific CARs requirements for updating a flight plan. Pilots can certainly understand the importance of providing an update whenever there is a change to when, or where, they expect somebody to come looking for them!

Closed

With the exception of pilots arriving IFR at aerodromes served by an ATS unit, pilots are required to file arrival reports in order to close a flight plan. Pilots arriving VFR at aerodromes served by an ATS unit should not assume that their flight plan will be closed. They may request that the unit close their flight plan. Otherwise, a phone call to or radio contact with the FIC at the remote communications outlet (RCO) after landing will save unnecessary search and rescue (SAR) action.

Overdue

The specific time an aircraft becomes overdue will depend on whether the aircraft is IFR or VFR, whether it is on a flight plan or itinerary, and whether a SAR time has been indicated on the flight plan. If an aircraft is overdue, the responsible ATS unit will initiate alerting service. This process will begin with a communications search—contacting ATS units, aerodromes and CARS along the proposed route of flight to see if they have communicated with the aircraft, and calling the contacts provided on the flight plan. This process will culminate with the notification of the joint rescue coordination centre (JRCC), which will dispatch the appropriate SAR resources.

Conclusion

We hope this article has provided a better understanding of how flight plans make their way through the system. For pilots, the message is simple: ensure your flight plan is complete and up to date and, particularly when flying VFR, ensure your flight plan is activated, updated as required, and closed with ATS! ◆


Photo : Pte Melissa Spence

Won't Happen to Me!

By MCpl Robert Delaney, 403 Helicopter Operational Training Squadron, Gagetown

Have you ever been sitting around with your peers, and listening to personal experiences? Have you ever caught yourself thinking "Won't happen to me." I think we can all relate. This is my take on such a situation. I was a Flight Engineer at 440 Sqn in Yellowknife working on Twin Otters and received a posting message to 403 Sqn on Griffon helicopters. One of the biggest changes for me, other than going from fixed wing to rotary wing, was to get used to wearing a helmet, survival vest, harness and monkey tail, as none of this equipment was part of my regular kit on the Twin Otter. Not a big deal, I would get used to it. As the date for my Griffon Flight Engineer Course was approaching, I was listening to the operational engineers telling stories of forgetting to secure their monkey tail for a given sequence. I was told that there will be a time when I would forget also. That's when I thought, "Won't happen to me." Off on my Operational Training Unit (OTU) I go, and low and behold, I never forgot to secure my monkey tail. But it caught up to me. On one of my first operational trips after finishing my OTU, we were conducting a Night Vision Goggles (NVG) trip that consisted of a slinging sequence. After hooking up the slung load to the aircraft, I reconnected my communication cord and stated "FE back on comms, working on number", letting the pilots know that I was getting the new torque numbers and new Vne required for the flight. The pilot then gave his crew brief, I then gave the new working parameters and stated "Cabin Secure". What I did not do was check to make sure my monkey tail was secure. The slinging sequence was carried out. On approach a Full Check for landing was requested and carried out. I was then asked, "Cabin?" It was then that I reached back to check my monkey tail for security, and found it was not connected to my harness. I had conducted a full sling sequence, with the cabin door open and on NVGs, without my monkey tail. I secured my monkey tail, and called "Cabin Secure." So my thought of "Won't happen to me", happened. Now the first thing I do when entering the helicopter, even before connecting my comms cord, is to secure my monkey tail. Now I'm one of those guys telling the new guys, "Careful, it can happen to you."

I secured my monkey tail, and called "Cabin Secure." So my thought of "Won't happen to me", happened.

Photo : MCpl Robert Bottrill

Photo : MCpl Kevin Paul

Pressure to **GO**

By Captain Jesse Wilts, 435 Transport and Rescue Squadron, Winnipeg.

In the summer of 2007, my squadron was tasked to take some very important people on a trip up north. This being my first VIP trip in the Hercules I was excited to go, and had an opportunity not only to meet them but also to fly them to their destination. I thought it would make for a memorable trip, and boy was I right!

When we arrived to pick up the aircraft our Flight Engineer noticed a dent in the edge of the wing during the pre-flight inspection. While this small crease seemed innocuous, it was enough to delay us a couple of hours. Due to our itinerary, we had very little time to delay our departure and we accepted the aircraft, dent and all, with confirmation that we would receive an engineering disposition to follow. If it were anything less than a priority one mission, we would never have left in the first place or even been given authorization by the chain of command to do so.

The second day was uneventful as we landed at our rendez-vous point. We waited for our guests, and waited and waited. This is when I learned that VIPs make their own timings and may also change their plans on a whim, which they did. At a range of 300 metres I watched our VIPs board another aircraft! My pride in the Hercules was almost affected, but we did have some willing passengers in the end. We then waited a couple more hours for them to arrive so we could finally leave.

When we finally arrived back in town it was very late, the crew was the last to leave the airport. When we tried to check into the hotel, we learned that our booked and confirmed rooms were given away to our passengers! After a long crew day we were almost completely denied crew rest. Miraculously we did find accommodations well after dark and at the peak of tourist season. I couldn't imagine flying the next day on zero sleep, and this sure was not the time to find out what it would be like.

Photo : Cpl Gayle Wilson

We arrived at the airport the next day to flight plan the next leg of our trip. I took one look at the weather and couldn't believe it. There was a low level jet lying perpendicular to the runway with severe icing and turbulence surrounding our destination. I consulted the airfield data and the crosswind was well above the 'Not Recommended' zone somewhere in the top of the page margin. After consulting with the aircraft commander we both agreed that attempting anything in these conditions would amount to suicide.

After briefing our VIPs on the weather, some accepted it and others did not. Those that did not take the news very well tried all day to pressure us to go. The pressure to go was higher than I've ever experienced, but we as a crew decided we value our lives enough to know when the proverbial Swiss cheese was lining up and we could feel it. Later in the day word got out that another aircraft had landed there. We couldn't imagine how, but trying to explain that it probably didn't have a rudder the size of a barn door fell on deaf ears. We still resisted the pressure to go. Only the next day did we learn that the other plane landed into wind onto an abandoned runway that was not published. I'm glad we didn't try that one. I will never forget the words of one of our passengers when he said that 'D-Day was delayed because of weather, and so are we.'◆

Max Crew Duty Day

By Captain Johnathon Wiebe, 431 Air Demonstration Squadron, Moose Jaw

As a pilot in the Standards/ Operations Cell at 431 Air Demonstration Squadron one of my jobs is aircraft recovery. I had been tasked to recover an unserviceable aircraft from Whitehorse Yukon that had been flown there to support Sourdough Days. I was on somewhat of a tight time schedule because I and two technicians would not be able to depart for Whitehorse till Tuesday and I needed to have the aircraft back by Wednesday as my family and I were departing on Thursday morning for a Squadron organized ski trip. For those of you not aware the Tutor jet in Snowbird configuration is a very short range jet. The flight from Whitehorse to Moose Jaw could, depending on weather and winds take up to five hops to complete.

I was picked up at my house on Tuesday morning at 0700L (1300Z) for transport to the Regina Airport. Our commercial flights went on schedule and we arrived in Whitehorse at 2100Z. The technicians quickly got to work and I started checking weather. They determined that it would be a quick fix to get the aircraft serviceable and they could have it ready to fly in two hours. I noticed that the weather for the next twelve hours was good with favourable tailwinds and VFR conditions at my fuel stops. However if I waited until Wednesday morning to depart, the weather conditions would have deteriorated considerably. The tailwinds would have dropped off, my fuel stops would require alternates and there were significant icing layers aloft all the way to Edmonton. It came down to if I departed late Tuesday afternoon as soon as the aircraft was ready I could make Edmonton that night with one fuel stop in Fort St. John and then one fuel hop the next day to Moose Jaw. If I waited till Wednesday morning I would be faced with making it to Moose Jaw in one day with possible fuel stops in as many locations as Watson Lake, Fort Nelson, Fort St. John and Edmonton. Add into this the first three fuel stops were forecast to have significant layers of icing aloft that would have to be contended with during my descents and climbs.

I made the decision to depart Tuesday late afternoon and attempt Edmonton that night. The flight to Fort St. John was uneventful but long. The flight was planned for best range in a tailwind which at 180kts IAS makes the

Photo : MCpl Robert Bottrill

"It was not till I pulled out onto the runway and did a last minute check of my compass that I noticed that it was not yet aligned ..."

aircraft trim not as effective in assisting the pilot to hold accurate heading and altitude. The weather at the fuel stop had deteriorated more rapidly then forecast and visibility was below VFR. The approach was shot at night into a strange airport in mountainous terrain with low visibility, no approach lights and the runway not aligned with the approach. It required all my concentration and I found my self quite fatigued on landing.

I considered staying on the ground in Fort St. John but upon review of the weather for that night and the next morning I elected to carry on to Edmonton. I filed my flight plan, completed my strap-in and checks having to stop on a couple of occasions to correct myself and make sure things were done properly. One of the errors I committed in my checks was not turning my inverters on at the appropriate time. It was not till I pulled out onto the runway and did a last minute check of my compass that I noticed that it was not yet aligned and that I still had an OFF flag on my main attitude indicator. Had I taken off into night IFR conditions with these two instruments reading incorrectly combined with my already high level of fatigue I would have found myself in considerable difficulty.

Once all systems were ready I departed on the short flight to Edmonton. Throughout what should have been a routine flight I found myself suffering from a lack of concentration. Routine tasks were started late and then not fully completed before I was moving onto the next task. I was constantly feeling like I was water skiing behind the aircraft.

Upon arrival in Edmonton and with all checks on the aircraft completed I had reached my 16 hour on-duty limit.

I reflected on my day and although I don't regret the decisions I made I was surprised at how fatigued I had become and how difficult it became to complete mundane tasks.
As inconvenient as rules such as Crew Duty times can be they are there for good reason and must be respected. More importantly we must monitor ourselves and our crews for signs of fatigue and be ready to change the plan or cut the mission short if necessary. We don't have to fly to our max crew duty time. ◆

Enforcing your LIMITS

By Air Cadet Instructor Pilot Isabelle Cadrin

The actions a flight instructor must take are not always obvious. I learnt this through several experiences that showed me that one has to respect one's personal judgment limits and when you feel that your personal limits have been passed regardless of the abilities of the pilot or student pilot you are flying with, corrective action must be taken without hesitation.

When a pilot has not flown for an extended period of time, a check flight is usually necessary to ensure the pilot is still proficient for the qualifications they may hold. In the Air Cadet Gliding Program, this is also the case. During the operations of the gliding program, I was asked to fly with a senior gliding instructor that had not flown in quite some time. The pilot I was to fly with had much more experience than I did, and held a higher rank. At the time I was a recently qualified glider instructor and had only a few months of experience under my belt. The flight went very well up until the point where we joined the circuit. The pilot joined the circuit parallel to the runway for a normal downwind and began the routine checks. At this point I looked outside at the runway and realized that we were much further from the runway than we should have been. At this point I wasn't too sure about what to do. I hesitated to say something; after all, he was also an instructor and had much more experience than myself.

After a couple stressful moments I decided that I had to say something, I told him that we were too far out. Luckily he immediately began to angle in towards the runway and admitted that he had chosen a poor reference point for the landing. Luckily for us it was a clear day with no wind. After having corrected his mistake, we just barely made the field and safely landed the glider.

Once we were on the ground, I realized just how close we had come to not making it back to the airfield. The area around the airport has a dense forest so an off-field landing may not have worked very well either. The personnel that were on the ground also saw the low approach and the fact that we were very far out in the circuit. Had there been stronger winds or downdrafts in the circuit, we very easily could have wound up in the trees.

The instructor that I was flying with realized that his judgment was off, because he had been flying larger aircraft recently and was not used to the smaller circuit that a glider would fly.

In the end, everything worked out alright, but at the end of the day I had learned a very valuable lesson that I will always remember: regardless of the qualifications or experience of a pilot that you are flying with, always be vigilant, don't be afraid say something as soon as something seems off and never let your guard down. ◆

Photo : Cpl Eric Jacques

Photo : Cpl Eric Jacques

"... I looked outside at the runway and realized that we were much further from the runway than we should have been ..."

Don't forget the obvious!

By Sergeant Donald Matthews, Firefighter, 17 Wing Winnipeg

There was an incident in the winter of 2000 that clearly illustrated how not to conduct a pre-flight check. It also demonstrated how the largest and most glaring hazards can be overlooked while concentrating on the finer details of a pre-flight check. Although the oversight could have easily lead to serious injury, the aircrew walked away from the crash uninjured though thoroughly embarrassed and chastened.

There was an aviation institute and flying club based out of a military air base from the late 1990's to the early 2000's. The institute offered flying lessons as well as supplying small aircraft for civilian pilots to fly. A flying school will inevitably supply the rescue crews with some memorable moments. On one occasion a small airplane skipped across the runway and ended up just outside the Base Fire Hall. During the night in question, our crew at the fire hall received a call indicating there was an in flight Twin Cherokee having difficulties lowering its front landing gear. The necessary persons were contacted and the fire fighters proceeded to take up their pre-assigned crash positions.

The aircraft landed minus its front landing gear and slid off the runway onto the adjacent grassy area. The two aircrew exited the aircraft unharmed and met the responding Platoon Chief. Our attention was drawn to the nose of the aircraft. We were shocked to see the aircrew had forgotten to remove the tow bar prior to taking off. It is hard to fathom how two crew members could miss a seven foot long orange bar attached to the front landing gear. It only takes minutes to conduct a walk around a Twin Cherokee.

This incident has remained firmly etched in my memory, and I try to incorporate the lessons learned into my everyday routine. Unfortunately, I still see similar incidents occurring at my workplace. I recently observed a driver performing a very detailed vehicle inspection only to drive away to an emergency with a few of the side compartments open, leaving a trail of rather expensive equipment in his wake. ◆

"We were shocked to see the aircrew had forgotten to remove the tow bar prior to taking off."

Photo : Sgt Craig Fiander

From the Investigator

TYPE: CH146 *Griffon* (146488)

LOCATION: Yuma Range, Yuma Arizona

DATE: 19 January 2008

Griffon CH146488 was tasked to transport five passengers from Marine Corps Air Station Yuma to the Yuma Range. The passengers requested to be dropped off as close as possible to the top of a 400-foot high rocky hill. The aircraft captain completed a reconnaissance pass and selected a landing area on the west side of the hill. The intended landing area was a narrow ledge approximately 20 feet below the summit of the hill. Due to the close proximity of terrain to the right of the helicopter it was decided to land with only the right skid resting on the ledge and conduct a right skid only insert. The approach to the ledge appeared normal until approximately five feet above the touch down point. At this point the helicopter suddenly lost lift and abruptly settled with the right skid on the ledge. As the helicopter continued to settle it rolled left which caused the right skid to get momentarily hung up on a small, rocky outcropping. The belly of the aircraft was punctured as it further rolled left. During this manoeuvre the flight engineer and mission specialist were partially thrown out their respective doors. Both occupants were prevented from being completely thrown out of the aircraft by their 'monkey tail' harness. The helicopter continued to roll left, reaching a bank angle of 48 degrees. The rolling motion caused the right skid to become free. The pilot then levelled the aircraft and lowered the nose to fly down the cliff. The pitch angle reached 34 degrees nose down. During the recovery from this unusual attitude it was necessary to conduct some aggressive manoeuvres in order to avoid terrain that was in front of the helicopter. The helicopter landed, shut down, and a post-flight inspection revealed that the mast overtorque cat's eye was tripped.

The investigation is focussing on site selection, environmental conditions, and helicopter aerodynamics.

From the Investigator

TYPE: Search and Rescue technician parachute assembly (CSAR-7)

LOCATION: Comox Lake, BC

DATE: 08 May 2009

The Canadian Forces School of Search and Rescue was conducting a basic Search and Rescue (SAR) technician trade qualification course. The student SAR technicians were to conduct their first water landing from a parachute jump commencing from 3,000 feet above the water surface. The jump was from a civilian registered aircraft and the drop zone (DZ) was at the east end of Comox Lake, located approximately 10 miles southeast of 19 Wing Comox. As the Jumper exited the aircraft the Life Raft Survival Kit (LRSK) interfered with the normal deployment of the main parachute. During the exit, the LRSK rolled inverted and rode up over the main parachute compartment. The Jumper's static line stretched tight in a normal manner and pulled the deployment bag (D-Bag) containing the main parachute from the parachute pack tray. The main parachute D-Bag fouled under the LRSK attachment strap preventing further main parachute deployment. The Jumper was now hung up - towed behind the aircraft by the taught parachute static line. The Jump Master (JM) advised the pilot of the situation so the aircraft could be manoeuvred to remain over water. The JM quickly completed an assessment of the situation and after receiving the appropriate hand signal from the jumper, gave the order to the Safety Person to cut the Jumper's static line. The Jumper tried to stabilize in a belly down free fall attitude; he then attempted to cut away his main parachute and deploy his reserve parachute. Following reserve parachute deployment, the Jumper noted little deceleration and that less than half the reserve canopy was inflated. The reserve parachute suspension lines appeared twisted but upon further examination, he noticed the main parachute inner D-Bag with extended suspension lines had wrapped around the reserve parachute suspension lines. The Jumper retrieved the D-Bag and swung it in a direction to unwrap it from the reserve parachute suspension lines. The reserve canopy began to inflate and slow his descent. The Jumper noticed the water surface approaching and he prepared for the water landing. At first contact he skipped off the water surface and then was thrown forward, landing in the water much harder than normal. A water rescue boat was immediately on the scene and operators assisted the Jumper into the boat. The Jumper received minor injuries.

The investigation is focusing on the design of the LRSK.

From the Investigator

TYPE: CT155 *Hawk* (155215)
LOCATION: 15 Wing Moose Jaw, SK
DATE: 18 April 2008

The *Hawk* training aircraft, crewed by a Qualified Flying Instructor in the rear seat and a student pilot in the front seat, was on a student Phase 3 Instrument Flying mission. The aircraft took off from Runway 11L and flew a local instrument departure in visual meteorological conditions. The aircraft was climbing through approximately 10,000 ft ASL at maximum continuous power, nine nautical miles (nm) southeast of the airfield when the pilots noticed a change in engine noise, followed shortly afterwards by a T6/NL caution (indicative of an engine malfunction) in the rear cockpit. The instructor took control, zoomed, turned towards the airfield, reduced power to idle and declared a "Mayday." As the instructor set-up the aircraft for a forced landing circuit pattern, the pilots began to experience vibrations, which progressively increased. The aircraft initially crossed the airfield in a north-westerly direction at 9000 ft ASL at approximately 230 Knots Indicated Airspeed (KIAS) and began an orbit to the south. During the second half of this orbit the vibration increased dramatically, followed by a loud bang and the illumination of the oil pressure and generator lights and the loss of the Head-Up display. The pilot placed the throttle to cut-off and re-crossed the field heading northwest at an estimated altitude of 4,000 ft ASL (2,000 AGL) at 185 KIAS. The pilot continued a left descending decelerating turn towards the runway. Approximately 1 NM back from the runway the instructor directed the student to use the emergency gear system to lower the landing gear. Shortly afterwards the instructor realized they were not going to make the runway and commanded the ejection. Both pilots successfully ejected at an estimated height of 200 to 300 ft above ground while the aircraft was in a steep descent. Both pilots sustained serious injuries during ejection. The aircraft struck the ground 1.5 seconds after the ejections in a wings level 30 degree nose down attitude and exploded. Field examination of the engine revealed that the low pressure compressor and turbine were at very low to zero RPM at impact. The low pressure turbine was found to have one full blade missing, with several other nearby blades missing various amounts of the blade span. In addition, the 12 bolts holding the low pressure compressor bearing housing were found loose. The engine was sent to the Quality Engineering and Test Establishment for a detailed inspection. The investigation will be focusing on the cause of the engine failure, aircraft forced landing procedures, training, and ejection system issues.

Epilogue

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

LOCATION: St Jean Airport, Quebec

DATE: 19 June 2006

The accident occurred in the afternoon at the St-Jean Airport (CYJN) where the Eastern Region Gliding School (ERGS) was conducting glider instructor training. Operations were expected to continue for another hour before the onset of deteriorating weather; however, a rapidly developing thunderstorm to the southwest brought inclement weather to the aerodrome earlier than expected. The accident glider, C-FZIQ, was being towed to its tie down position as a result of the changing weather when a large increase in wind speed caused the glider to become airborne. The glider hovered momentarily, still tethered, before the tow rope severed, causing the glider to invert and crash on the aerodrome. There were no injuries; however, the glider sustained very serious damage. Findings from the investigation showed that the ground visibility before the occurrence had reduced to approximately four miles in haze, limiting the ability of the Launch Control Officer (LCO) to see the approaching storm. Also, a glider pilot noted while airborne that the weather was unsatisfactory for further flights but did not consider passing a Pilot Meteorological Report (PIREP) to the LCO. The investigation revealed that the LCO used a telephone call to the Quebec Flight Information Center as his sole source for weather information despite internet access to the NAV CANADA Aviation Weather Web Site on the hangar line. It was also revealed that the Air Cadet Glider Program (ACGP) does not teach pilots how to interpret ground based weather radar information. Measures identified to prevent re-occurrence include the need for national guidelines about when to cease flying operations in the presence of hazardous weather, and training for ACGP pilots about weather radar services available to assist them in making weather related decisions. All gliding sites have been directed to post current weather forecast information at the launch site for all pilots to review. In addition, the importance of timely PIREPs from both tow pilots and glider pilots has been emphasized. ERGS has established an internet connection on the south side of the St Jean airport to provide weather information directly to gliding site pilots. ◆

Epilogue

TYPE: CC130 *Hercules* (CC130HR30)

LOCATION: Kandahar, Afghanistan

DATE: 28 July 2008

The accident occurred during daylight hours on a transport mission to Kandahar. The pilot elected to fly the approach to the runway at the minimum Maximum Effort Landing approach speed (which is lower than the normal approach speed) to build and maintain separation from a preceding aircraft. The crew reported the approach was stabilized until the pilot raised the nose and reduced power to initiate a flare for landing. As soon as the pilot reduced power, the aircraft "dropped" and landed hard with a nose-up attitude of approximately 5 degrees. Upon touchdown, the lower aft portion of the fuselage struck the runway (commonly known as a "tailstrike"). The aircraft damage level was assessed as serious.

The density altitude (DA) was approximately 6,500 feet. Based on information from the Flight Data Recorder, the touchdown rate was calculated to be approximately 450 feet per minute (fpm). The maximum allowed rate of descent for a CC-130 at the occurrence aircraft's weight is 300 fpm.

The aircraft commander (flying pilot) had recently returned to the CC-130 community and received an abbreviated conversion course, which did not include training on the CC130HR30. The pilot's only "stretch" training was carried out during his initial CC-130 training in 1999 and he had not operated the stretch aircraft since then.

The low airspeed maintained on the approach coupled with the steep approach angle resulted in the aircraft's arrival over the runway in a low-energy condition with no excess kinetic energy (indicated airspeed), and little additional energy in the form of thrust (due to their low power setting of the engines) to reduce the rate of descent. In this situation, flaring is not an effective means for reducing the rate of descent (RoD). Therefore, when the power was retarded and the pitch attitude was increased in anticipation of landing, the RoD was not sufficiently reduced and a hard landing resulted. The situation was likely exacerbated by the high DA.

Following the accident an Aircrew Information File was promulgated to highlight the Caution in the Aircraft Operating Instructions concerning the restriction of 300 fpm RoD at landing for weights above 130,000 pounds. Recommended Preventive Measures included changes to CC-130 refresher training to ensure all evolutions are validated against the Course Training Plan/ Standard on a proficiency basis; pilots be required to demonstrate proficiency in landing CC130HR30 using the Maximum Effort Landing technique prior to be assigned to an operational mission; changes to simulator training; and an amendment to the Standard Manoeuvre Manual to include the Caution contained in part 5 of the AOI concerning Maximum Effort landings at aircraft weights above 130,000 pounds. ◆

Epilogue

TYPE: CF188 *Hornet* (188705)

LOCATION: Inuvik, North-West Territories

DATE: 03 September 2008

During a recovery from a routine air sovereignty alert training mission the pilot elected to complete a firm "carrier-type" landing (an approved procedure) due to the relatively short runway length (6,000 ft). Upon touchdown, the pilot noted symptoms typical of a main landing gear (MLG) planing link failure and immediately applied maximum power and conducted a go-around. After further assessing the situation the pilot returned for an arrested landing. Shortly after engaging the cable, the aircraft leaned about 10 degrees to the left and it became difficult to maintain the runway centreline. After coming to a stop the pilot secured the left engine, at which time the aircraft settled further to the left, approximately 20-25 degrees. The right engine was then secured and the pilot egressed without further incident. The aircraft sustained serious damage. Planing link failures have been a concern with the CF188 since its introduction into the Canadian Forces. Significant coordinated international flight and ground testing has failed to isolate any one particular root cause. The technical investigation found that the accident aircraft's MLG / planing link rigging was within the limits that were in place at the time of the last scheduled inspection but was out of rig compared to the latest specifications, introduced after the last inspection. A MLG "Get Well Program" is underway in which the original equipment manufacturer refurbishes the landing gear to "like new" condition. The accident aircraft had not yet been through this program. Historical data indicates that all planing link failures have occurred when the Exerted Landing Weight (ELW) (aircraft weight times vertical "g" on landing) is greater than 50,000 pounds. The landing previous to the accident flight had a landing weight of 34,100 pounds and a 'g' loading of 2.3, producing an ELW of 78,761 pounds. On the accident landing the ELW was 71,370 pounds. An ELW monitoring program has been established to identify aircraft that have experienced an ELW of greater than 50,000 lbs to determine which aircraft may be at risk of incurring damage and be inspected accordingly.

The investigation found that the pilot conducted the landing in accordance with all orders and established procedures, however, those procedures may have contributed to the eventual failure of the planing link. Because of its design for employment as a carrier based aircraft, the CF188 has been landed using the "carrier type" as the primary landing technique. In response to the planing link failure problems, the "cushioned" landing technique has been introduced. More recently, it has been recommended that the cushioned landing technique and slight longitudinal stick input should be the primary technique. As a separate issue to the actual planing link failure, the investigation identified a safety concern regarding the interpretation, by some pilots, of the minimum fuel requirements for single runway operations. Clarification of the order has been recommended. ◆

Epilogue

TYPE: CH146 *Griffon* (146427)
LOCATION: Carlsbad, California
DATE: 15 March 2008

The occurrence took place at the end of the training day when a *Griffon* helicopter was flown from Camp Pendleton to Palomar Airport for refuelling. After the aircrew received their clearance to land, the aircraft lost its right-hand (RH) cargo door. The aircrew heard a loud "bang" but, at the time, they were unaware that the cargo door had departed the aircraft. Both pilots immediately referred to their instruments and assessed controllability. Confident that the aircraft could be flown to the airport, an emergency was declared and the aircraft landed short of the runway. At the time of the occurrence, the aircrew believed that the cargo door was in a fully pinned open configuration, consequently, they flew at approximately 100 knots indicated airspeed (KIAS). The evidence collected during the investigation showed that the cargo door was not secured in the open and pinned position. As a result, the aircraft was exceeding the maximum allowable airspeed for cargo doors in the in-transit configuration by 20 knots. With the aircraft in a RH turn and descent, the resultant airflow on the right hand passenger door generated sufficient lift and drag to cause the front J channel on the bottom of the cargo door to disconnect from the fuselage bottom track. Once disengaged, the additional drag on the cargo door completely tore it from the fuselage tracks. Laboratory work was conducted to determine the condition of the latching mechanism used to secure the cargo door in the open position. It confirmed that the pit-pin used to secure the door's keeper to the latch assembly was unserviceable. The condition of the pit-pin was not detected during the pre-flight inspection and is deemed to be a contributor to the occurrence. Further, the investigation revealed that the verification of the door security done prior to the last flight relied on a "pull-test" and did not include a visual and/or tactile check of the pit-pin. The act of pulling on the cargo doors to test for security may lead to the false assumption that the door is fully secured, whereas the visual and/or tactile check would allow the Flight Engineer (FE) to detect when the pit-pin is partially inserted and/or the pin locking mechanism is unserviceable/not fully engaged. Preventive measures range from revision of the training standards to ensure all FEs are taught a procedure that requires them to confirm the pit-pin is down and locked to the requirement for a new design of the front bracket holding the bottom of the cargo door to the fuselage track. ◆

Epilogue

TYPE: CP140 *Arcturus* (140120)

LOCATION: 19 Wing, Comox, British Columbia

DATE: 28 January 2009

The incident occurred during the early morning hours as a tow crew of five personnel was towing an *Arcturus* aircraft out of 12 Hangar at 19 Wing Comox. The tow crew supervisor positioned himself adjacent to the tow bar on the right-hand side of the mule. There was no tail-walker assigned and the option of using one of the available personnel to cover the rear of the aircraft was not discussed.

As the aircraft began to move backward it also began to drift left and the drift went undetected. The mule driver could not see the vertical stabilizer from the driver's seat and wing-walkers did not perceive that the vertical stabilizer was moving toward the side of the "doggy door" opening. The tow crew supervisor also did not notice that the aircraft was drifting off the centreline and had positioned himself in such a way that he was too close to the aircraft and could not see the vertical stabilizer. As the aircraft moved rearward, the rudder and vertical stabilizer struck the top of the hangar door opening adjacent to the "doggy door", extensively damaging the rudder and vertical stabilizer tip cap and causing minor non-structural damage to the vertical stabilizer. The Squadron normally operates out of 7 Hangar but on the day of the occurrence the incident aircraft was parked in 12 Hangar which, unlike Hangar 7, requires a "doggy door" above the main door to provide clearance for the vertical stabilizer of the CP-140. Tow crews are generally less familiar with towing aircraft in and out of 12 Hangar and are not necessarily aware that it is critical to have a tail-walker specifically tasked to ensure clearance between the vertical stabilizer and the "doggy door". The tow crew members were all qualified, highly experienced and authorized for the task. The tow crew supervisor; however, had only recently been authorized to perform his duties and had only towed an aircraft from 12 Hangar once before.

In accordance with local orders, a CP-140/A tow crew will normally consist of a minimum of six personnel; however, contrary to published procedures, it had become common practice on early launches to tow aircraft out of hangars with a five-person tow crew. The servicing desk supervisor was aware of the short-handed situation but viewed the tow job as routine and uncomplicated and did not consider participating in the tow crew. Instead, he elected to remain in servicing and concentrate on his own tasks to release the aircraft for the day's flying activity. Recommendations include the painting of CP-140 main wheel guidelines on the floor of 12 Hangar, a review of scheduling and manning practices and a general audit of squadron procedures. Also, it is recommended that this occurrence be used as a tool in educating personnel on balancing effective operations and flight safety. ◆

Epilogue

TYPE: CT114 *Tutor* (114159)

LOCATION: Malmstrom Air Force Base, MT

DATE: 18 May 2007

The accident occurred during a 431 Air Demonstration Squadron (Snowbirds) practice airshow at Malmstrom Air Force Base (near Great Falls, MT) during a manoeuvre known as the "Inverted Photo Pass" in which Snowbird (SB) Lead flies across the show line upright with SB2, SB3 and SB4 flying inverted in formation on Lead. Shortly after SB2 rolled inverted the aircraft was seen to briefly oscillate in pitch and roll and then begin a negative 'g' climbing roll to the left and move away from the formation. The aircraft reached a maximum altitude of approximately 750 feet above ground level and continued to pitch down. The aircraft struck the ground in a steep nose down wings level attitude and was completely destroyed. The pilot did not eject and was killed on impact. The investigation found that the pilot's lap belt had come open when he pushed negative 'g', causing him to come out of the seat and be thrown against the canopy. The survival seat pack also became dislodged and interfered with the control stick, preventing the pilot from pulling the stick back to pitch the nose up and arrest the descent. The pilot's lap belt came open because it was in an insidious condition known as "false-lock", caused when the metal clevis on the parachute arming key (see photo above) interferes with the proper closing of the buckle. This design deficiency first became apparent in January 2002 when, in a similar occurrence, a Snowbird pilot came out of his seat under negative 'g'. In that incident the pilot was able to safely recover the aircraft. Immediately following the 2002 occurrence, a Record of Airworthiness Risk Management (RARM) was generated that identified the unmitigated risk as HIGH and recommended several measures to reduce the risk, including a re-design of the parachute arming key. A new key design was quickly completed, but, due to a series of delays, it took over three years to complete the operational test and evaluation. Additional delays were incurred in passing the results of the operational test and evaluation to the technical airworthiness staff responsible for implementing the new key into the Tutor fleet. Over this prolonged time period both the aircrew and the airworthiness staffs lost sight of the original risk, resulting in a gradual erosion in the sense of urgency to implement the modification. A lack of false-lock occurrence reporting also contributed to an underestimation of the seriousness of the problem.

Functional checks were introduced in 2002 to ensure the lap belts were not in a false lock condition and the Aircraft Operating Instructions were amended accordingly. Again, over time, the users had become complacent towards the checks and had lost sight of their importance so that by the time of the accident a thorough and standardized briefing was no longer in place. While a definitive test for false-lock, the functional checks rely on effective training to ensure the pilots know the proper checks, actually perform them and perform them correctly. Following the accident, the modified key was finally introduced, numerous changes were made to CF airworthiness processes and aircrew were reminded to report all aircrew life support equipment anomalies. ◆

For Professionalism

For commendable performance in flight safety

Captain Andrew Smith

On 17 October 2008, Captain Smith, a CH-146 *Griffon* helicopter instructor pilot, was participating in the annual aircrew pre and post flight check re-familiarization. A portion of this training requires the aircrew to conduct a pre-flight inspection on the helicopter. It was during this task that Captain Smith noted a discrepancy with the installation of the tail rotor pitch link bolts. The subject bolts were installed backwards with the heads of the bolts aligned opposite to the direction of rotation.

He brought this condition to the attention of the maintenance staff and a Flight Safety report was initiated. The Flight Safety investigation revealed that the bolts were incorrectly installed on 30 May 2008 during a tail rotor blade change. This replacement and resultant balancing process required the bolts in question to be removed and installed at least three times. It was also discovered that the aircraft flew for more than 50 hours, the squadron maintenance staff completed four 25 hour inspections and the squadron aircrew performed dozens of pre-flight inspections without this condition being noticed.

The tail rotor pitch link bolts serve a critical function on the *Griffon* helicopter. They secure the pitch change mechanism in place and allow the pilot to make the required anti-torque pedal inputs to maintain directional control. The loss of these bolts and subsequent failure of the pitch change mechanism would result in a loss of tail rotor control and potentially a catastrophic accident.

Captain Smith's keen eye and attention to detail enabled him to recognize a hazardous condition that could have had disastrous consequences. He is to be congratulated for a job very well done and is most deserving of this For Professionalism award. ◆

Captain Andrew Smith is currently serving with 403 Helicopter Operational Training Squadron, Gagetown.

Corporal Robert Bennett

In November 2008, Cpl Bennett, an Aviation Technician with 14 Air Maintenance Squadron (AMS) was tasked to complete engine maintenance on a CP-140 *Aurora* aircraft. Prior to his supervisor performing a quality check on the engine, Cpl Bennett took the initiative to perform his own quality check and discovered a small hairline crack on the compressor diffuser just below the 14th stage ducting. Although there was no evidence of compressor blow-by, no soot found in the crack nor any signs of streaking, Cpl Bennett felt further investigation was necessary. He discussed his findings with his immediate supervisor and arranged for non-destructive testing (NDT) of the area. While waiting for the NDT results, Cpl Bennett researched the appropriate technical publication and noted that a crack, without evidence of compressor blow-by, of up to 2 1/2 inches was acceptable for this area. The NDT inspection showed the crack to be 1 3/4 inches long and revealed that it had progressed completely through the diffuser. Cpl Bennett's additional research of the engine's record of abnormal occurrences established that the crack had been previously documented on 24 August 2007 as being 1 3/8 inches long. It was determined in conjunction with 14 AMS Engine Bay that the accumulated engine time since the first record of the crack was only 4 to 6 ground run hours. With a crack growth of 3/8 of an inch in this short a period, the decision was made to raise a Flight Safety occurrence and remove the engine. It is certain that this crack would have severely affected engine performance/efficiency and over time hindered the safe operation of the aircraft. Cpl Bennett's quick independent action and attention to detail alleviated the potential for severe engine and collateral aircraft damage. He has clearly displayed notable airmanship and is to be commended for his superior efforts. Cpl Bennett's admirable character is impressive and makes him very deserving of this For Professionalism award. ◆

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

Corporal Jonathan Gagné

Cpl Gagné, an avionics systems (AVS) technician was completing an "A" check on a CC-115 *Buffalo* aircraft while undergoing flight line training. During the aviation (AVN) inspection he noticed that the build-up of the engine dual-pulley assembly was incorrect on the left-hand engine and was causing a control push-pull rod to rub on the assembly.

The dual-pulley assembly is difficult to examine and is not an item that is required to be inspected in detail during the "A" Check. Although power-plant systems were not part of Cpl Gagné's trade training and despite the fact that he was working on the flight-line in diminished lighting conditions, he showed remarkable attention to detail by thoroughly inspecting the dual-pulley assembly and discovering the obscure anomaly. He immediately notified his supervisor who confirmed the incorrect assembly build-up. As a result, the squadron initiated a fleet-wide Special Inspection (SI) of all CC-115 aircraft and spare engines held at 19 Wing Comox. The SI revealed that another aircraft had a similar anomaly on the left-hand engine.

Left undetected, the control rod end rubbing on the dual-pulley assembly would have damaged the pulley and possibly compromised the fuel control unit (FCU). The loss of an FCU during flight would have resulted in an engine emergency and may have placed the aircraft in a hazardous situation.

442 Transport and Rescue Squadron must optimize the productivity of its limited pool of AVS and AVN technicians by allowing a limited number of cross-trade qualifications. Cpl Gagné was still under training for AVN related checks and was inspecting systems with which he had little familiarity. Performing well beyond what was expected, Cpl Gagné demonstrated commendable professionalism and keen observation skills in identifying the non-serviceability of a critical aircraft system. His mature manner and professional maintenance ethos makes him very deserving of this For Professionalism award. ◆

Corporal Gagné is currently serving with 442 Transport and Rescue Squadron, 19 Wing Comox.

Master Corporal Reine Desforge

On 24 September 2008, Master Corporal Desforge was working as a flight steward on a CC-150 *Polaris* aircraft. The aircraft delivered a number of military personnel to CFB Edmonton and was continuing onward to Trenton with a planned stop in Winnipeg. It was a particularly dark evening in Edmonton and the aircraft was parked on the Fixed Based Operator overflow ramp away from the main hangars and direct lighting. Just prior to the first engine start, the stairs were pulled away from the aircraft and MCpl Desforge moved into position at the front left door of the aircraft. While performing his duties, he noticed something lying on the ramp in the vicinity of where the stairs were previously positioned. Recognizing the significance of his observation, he immediately proceeded to the cockpit and advised the pilots not to start the engines as he suspected there was FOD on the ramp in front of the left engine. The pilots promptly aborted the start procedure and notified ground personnel of this concern. The ensuing search of the area revealed a red carpet had been left behind on the tarmac when the stairs were removed. There is little doubt that once the engine start was completed and the engine power increased, the carpet would have been ingested into the engine causing significant damage. MCpl Desforge's situational awareness and attention to detail in the completion of his task resulted in the discovery of a hazardous situation not normally observed from his position. His professionalism and active participation in the safety of flight is commendable. His astute observation under poor lighting conditions was the key element in averting potential catastrophic engine damage to a limited resource. MCpl Desforge's actions are commendable and make him very deserving of this For Professionalism award. ◆

Master Corporal Desforge is currently serving with 437 Transport Squadron, 8 Wing Trenton.

For Professionalism

For commendable performance in flight safety

Master Corporal Lee Hall and Master Corporal Jean-François Turcotte

Sea King aircraft CH124429 was nearing the end of an extended period of heavy maintenance and was soon entering the ground run and test flight phases. MCpl Turcotte was tasked to install the main gear box assembly drip tray and was in the process of carrying out a final area inspection when he noticed a significant wear pattern on the left lateral torque shaft, a critical component of the aircraft's flight control system. Immediately recognizing the airworthiness implications of his observation, MCpl Turcotte called upon his supervisor, MCpl Hall, to assist in investigating the root cause of the abnormal wear. Under closer inspection, they determined that the left lateral bearing rod end was rotated too far into its link assembly, causing the threaded end portion to gouge into the torque shaft whenever flight controls were moved. Realizing that the rigging serviceability of the flight controls was now compromised, MCpl Hall initiated a more in-depth inspection. It was then discovered that the opposite was true with the fore and aft torque shaft in that the bearing rod end was not rotated far enough into its link assembly, to a point that it failed an inspection-hole check to verify if the rod end was made safe. Drawing upon their substantial experience in flight control rigging procedures, they suspected and re-affirmed through maintenance technical orders that two differing lengths of bearing rod ends may be utilized depending on varying rigging clearances. In this case, the two bearing rod ends had more than likely been interchanged during the initial installation.

MCpl Turcotte's outstanding attention to detail and MCpl Hall's diligence in expanding the scope of the inspection revealed an unserviceable condition that had the real potential to evolve into a catastrophic incident. Their exceptional professionalism and systematic approach in identifying and exposing the cause factors will serve the *Sea King* maintenance community well in preventing further occurrences. Their actions clearly demonstrate a high degree of expertise and competency that make them very deserving of this For Professionalism award. ◆

Master Corporal Hall and Master Corporal Turcotte are both currently serving with 12 Air Maintenance Squadron, 12 Wing Shearwater.

Master Corporal Mark Lapointe

In May 2007, MCpl Lapointe, an aviation technician at 14 Wing Air Maintenance Squadron was conducting periodic maintenance on a CP-140 *Aurora* aircraft when he observed a crushed engine inlet anti-ice tube under the inlet thermo-switch. Upon further investigation, he noticed an anomaly with the mounting bracket of the thermo-switch. The mounting bracket appeared to be manufactured too small to properly fit the anti-ice tubing and the mounting bolts did not completely go through the locking nuts. Without prompting, MCpl Lapointe immediately researched the technical drawings and found that there was indeed an inconsistency between the Canadian Forces technical orders and the actual parts being manufactured by the contractor. Using his own initiative he conducted extensive research and initiated surveys on the other three engines. He discovered that they all had faulty thermo-switches installed. MCpl Lapointe immediately forwarded his research findings to the unit Flight Safety team and the Engineering Project office where a full investigation was initiated. The investigation resulted in a complete supply system purge of all non-conforming thermo-switches and a recommendation for a fleet-wide Special Inspection. MCpl Lapointe's exceptional attention to detail and professionalism averted the use of non-conforming parts which potentially could have led to an in-flight emergency and possible loss of personnel and flying assets. ◆

Master Corporal Mark Lapointe is currently serving with 404 Maritime Patrol and Training Squadron, 14 Wing Greenwood.