AVIATION SAFETY LETTER

In this Issue...

Learn from the mistakes of others;
you'll not live long enough to make them all yourself ...

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Canada

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GUEST EDITORIAL

I would like to update you on a subject about which there has been much discussion for some time now—the noise caused by seaplanes, and the increasing number of complaints and legal action undertaken by residents and municipalities against this type of operation. It is an extremely delicate subject, and the opinions of seaplane operators and residents are often diametrically opposed. Transport Canada is regularly called upon to intervene in this kind of situation to help the parties find tailor-made solutions. It turns out that, with a little co-operation, proper planning, and by implementing some simple precautions, it is possible to reduce the number of decibels (the measure of sound) that affect residents, and maintain or re-establish good neighbourly relations.

Let's review some established facts about noise. I put them into three categories: the source, the surrounding factors, and the hearer. This is not a complete list, and you may already know all the facts, but you may also learn new ones, or reflect on them after making the list.

Source
- Two-bladed propellers make more noise than propellers with three blades;
- Some types of engines produce higher decibels, especially at full throttle;
- The intensity of the noise is less bothersome than repeated exposure, that is to say, a very loud noise for a short amount of time is less bothersome than repetitive medium-intensity noise (touch-and-goes, for example);
- The number of decibels decreases with distance, that is to say, if you take off further from shore, or fly over residences at a higher altitude, the noise heard by the residents will be not be as loud.

Surrounding factors
- Wind carries sound downwind;
- The landscape may prevent noise from dissipating. Thus, the hills that often surround lakes act as an amplifier.

Hearer
- Noise tolerance differs from person to person. Studies show that some people are more sensitive to, and bothered by, noise;
- Noise tolerance varies depending on the activity being done, and the time of day. For example, noise at 6 a.m. on a Sunday morning when we're trying to sleep is much more annoying than the same noise at 2 p.m. on a Saturday afternoon, when we're working in the yard.

What do we do with this information? Whether you're a private pilot who uses a seaplane occasionally, or an operator who carries out aerial sightseeing, be proactive. Consider the "noise" factor when choosing the type of aircraft being used, contact the municipality and residents in the area before beginning your activities to find out their concerns, avoid carrying out activities at "risky" times of the day; plan your take-off run in order to move away from the more densely populated areas, and reduce climb power as soon as possible; adjust your path in order to have a steeper approach angle (reduced engine) instead of conducting a low approach with a lot of power; avoid unnecessarily approaching or overflying houses; maintain good communication with people; take the time to explain your safety requirements to them; and lastly, try to find amicable solutions. In our experience, there is nothing more effective than communication, respect, and trust to prevent the situation from getting out of hand. By following this advice, you will be able to fully enjoy your favourite pastime as a private pilot, and if you work in the field, you will avoid negative publicity for your company, and all kinds of legal procedures that result from conflicts.

Of course, you should never compromise safety to reduce noise at all costs, but it is often possible to integrate good practices to manage noise without putting your safety at risk.

Have a safe flight!

Diane Desmarais
Diane Desmarais
Regional Director, Civil Aviation
Quebec Region

Apron jet-blast—let's be careful out there

Dear Editor,

We completed the pushback from gate X at airport Y. As the pushback was completed, "Apron" gave permission to an airliner to taxi onto the same gate. We were positioned directly in line with the lead-in line to the gate, as instructed. As the other aircraft taxied onto the gate, our ground crew and our aircraft were subjected to significant jet blast, along with blowing snow and flying debris, as the ramp had recently been treated with chemicals due to icing conditions.

We said something on the radio to Apron about this being ill-advised, but there was no meaningful response and they gave us taxi instructions toward the de-icing pad. The crew of the other aircraft never said a word. There was no attempt by the ramp crew working the other flight to stop their aircraft from entering the gate while we (and our ground crew) were sitting directly in their jet blast zone. Had they waited a minute or two, we and our ground crew would have been clear of the area.

Our attempts to address this issue with the other airline and with the airport were unsuccessful. One tried to deflect the responsibility for this incident onto the other, and the other gave no response at all. I would argue that they certainly weren't in keeping with the spirit of safety management systems (SMS).

Many pilots refer to the Apron folks as "apron control," when in fact they are an advisory service. They do not "control" the flow of traffic on the ramp. It is their job to encourage a smooth and efficient (and hopefully safe) flow of traffic on the ramp. As per section RAC 1.2.4 of the Transport Canada *Aeronautical Information Manual* (TC AIM), "This service normally includes gate assignment, push-back instructions, and advisories on other aircraft and vehicles on the apron." So, it must be up to all parties involved (airport management, "Apron," pilots and ground crews) to watch out for areas of potential risk to other persons and equipment on the ramp.

There were opportunities to prevent this. Apron could have asked them to hold until we were clear, but even prior to that point, the pushback should never be done "straight back" behind the gate, and the aircraft should never be allowed to taxi directly in front before the departing aircraft has cleared the line. At most major airports, ground crews will be instructed to push an aircraft "around the corner" so that access to the gate is clear for the next arrival. This also prevents a situation where two aircraft are pushed back in parallel, potentially forcing one crew to blast the other aircraft as they taxi away from the ramp. I've seen this happen at this airport on several occasions. Crews should also know it is unsafe to taxi in front of another aircraft lined-up with the gate.

Finally, ground crews should be able to recognize such a developing scenario and stop it. They can cross the wands for a couple of minutes until the departing aircraft and their ground crews are no longer in the jet-blast danger zone. Let's be careful out there!

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Name withheld by request

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Vectors in the air, progressive taxi on the ground

Dear Editor,

I would like to clarify a comment made in the article "COPA Corner—Runway Incursions—Your Part," published in *Aviation Safety Letter* (ASL) 4/2007. In the second-last paragraph, the author suggests that "At controlled airports, you have help available—don't be afraid to ask ATC ground control for vectors to the runway or ramp to avoid ending up in the wrong place." Controllers are not permitted to provide directional guidance in the form of vector headings, even if using airport surface detection equipment (ASDE) (ATC MANOPS 307.5). They are, however, permitted to provide directional instruction (also known as progressive taxi) such as: "TURN LEFT/RIGHT AT THE NEXT TAXIWAY/RUNWAY," or "TURN LEFT/RIGHT ON TAXIWAY/RUNWAY (number) APPROXIMATELY (number) FEET AHEAD." We felt that the distinction should be made to the ASL readership.

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Ann Lindeis, Ph.D.
Manager, Planning and Analysis, Safety and System
Performance Development
NAV CANADA

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Thank you Dr. Lindeis. The Canadian Owners and Pilots Association (COPA) confirmed that the intent was to let readers know that at unfamiliar or complex airports, pilots should not be afraid to ask for assistance so as to minimize runway incursions. "Progressive taxi" is a term that is better known and employed more often in the U.S. than it is in Canada, so the author probably wanted to use another term that better described the intent. —Ed.

PRE-FLIGHT

Best Practices in Controller-Pilot Communications

by Joel Morley, Operational Safety and Human Factors Specialist, NAV CANADA

NAV CANADA

As an aviation professional, you learned the fundamentals of proper radio communication early on in your training. As a fledgling pilot, air traffic controller or flight service specialist, you wrote exams on the phonetic alphabet and the meaning of certain key words and phrases, while your instructors tried to instill good practices in communicating over the radio.

And as you progressed in your career, you were regularly tested, and during those times you did things the way you were taught. Between tests, however, in the real world, things are often done a little differently…

Direct controller-pilot communications are a critical link in the safe, expeditious flow of air traffic. To provide separation, it is imperative that controllers and pilots have the same understanding of the trajectory the aircraft will follow.

Built-in checks

This is why controller-pilot communications contain built-in checks to ensure understanding, including standard phraseology and required readbacks of clearances and instructions.

Controller-Pilot Communication Loop
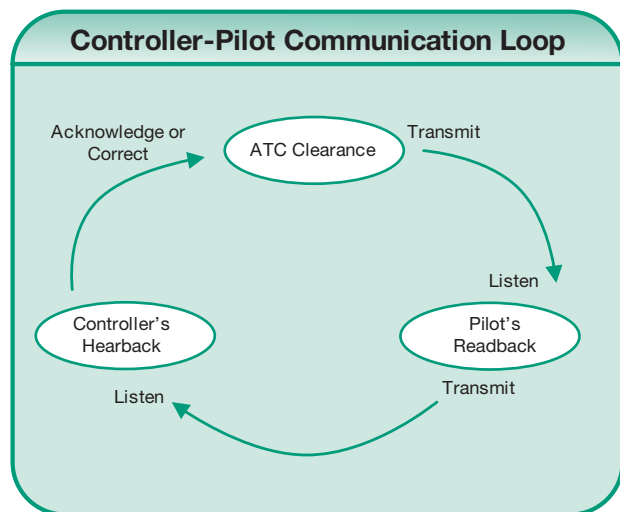
Take a moment to consider how frequently practices differ from the ideal we learned early in our careers, when it comes to controller-pilot communications.

How often do we hear non-standard phraseology, readbacks that are "close-enough," incomplete call signs being used, or no call signs at all?

The simple answer is quite frequently.

One study completed in the United States found that over 40 percent of controller communications and 59 percent of pilot communication contained at least one communication error!

Typical errors

These errors included the incorrect grouping of numbers, omitting elements of a message, substituting words or phrases, transposing elements of a message, excessively long messages, partial readbacks, trouble speaking, and difficulties with pronunciation[1].

A significant portion of communications are non-standard. Put another way, these non-standard communications are not taking full advantage of all the checks in place within the air transportation system.

This represents a considerable drift from the way the system was designed to function to the way it actually functions.

Why we drift

Sidney Dekker describes the reasons for drift within a system and the possible impact[2]. We drift because we depart slowly from the ideal, and we get away with it.

It is a quiet day and there is not a lot of traffic so, as a pilot, you drop your call sign when reading back a clearance. The controller knows your voice anyway, and nothing happens… Others may notice the non-standard phraseology, but they don't say anything.

As a controller, you notice and you are frustrated by it, but you either don't have the time, or don't take the time, to insist on a full readback. You figure there is no point, because if you took the time to correct every pilot using poor phraseology, you wouldn't have time to do anything else!

1 Prinzo, O. M. (1996). *An Analysis of Approach Control/Pilot Voice Communications*. DOT/FAA/AM-96/26.
2 Dekker, S.W.A. (2004) "Why we need new accident models." *Journal of Human Factors and Aerospace Safety*, 4(1), 1-18. Ashgate Publishing.

Pre-flight

Or, perhaps you are the flying pilot listening to your colleague on the other side of the cockpit. You know it is not quite right, but you don't say anything because you don't want to look uptight, and everybody does that when it is quiet. There is no adverse consequence, and nobody seems put out by it, so we continue the practice and we continue to get away with it.

One of the reasons we continue to get away with it is that the system is robust to such errors. There are multiple checks in place to catch errors, and these checks work well most of the time, so most of the time the errors are inconsequential.

In fact, one European study found the rate of communication problems leading to a reported occurrence was quite low, with an estimated 2.44 communication-related occurrences per million instructions or clearances delivered[3]. In other words, not doing things "by the book" when it comes to communication carries no real consequence.

From drift to problem

There will, however, come a time when we *won't* get away with it. As Sidney Dekker points out, drift slowly erodes defences, reducing the effectiveness of the checks that are in place to maintain safety, and thus increasing risk.

What if that clearance you read back without including your call sign wasn't for you? What if you responded to it simply because you were nearing top of descent and you were expecting it? And what if, as a controller, you didn't notice that it was not the right voice accepting the clearance?

As part of our ongoing safety management activity, NAV CANADA investigates more than 300 operating irregularities[4] each year. These investigations are clearly indicating that communication errors are a problem that requires our attention.

Almost one-third of operating irregularities investigated by NAV CANADA in 2005, had communication error as a contributing factor. And almost one-third of these communication problems were related to readback/hearback errors on the part of the controller or the pilot.

Although the occurrences investigated by NAV CANADA did not result in loss of life, their potential should not be underestimated. Communication errors have been shown to contribute to the types of occurrences that carry the greatest risk to aviation safety, including altitude busts, runway incursions, and losses of separation.

It should also be remembered that the worst accident in the history of aviation, in terms of loss of life, resulted from the use of non-standard phraseology, when two 747s collided on a runway in Tenerife in 1977.

Conclusions
All of this leads to three conclusions:

1. Communication errors are common in aviation. There is ***drift***.
2. Few of these errors are consequential. The system is ***robust*** to these errors.
3. Communication errors have the potential for significant consequences. There is ***risk***.

So, what is being done to address this risk?

Working Group
To address this issue, NAV CANADA is forming the Air Traffic Services-Pilot Communications Working Group.

Made up of representatives from across the aviation industry, the Working Group will identify means to raise awareness of the potential impact of communication errors on safety.

The output of the Working Group will be materials designed to raise awareness of the importance of employing best practices in controller-pilot communications.

This issue is not unique to Canada, and other countries have recognized this problem as well. Similar working groups have already been formed in the UK and Europe, and have produced some interesting material on communication errors.

The following Web sites have more information: www.allclear.aero or www.caa.co.uk/docs/33/SRG-NATS_RTDISCIP.PDF.

There are some simple steps we can all take to begin addressing this issue:

1. Examine your own communication practices. Are you using standard phraseology? Are you providing full readbacks to clearances and instructions, including your call sign? Are you keeping the controller fully informed of your intentions?
2. Insist on best practices from others in your cockpit and your company. Help stop the drift by saying something when you see non-standard communication practices.

We all know how to communicate properly on the radio. We learned early on in our careers. We need to make sure we are doing things right!

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3 Van Es, G. (2004). *Air-Ground Communication Safety Study: An Analysis of Pilot-Controller Occurrences*. Brussels: Eurocontrol.
4 An ATS OPERATING IRREGULARITY is defined as: a situation which occurs when air traffic services are being provided and when a preliminary investigation indicates that safety may have been jeopardized, less than minimum separation may have existed, or both.

If you would like more information about the Air Traffic Services-Pilot Communications Working Group, or would like your organization to be involved, please contact Joel Morley at NAV CANADA by e-mail at morleyj@navcanada.ca. △

Disruptive Passenger Behaviour—Creating a Safer Environment

by Erin Johnson, Cabin Safety Project Officer, Cabin Safety Standards, Standards, Civil Aviation, Transport Canada

Have you ever been on a flight that was disrupted by an irate, intoxicated, or stressed-out passenger? If so, you were most likely bothered by the increase in noise and commotion that ensued. Perhaps you even experienced a sense of fear and anxiety from the disruption. Not only do unruly passengers create an annoyance for fellow passengers, they are also a serious threat to the safety and security of the entire aircraft operation. Unruly passengers hinder crew members' ability to carry out their duties, maintain order, and provide for the safety of other passengers, other crew members, and the aircraft itself. This, in short, is the aviation safety concern that arises from disruptive passenger behaviour.

Background

In the mid-1990s, media headlines drew public attention to several incidents involving unruly passenger behaviour. The Air Transport Association of Canada (ATAC) raised concerns about the increase in unruly passenger incidents. ATAC also drew attention to the fact that there was a lack of regulatory provisions to aid crew members in responding to situations where passengers exhibited unruly or harmful behaviour.

Following this, in 1998, a Prohibition Against Interference with Crew Members Working Group was formed, which included members representing a variety of expertise. The mandate of the Working Group was to define instances of abusive and unruly passenger behaviour, determine the need for a zero-tolerance policy for unruly passengers, and recommend an effective strategy to reduce the number of incidents of interference with crew members. Upon completion of their mandate, the Working Group filed a final report containing 11 recommendations, all of which were accepted by the Canadian Aviation Regulation Advisory Council (CARAC).

Following the events of September 11, 2001, the *Public Safety Act, 2002*, was enacted by the Parliament of Canada, which brought about amendments to the *Aeronautics Act*. These amendments facilitate action against unruly passengers and make it an offence to engage in any behaviour that endangers the safety or security of a flight, or persons on board, by interfering with crew members or persons following crew members' instructions.

The public and air operators—sharing the responsibility

The two main areas of focus of the Working Group's recommendations included raising the travelling public's awareness and amending the *Canadian Aviation Regulations* (CARs) with respect to unruly passenger behaviour.

A public awareness campaign to inform the travelling public of the dangers of interference with crew members was launched in June 1999, and continues to be in place today. Posters, brochures, and ticket stuffers—identifying which behaviours would not be tolerated on board an aircraft, and possible consequences to those behaviours—are posted at airports and distributed to travellers.
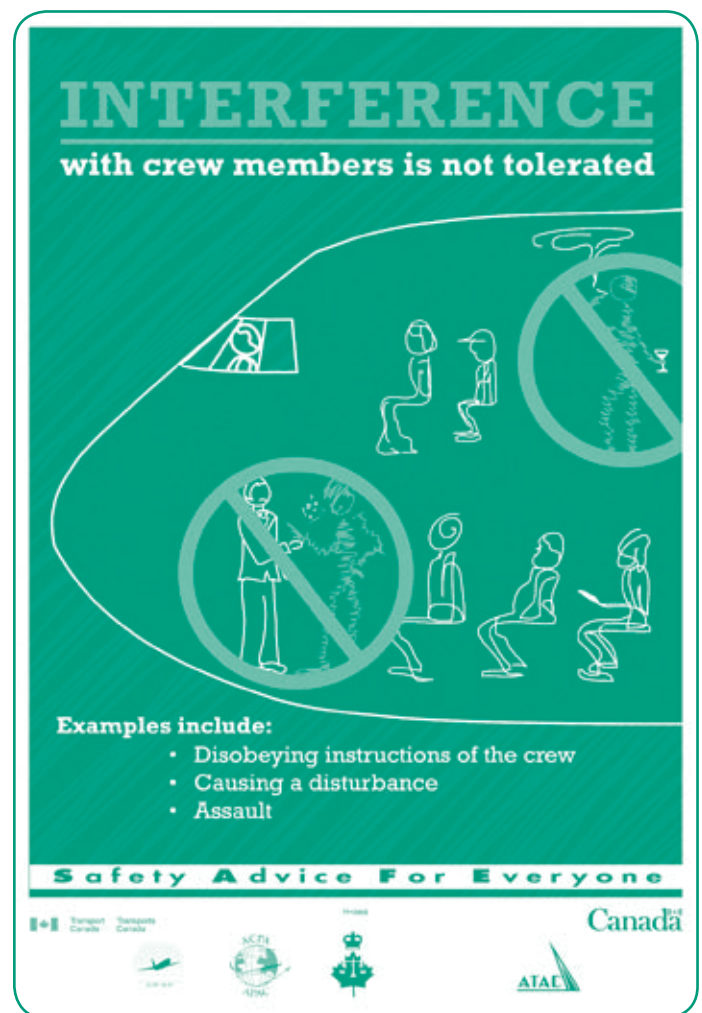
Poster "Interference with crew members is NOT tolerated" (TP 3382)
www.tc.gc.ca/CivilAviation/Publications/menu.htm#posters

Pre-flight

INTERFERENCE ON BOARD
AN AIRCRAFT WILL NOT BE TOLERATED
"Transport May Be Denied"

TP 13378

Passengers are entitled to travel in a safe and secure environment. Under the *Criminal Code of Canada* and the *Aeronautics Act*, it is illegal to behave in a manner that is threatening to crew members and passengers.

The crew will not tolerate any disruptive behaviour.

Police will be asked to meet the aircraft upon arrival.

Anyone in contravention of the law, or anyone violating the rights of others will be intercepted by the police upon landing. That person may be:

Arrested ▶ Charged ▶ Prosecuted

Anyone found guilty will have a criminal record and may face fines up to $5000 or imprisonment.

Examples of *interference*:

Harassment
Verbal abuse
Physical assault
Sexual offences
Intimidating behaviour
Intoxicated and disorderly conduct
Disregard of smoking regulations
Consuming "carry on" alcoholic beverages
Refusal to follow instructions of the crew
Endangering the safety of the aircraft

Safety advice for everyone

Transport Canada
Transports Canada

Canada

ACPA APAC ATAC

Ticket stuffer "Interference on board an aircraft will not be tolerated" (TP 13378)
www.tc.gc.ca/ CivilAviation/commerce/CabinSafety/RelatedSites.htm

In addition to the awareness campaign, new regulations were drafted and published in the *Canada Gazette*, Part I, in May 2007. The new regulations and their accompanying standards are intended to address a need for provisions in the CARs that will enhance the ability of air operators, private operators, and their employees to deal with passengers who are unruly. The regulations target the problem of unruly or disruptive passenger behaviour, or what is often referred to as "air rage." They are directed at those passengers who indicate by their words or actions that they may behave in a manner that may create an unpremeditated hazard, rather than at those individuals who board, or attempt to board, an aircraft with the deliberate goal of destruction.

Zero tolerance
With these new regulations, air operators and private operators are responsible for refusing to allow any person on board who is displaying behaviour that may present a risk to the safety of the aircraft, persons on board the aircraft, or their property. All employees who meet the definition of "operational personnel" will have the same decision-making authority with respect to refusing passengers. "Operational personnel" refers to the air operator's employees whose duties require that they interact directly with a person on board, or about to board, an aircraft, and includes crew members, gate and check-in staff, and their direct supervisors. This definition does not immediately include baggage handlers or catering personnel, unless the operator decides to include them in its training.

The regulations will introduce a definition of "interference with a crew member." This phrase will be interpreted as any action or statement, set out in the four levels listed below, by a person on board, or about to board, an aircraft that distracts or prevents a crew member from the performance of their assigned safety responsibilities.

The four levels of interference with crew members have been identified and are harmonized with levels used by other countries, such as the United States. They range in seriousness from a minor incident (level 1) to an incident causing a threat to safety (level 4). Examples of interference with crew members include unacceptable language, obscene or lewd behaviour, threats, tampering with emergency or safety equipment, attempting to enter the flight deck, and use of weapons. Essentially, it is any behaviour that in its nature hinders the work of crew members and poses a possible threat to the safety of a flight and the travelling public.

All such incidents of interference with crew members will require intervention by the affected operational personnel; however, the response will be different depending on the level. It will also be mandatory for all unruly passenger incidents, except those categorized as level 1, to be reported to the air operator. For level 1 incidents, a report may be submitted voluntarily.

An ounce of prevention is worth a pound of cure…
The new regulations focus on prevention through the establishment of clear and precise procedures.

Accordingly, air operators will be required to establish procedures in their operations and flight attendant manuals to assist employees in dealing with occurrences of unruly behaviour, and to ensure that occurrences of such behaviour are reported to the air operator.

Another new regulation will make it a requirement for operational personnel to be trained on their responsibilities and the company's procedures in both their initial and annual training. Such procedures should include ways to avoid situations where passengers may become unruly, and provide all employees with the means and knowledge necessary to respond appropriately to such situations. By recognizing signs that could lead to a possible incident of interference, employees will be better apt to diffuse it before it escalates. By reacting promptly, incidents of greater safety threat will be lessened.

The regulations will provide both travellers and crew members with better resources and recourse, should an incident occur. They are not intended to ban passengers for life, but rather to offer crew members a safe workplace, and passengers safe transport to their destination.

Finally, with the new regulations, reporting will become mandatory, and statistics will be required to be submitted to Transport Canada every six months. These statistics will provide the necessary information to track trends and determine if the number of incidents has increased or decreased.

A safer environment for passengers and crew members
With the launch of the awareness campaign and the proposed new regulations in the CARs, Transport Canada continues to work towards providing both passengers and cabin crew members with a safe and hazard-free environment by eliminating potential hazards associated with unruly passenger behaviour. △

The SAC Column—Book Report: *Blink*
by Dan Cook, Soaring Association of Canada (SAC)

The SAC submitted the following book report for publication in the Aviation Safety Letter *(ASL). One of the issues the SAC has been wrestling with in gliding flight safety has been why some pilots react and others don't. In addition, the quality of the pilot's response in high-stress situations varies greatly. This is often labelled as pilot error in subsequent occurrence reports, but the nagging question is, why? The book* Blink *discusses potential reasons, and it is why Dan Cook wrote the report. I personally find it applicable to all pilots, not only to the gliding community. —Ed.*

Book Report: *Blink*
Author: Malcolm Gladwell
Publisher: Little, Brown and Company, Time Warner Book Group, New York, NY, 2005

Malcolm Gladwell is a staff writer for The New Yorker *magazine, and formerly a business and science reporter at the* Washington Post.

The book *Blink* explains how unconscious thinking can have an impact on our decision-making process in the "blink of an eye." It shows why some people make brilliant snap decisions, while others make less successful ones. The book is recommended reading for pilots if they want to help themselves understand human factors in how we make decisions under pressure.

The author speaks about "adaptive unconscious" decision making, and states, "we make very quick judgments based on very little information. The adaptive unconscious does an excellent job of sizing up the world, warning people of danger, setting goals, and initiating action in a sophisticated and efficient manner." In flight, we use the frontal lobe of our brain to analyze and make decisions, but we are often making many more rapid decisions that we are not consciously aware of. Gladwell states, "our unconscious is a powerful force. But it is fallible. It's not a case that our internal computer always shines through, instantly decoding the truth of a situation." He further explains that it is possible to learn when we can use this ability and when we should be careful.

Gladwell points out that we use a process called "thin slicing," which is in our adaptive unconscious to make snap decisions accurately. He gives examples of many experts who can look at certain criteria and make accurate, fast decisions. He points out that the quick decision is often more accurate, since a detailed study often leads to other factors or doubts clouding the issue. He states, "thin slicing refers to the ability of our unconscious to find patterns in situations and behavior based on very narrow slices of experience," and, "the truth is that our unconscious is really good at this, to the point where thin slicing often delivers a better answer than more deliberate and exhaustive ways of thinking."

Gladwell explains that we often function (most of the time for some) on a kind of autopilot. We believe we are making rational decisions, but we are often using thin

slicing and the previous associations we have made. Poor decision making is often identified in human factors following an aviation accident.

He discusses the issues of training for development of the cognitive subconscious for decision making. He states, "I think two important lessons are here. The first is that truly successful decision making relies on a balance between deliberate and instinctive thinking…. Deliberate thinking is a wonderful tool when we have the luxury of time, and the fruits of that type of analysis can set the stage for rapid cognition. The second lesson is that in good decision making, frugality matters." Here, Gladwell explains that "the most complicated problems have identifiable underlying patterns, and when identifying these patterns less is more…. To be a successful decision maker, we have to edit." This editing would have to be done unconsciously for thin-slicing decision making.

What does this mean for us as trainers of student pilots who are learning to make decisions that will have to be made quickly in the future? One could argue, based on Gladwell's book, that to be effective we need to do some analysis to try to identify the underlying patterns that are important in a situation. We may not be able to accurately identify all the criteria for a thin-slice decision for the many aviation situations that might constitute an emergency. Gladwell explains that creating scenarios as close to real life as possible, which would safely allow the student to experience what should be done, could unconsciously develop thin-slicing criteria for snap decision making. In aviation instruction, scenario-based training (SBT) can help develop these useful criteria in our student's unconscious.

The last area the author touched on that I believe is important to us as pilots was the physiology of acute stress. Gladwell writes about how acute stress and the adrenaline we produce can affect our thinking. He writes that "Dave Grossman, a former army lieutenant colonel and author of *On Killing*, argues that the optimal state of 'arousal'—the range in which stress improves performance—is when our heart rate is between 115 and 145 beats per minute (bpm). After 145 bpm, bad things begin to happen. Complex motor skills start to break down." This is where many of us feel as though things are happening in slow motion. He continues with, "doing something with one hand and not the other becomes very difficult…. At 175 bpm, we begin to see an absolute breakdown of cognitive processing…. The fore brain shuts down, and the mid brain takes over. Vision then becomes even more restricted." At this point some of us experience tunnel vision, "behavior can become aggressive. At heart rates above 175 bpm the body considers physiological control a non-essential activity. Blood is withdrawn from our outer muscle layer, and concentrated in the core muscle mass. This is to reduce bleeding in case of injury. But that leaves us clumsy and helpless." He describes people having had difficulty dialing 9-1-1 or moving away from an approaching vehicle. You will recall the discussion earlier on the brain injury in the frontal lobe. Here they describe the fore brain shutting down at 175 bpm, which has similar symptoms to the "ventromedial" patient experiencing a lack of ability to make a decision and take action. Sometimes we call it pilot error, but we are victims of our own biology.

In summary, the author states that "our unconscious thinking is, in one critical respect, no different from our conscious thinking: in both, we are able to develop our rapid decision making with training and experience." I believe this is a good human factors book to read and add to your pilot library. It will give all pilots and flight instructors food for thought; an insight into how they perform and how training may be improved. △

Doing the Right Thing
by Armin Shafai, Flight Operations Specialist, Mesa Airlines

During a recent visit to the Phoenix, Ariz., airport ramp, I had the opportunity to observe a pilot conducting a pre-flight walk around. Two things gravely concerned me as I watched. First, the pilot was holding a cup of coffee in his hand, and second, he was applying the concept of walk around literally—a casual stroll around the aircraft.

If this had been a check ride, I am confident that this pilot would have failed on the spot; and yet, here he was, preparing to pilot a regional jet aircraft on a revenue flight. Even worse is that I'm sure others were also watching—possibly even a few of his passengers! Now, what kind of confidence does that instill?

So here is my question: as pilots, why do so many of us become complacent and lose the edge in our approach to safety or the application of procedures—or put another way, fail to do the right things consistently, 100 percent of the time? I'm sure that at one point in his training days, this pilot was shown that a proper walk around involves carrying a checklist, and perhaps a flashlight, in one hand while actively checking the condition and serviceability of the aircraft.

Let's think of it this way, would we ever see a surgeon sauntering into the operating room minutes before an operation, holding a cup of coffee to see the patient before starting the operation? If surgeons—highly skilled and trained professionals—fail to observe the basic precautions prior to an operation, they may risk causing

injury or possible death to their patient. If pilots—highly skilled and trained professionals—fail to notice low tire pressure during the walk around, they could risk damaging the aircraft or causing injury or death not only to themselves, but to the rest of the crew and passengers.

For some pilots, it seems that each move up the aviation career ladder signifies that standards can be relaxed and a different approach can be adopted towards following polices and procedures, and in the application of safety. However, the challenge then becomes overcoming this change in attitude or mindset, considering that nobody forces them to cut corners during the walk around, take off without a current weather briefing, or ignore a known or suspected discrepancy prior to takeoff. In a sense, this change in attitude is a form of self-induced barrier towards doing things the right way.

One reason for this change in attitude could be the belief that, "now that we've made it in the 'big leagues,' we no longer need to do the things we used to do during our training days." Perhaps we adopt this attitude because we no longer need to demonstrate to someone (instructor, flight test examiner) that we are proficient in these skills. Perhaps since we are no longer assessed on performing these minor—yet important—tasks, we give less importance to completing them consistently and effectively. Another self-induced barrier could be the perception that others will view us as too "by the book" or "going overboard." Would we criticize our doctor or surgeon for that?

Here is where the often over-used word "professionalism" comes into play. In my opinion, professionals are those who apply their knowledge and skills in striving to do the right thing consistently, every time. We cannot take a course in "professionalism" to gain this attribute. Like any other skill, professionalism must be learned, practiced, maintained and built upon; if not, it will erode with time. The good news is that our "professionalism" teachers are all around us. We should simply look around, and while observing our peers doing their job, ask ourselves who performs their job correctly and consistently all the time, and who gets by with performing the minimum required tasks, or uses shortcuts all the time? Now, whom should we emulate?

The pilot was applying the concept of walk around literally —a casual stroll around the aircraft.

Professionalism—when incorporated as part of our core competencies—becomes the primary driving force in overcoming the self-induced barriers towards complacency. In wanting to be a professional, we will want to do the right thing consistently, every time. The best part is that it moves with us from job to job and is recognizable by all, so whether we remain in our current position, or plan on moving on to bigger and faster aircraft, professionalism becomes our most notable and visible attribute. One of the by-products of doing things the right way all the time (professionalism) is consistency. When we become consistent, we almost eliminate surprises, or—put differently—we reduce or eliminate the "error" element when paired with the word "human."

As our notable attribute, others who fly with us will recognize this consistency and approach to doing the job right, every time. It will encourage others to emulate this attribute, or it will let them know they can't cut corners or skimp over policy or procedures, thereby jeopardizing safety. △

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COPA Corner—Ramp Rash (Hangar Rash)

by John Quarterman, Manager, Member Assistance and Programs, Canadian Owners and Pilots Association (COPA)

Accidents and incidents are tracked across the aviation system by Transport Canada (TC), NAV CANADA, and of course, the Transportation Safety Board of Canada (TSB). But who tracks ramp and hangar rash? Most of us who have been around aviation long enough know about it, have seen the results, and may even have been responsible for it.

Ramp or hangar rash is that mysterious set of dents that appear on aircraft after ice storms (caused by too-zealous line staff who don't necessarily understand that broomsticks and shovels are not the way to de-ice aircraft). Hangar rash is also the dents in the wings, rudders, and tail caused by aircraft being stacked closely together in hangars, overlaid like a jigsaw puzzle, where the only person who can untangle them is the one who put them together so intricately in the first place.

Student-pilots jockeying their aircraft around the gas pumps is another source of ramp rash. Trying to move an aircraft around the fuel pumps, without contacting the ones crowded in behind it, can be a task that goes beyond the skills of most mortal humans. All in all, it sometimes seems as though parking control on airport and flight-school ramps is the thing we do worst in general aviation.

All of the above begs the question: why don't we do better?

Well, it seems that the major problem comes from the lack of planning in ramp layouts, and pilot and ground-staff training in ramp movements. We, in the pilot population, have all been trained to taxi, communicate, fly, land, take off, deal with emergencies, and even deal with a forced landing, but we haven't been trained to run a ramp properly. In the ground-staff contingent, all too often, the training comes on the job and from learning the hard way by breaking aircraft.

So what are the statistics? There really aren't any because the regulations don't specify any reporting unless the aircraft is under its own power. Damage caused by pushing or pulling other aircraft into an aircraft is not reported, and neither is hitting poles, fences, hangar doors, etc., with an aircraft. Even when the aircraft is under its own power, the need to report only comes if some major damage affecting airworthiness takes place. We can also surmise that in some cases major damage goes unreported—how much and what percentage is unknown.

The fact that this kind of damage goes unreported does not mean that there isn't a problem. The aircraft maintenance engineer (AME) at a particular flight school that has about 10 aircraft was asked recently, "what is your estimated cost of ramp rash every year?" The reply was stunning: "About $20,000."

For a flight school with razor-thin operating margins, this amount was way beyond "affordable."

So what to do?

Well, one answer is efficient ramp organization. It should be possible to refuel an aircraft after a flight without having to move three other aircraft. Some careful planning, good signage, and ramp painting clearly indicating which way to go, as well as good training for all the pilots and ground personnel are all ways to minimize the potential for damage. Placement of the aircraft refuelling area is, of course, critical!

Aircraft in the hangar for winter pre-heat should have a clear way to move in and out of the hangar space, minimizing the unnecessary movement of other aircraft.

Another answer is co-operation. Having enough people to move aircraft in and out of the ramp area, placing personnel so that the aircraft being moved is well-monitored for clearance around the wings and tail, and getting that extra set of eyes to watch and supervise the whole process can help prevent an expensive mistake.

The last answer is attitude. Being aware and careful can prevent expensive ramp rash.

As for the flight school I mentioned, it now has a carefully-planned and painted circular refuelling movement pattern instituted on its ramp; movement and handling of aircraft is much safer and damage is much more unlikely. This has apparently resulted in fewer incidents of ramp and hangar rash, all of which means more money for other uses.

Notes on abnormal occurrences
Pilots are advised that ramp or hangar rash should always be followed by inspection by a competent person, usually an AME.

Canadian Aviation Regulations (CARs): (see: www.tc.gc. ca/CivilAviation/Regserv/Affairs/cars/PART6/605.htm#605_88)
605.88 (1) No person shall conduct a take-off in an aircraft that has been subjected to any abnormal occurrence unless the aircraft has been inspected for damage in accordance

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with Appendix G of the Aircraft Equipment and Maintenance Standards.

(2) *Where the inspection referred to in subsection (1) does not involve disassembly, it may be performed by the pilot-in-command.*

CARs Standard 625, Appendix G—*Inspection after Abnormal Occurrences* spells out what occurrences MUST be followed by an inspection, and what must be inspected (see: www.tc.gc.ca/CivilAviation/Regserv/Affairs/cars/Part6/Standards/a625g.htm).

For more information on COPA, visit www.copanational.org. △

Transport Canada Civil Aviation: An Update on the Reorganization

by Derek Howes, Program Manager, Business Planning and Quality Assurance, Program Management, National Operations, Civil Aviation, Transport Canada

The implementation of safety management systems (SMS) has brought, and will continue to bring, significant changes to the way in which the holders of Canadian operations certificates perceive and manage safety. SMS is moving Canadian aviation companies from an environment that focuses on safety within the individual, technical facets of a company (operations, maintenance, air traffic control, etc.), to one where a company manages safety at a systemic and organizational level.

While regulatory compliance and excellence within the various technical areas within a company remain fundamental components of any company's approach to safety, elements, such as recognizing the impacts of organizational inter-relationships between various areas of the company, proactive hazard identification and risk analysis, and active monitoring/quality management processes, will all contribute to a systemic approach to safety within the Canadian aviation system. Such an approach holds significant promise for improving the Canadian aviation system's already excellent safety record.

But what about Transport Canada Civil Aviation (TCCA) itself? Throughout its history of regulating and overseeing the Canadian civil aviation system, TCCA's structure has very much paralleled that of industry, with organizations based on specific and technical aspects of the industry—aircraft operations, maintenance activities, manufacturing and engineering, air traffic services (ATS), etc. With the requirement for industry to implement SMS, and with the requirements of our own internal Integrated Management System (IMS), TCCA has to ensure that it has the capacity and the culture to work at the same systemic level that we are demanding of industry.

As part of this, TCCA undertook a review of its organizational structure and is now in the process of making transitional steps toward that new organization through the National Organization Transition Implementation Project (NOTIP). While NOTIP is charged with the overall reorganization of TCCA, this article examines the concepts of oversight of and services provided to the aviation industry. Over the course of the past year, several transitional organizational steps have been taken in these activity areas, both at regional levels and at Headquarters. While these transitional organizations will definitely be subject to change as the broader organization rolls out, an understanding of two of the major criteria underpinning these steps will give the reader a broader view of the TCCA oversight role in 2010 and beyond.

Transport Canada's Headquarters: in Place de Ville, Tower C, in Ottawa, Ont.

Multidisciplinary teams

As indicated above, TCCA has traditionally been organized along functional and technical lines. Under this organizational structure, companies involved in more than one facet of the aviation industry would be audited and inspected ("overseen") by various Transport Canada groups. For example, a national airline with a maintenance organization would be overseen by separate, Headquarters-based groups involved with air operations and cabin safety, while at the same time being overseen by regionally-based maintenance, aviation occupational safety and health, and dangerous goods groups.

As one of the foundational criteria for the TCCA reorganization, we are moving to multidisciplinary teams—integrated groups of personnel charged with all aspects of oversight for the particular company involved.

Such changes have been reflected in the creation of a National Operations Branch in Headquarters (charged with the oversight of nationally-based airlines and air navigation service providers), and in the creation of a Combined Operations Group in some Regions (tasked with oversight of regionally-based companies).

Such a multidisciplinary team brings a more systematic focus to the oversight of that company; TCCA is more clearly able to see the linkages between all components of the company and the broader challenges and risks facing that organization.

Accountability

One of the other basic criteria established for the reorganization is the idea of accountability. In a concept closely related to multidisciplinary teams, TCCA intends to have "accountable managers" or "enterprise managers" assigned to specific companies. Under such a concept, companies will be able to deal with one Transport Canada enterprise manager for "one-stop-shopping" in areas such as certification, on-going Transport Canada oversight, etc. As indicated in the above section on multidisciplinary teams, Transport Canada responsibilities are currently split amongst a number of groups—often between Headquarters and Regions.

Such enterprise teams and enterprise managers have been established in Headquarters as part of the formation of the transitional National Operations Branch. Major national airlines have been assigned to specific enterprise team leaders (ETL). In turn, each ETL has a multidisciplinary team to support Transport Canada activities with that company. Similarly, an accountable manager, along with a team of diverse experts, is responsible for Transport Canada's work with Canadian air navigation service providers.

While such specific implementations of enterprise management and enterprise teams will no doubt undergo refinement and change as TCCA's reorganization is fully realized, clear benefits are immediately apparent—companies receive one-stop service through one accountable point of contact. At the same time, from Transport Canada's point of view, these teams facilitate the systemic focus on the overall company.

Implications

While there are clear benefits associated with the two above organizational criteria, there are also certain implications that must be examined and planned for.

Work standardization

One of the major benefits in the existing TCCA organization was the grouping of similar functional experts. By having functional experts (pilots, aircraft maintenance engineers [AME], etc.) working together, work standardization was facilitated. An inspector had immediate access to a pool of other experts with the same technical skills. Subject matter expert (SME) managers were in place to ensure standard approaches in that functional area. All of this facilitated common work practices throughout the organization. With cross-functional or multidisciplinary teams, such support mechanisms are not "built-in," and work standardization is more difficult to achieve. This challenge has been recognized and will be addressed as the reorganization rolls out.

System level intelligence

While the enterprise model facilitates the gathering of system intelligence and the identification of hazards at a company level, there is a need to integrate this information at an overall, "civil aviation" system level.

Similarly to the response to work standardization, a "safety intelligence" function has been identified as a fundamental component of the new TCCA organization. Teams of personnel, with appropriate analytical and risk analysis background, will be put together in both Headquarters and Regions, with a mandate to provide the risk information needed to formulate the longer-term, strategic direction for TCCA and the short-term annual plans.

Program management

Two issues were identified—work standardization across multiple enterprise teams, and the need to gather and analyze the "safety intelligence" point to a broader need for strong and effective horizontal co-ordination amongst the various enterprise teams. In response to this need, the TCCA reorganization has identified the need for a strong "program management" component in each of the Regions and the Headquarters branches.

Summary

In implementing *Flight 2010*, SMS, and IMS, TCCA is in the midst of a significant culture change—from a technically-focused, transactional-based model of oversight and regulation to a model that, while maintaining touch with the technical aspects of the aviation industry, focuses on overall companies and on the overall civil aviation system.

The transitional steps taken to implement enterprise managers, enterprise teams, and put in place strong cross-functional program management functions, are the first steps in that cultural change.

We look forward to the rest of the journey! △

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Declaring an Emergency

by Mark Dixon, Civil Aviation Safety Inspector, General Aviation, Ontario Region, Civil Aviation, Transport Canada

"TOWER, THIS IS HOTEL ECHO LIMA PAPA, WE ARE DECLARING AN EMERGENCY 10 MILES OUT, 4 PEOPLE ON BOARD, 1 000 POUNDS OF FUEL AND NO HAZARDOUS MATERIALS."

What does it mean to declare an emergency? Is the pilot-in-command (PIC) going to have to face an inquiry? Does the PIC have to pay for emergency services? Does the PIC need permission to do this? Is declaring an emergency a really big inconvenience to air traffic control (ATC) and other aircraft?

This article will look at declaring an emergency from a decision-making standpoint, and shed some light on the why and when to declare an emergency.

First, read the following report taken from the Civil Aviation Daily Occurrence Reporting System (CADORS) and, assuming you were the PIC, make a quick decision if you would declare an emergency or not:

The (a/c type) turbojet aircraft (operating as XXXX) was on an IFR flight from Chicago (O'Hare) International Airport (KORD) to Ottawa MacDonald–Cartier International Airport (CYOW). The flight crew reported that they had a flap problem and requested to land on Runway 32. They advised that they were not declaring an emergency and that no emergency equipment would be required. However, NAV CANADA tower staff declared an emergency and the crash crews and airport duty manager were advised. The aircraft landed without incident at 0329Z, and aircraft rescue and firefighting (ARFF) stood down at 0330Z. Operational impact—unknown.

Well, would you or not? Let's look at the situation.

Having declared many emergencies over the years, I feel there is no such thing as a "slight" or "kind of" emergency. It is either an emergency or it is not. To decide if you should declare an emergency depends on the situation. The decision to declare should be made as early as possible, and communicated to ATC right away. Generally speaking, you should never be afraid to declare the emergency. If the situation that you are experiencing is in any way, or could become, unsafe or dangerous, declare the emergency. Humming and hawing, delaying, declaring "kind of

an emergency" or a "small emergency" leaves a lot of uncertainty. You owe it to your passengers, crew, and the aircraft owner to declare an emergency if you have a problem that warrants it. ATC will only be able to co-ordinate emergency resources and help out if they know you have a problem. If they are left out, or uncertain of the degree of the situation, it makes it difficult to help. Emergency services personnel are professionals who will not give you a hard time about declaring the emergency—it's their job, and they are always happy to help. You will not face an inquiry or be liable for fees or fines.

A CADORS report is generated by NAV CANADA and is followed up by Transport Canada or the Transportation Safety Board of Canada (TSB). When contacted, we like to get details and discuss the incident. For all of the CADORS reports that I have followed up, I have told the PIC that declaring an emergency was a good decision, and that we are following up from an "educational safety" point of view.

For the purposes of this newsletter, I ran the above CADORS report by a wide variety of Transport Canada inspectors, private pilots, flight instructors and senior airline check pilots.

Emergency vehicles responding to an aircraft emergency

Not surprisingly, the opinions varied wildly. Some pilots will declare an emergency if their watch stops working within a control zone on a VFR day; others would only declare if

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three of the four engines were on fire, the first officer was incapacitated while doing an ADF approach to minima, with no electrics, hydraulics, or hand held radio, 10 min of fuel remaining, and no suitable alternate within 1 000 mi. OK, that's an exaggeration, but the feedback clearly makes declaring an emergency a pilot decision-making topic.

The Transport Canada *Aeronautical Information Manual* (TC AIM) makes several references to emergencies—SAR 4.1, COM 5.11, and RAC 1.8. Go and look up these references, I'll wait while you do this…

When an emergency is declared, flight priority is also being requested. It is then up to the pilot to decide if emergency response vehicles (fire, ambulance) are needed on site for the landing. This decision essentially rests with the pilot, although NAV CANADA or the airport authority may also call for emergency response vehicles (as was the case in our CADORS report). Declaring an emergency is not exactly the same as a MAYDAY or PAN PAN call; however, they do often come together. A MAYDAY is a situation of distress where safety is being threatened by grave and imminent danger, and requires immediate assistance. A PAN PAN call is used in a situation of urgency where safety is threatened, but does not require immediate assistance. To sum up, MAYDAY and PAN PAN calls are the communication tools, and declaring an emergency is the request for "flight priority."

Every sound decision requires an assessment of the situation and the various options. Sometimes you have very little time to make a choice. Let's assume time was limited for our crew in the CADORS report; therefore, the best choice in my opinion is the safest one—declare the emergency and get ARFF on site. Taking the high road will generate less second-guessing and doubt from the crew, and allow you to proceed with checklists, standard operating procedures (SOPs), briefings, abnormalities, and ensure everyone is clear on the plan. This should lead to the least risk to passengers, crew, and others. Money concerns should be very low on the consideration pole.

In general aviation, the need to declare the emergency should be elevated. If you are a private pilot with 100 hr, but only flew 15 hr in the past year, you should never hesitate to get help. From my inquiries, the bulk of our professional pilots have no problem requesting assistance.

Here's an analogy to consider: You live next door to a neurosurgeon, and someone in your house just slipped, fell, and is unconscious. You look out the window and your neighbour is washing his Lexus in the driveway. Would you hesitate to run out and ask him to get his wife to come over and diagnose your friend? (He is an Embraer 145 first officer on three-months unpaid leave for not declaring an emergency and not following SOPs during a pilot proficiency check, so you wouldn't want to take his advice about any kind of emergency situation!)

Whatever type of aircraft you are flying, chances are there is another pilot or controller within radio range who has been there and done that, and I have yet to meet one who would not lend a hand.

When in doubt, don't worry about it, and declare! The answers to the five questions at the beginning, then, are respectively: a bit of excitement, no, no, no and no. △

Longline Accidents—Another Perspective

by Rob Freeman, Acting Program Manager, Rotorcraft Standard, Certification and Operational Standards, Standards, Civil Aviation, Transport Canada

Since external load longline operations were invented, there have been accidents due to the sling equipment becoming snagged and then dragging down the helicopter. Usually the aircraft ends up on its nose, with high vertical g loading and fatal consequences for the pilot, who (statistically) is likely not wearing an upper-body restraint, or helmet.

During the subsequent investigation, one question is always asked, "why didn't the pilot drop the load?" Friends and associates are left puzzled by the apparent oversight to do the obvious: if the load is snagged, release it! Some of these snagged loads have occurred subsequent to system malfunctions, and some were simply a result of the crew not maintaining sufficient terrain clearance. In the Transportation Safety Board of Canada (TSB) accident report A03P0247, which began as an engine compressor/gas producer problem and ended up as a complete engine failure during the turnaround and approach to land, the TSB noted:

"The location of the external cargo release switch varies on different helicopters and with different operators…. In the accident helicopter, the switch position on the cyclic control grip was not what the pilot was accustomed to…. Therefore, it is probable that the pilot's action during the emergency did not activate the external cargo hook release mechanism and, rather, that the trailing longline snagged a tree while the helicopter was still airborne. This factor was an additional complication to the survivability aspects of this accident; it could not be speculated whether items such as the pilot's safety harness or seat, or the aircraft's vulnerability to impact forces or post–impact fire would have permitted the pilot to survive the impact."

It is true that the release switch placement may have delayed or prevented the pilot from jettisoning the load. However, this pilot had time to realize a problem was developing with the engine, and had actually turned back toward the take-off pad before snagging the line. There was a reasonable amount of time to locate and activate the release, and yet this was not done. Wouldn't the well-experienced pilot have depressed the emergency foot release, if the primary emergency release could not be quickly located? Another thought: no one wants to pickle a load unless it is unavoidable. It may be that rather than searching for the switch, the pilot was trying to get back to the pad with the load intact, and delayed the release. When the load became caught, the decision may have been out of his hands, literally.

Artist's impression of catastrophic contact between a light sling load and the tail rotor assembly

In another longline accident (TSB report A00A0076), a Bell 212 was slinging empty drums from a lighthouse. It was the last load of the day, and the weather conditions were favourable—clear, with a strong wind. For some reason, shortly after takeoff, the helicopter descended until water contact was made with the load, and all was lost. The hook assembly was violently displaced 30° to the rear at water contact. The rotor system suffered mast bumping and shearing during the accident sequence. The tail boom and the tail rotor assemblies separated from the aircraft in flight.

I mention this accident because of the very sudden and severe departure from controlled flight. Anyone who has worked around a sling operation can tell you the ground crew will normally watch the arrival and departure. Once the helicopter is established in a climbout, interest wanes, and people return to whatever it was they were doing. In this case, the one witness stated that he turned, noticed a splash, and couldn't see the helicopter anymore. The fact that the helicopter contacted the water in sight of the departure point, after being initially monitored by several people, means that the complete accident—from event initiation

to crash—probably occurred in a matter of seconds. The point here is that the reaction time to save the aircraft must have been almost zero. Load/water contact, violent aircraft pitching, mast shearing, and airframe immersion occurred so quickly that only a single splash was seen. Again, why did the experienced pilot not release the load?

During external cargo operations, the load acts like a pendulum, oscillating around the point of attachment—the cargo hook. The pilot, through the judicious use of the flight controls and a healthy measure of concentration and skill, minimizes the oscillations. A good longline pilot makes it look smooth and easy. It most definitely is not either of those things, and is an area of helicopter flying where good training, experience, and "seat-of-the-pants" talent are irreplaceable.

Sadly, all of this can change very suddenly when the load gets snagged on a tree or other ground-level object. The delicate balancing act falls apart. As the line becomes taut, the pendulum is reversed, and the helicopter effectively becomes the "load." All movement now occurs around the fixed ground pivot point (the snag), and the resulting flight path is an arc, until the helicopter strikes the surface in a nose-low position. At the exact moment the snagged line becomes taut, the centre of gravity will be dramatically shifted far outside the limits of what can be countered by the flight controls. Unless the line can be slackened or the load released, recovery is impossible, and the time to impact is only a few seconds away.

If you are lucky enough to be moving forward slowly when the snag occurs, you may have time to recognize the problem and save yourself. A helicopter with a 100-ft longline, travelling forward at a relatively slow 30 kt, or approximately 50 ft/s horizontally, will strike the ground or water two seconds after snagging the load. At 60 kt, you have one second. That's not much time to react, even for the best of pilots. Forward momentum is translated into a circular acceleration vector toward the ground. This phenomenon is dynamic pitch over, with the same causal factors and potential for catastrophe as dynamic rollover.

Think about it. You are flying along at low level with a load, and suddenly have to deal with some malfunction or distraction, i.e. strange engine noises. Your mind is occupied with the problem, what you are going to do, plus where you are going, and the radio calls that need to be made. It is normal pilot behaviour in this situation, perhaps at the subconscious level, to instinctively lower the collective to begin to reduce airspeed and altitude. This may be the last link in the accident chain, as the clearance between the ground and the load is inadvertently zeroed out. There is a sudden and violent rearward tug on the airframe, with banging noises due to fuselage contact with the sling hook or gear. As the nose suddenly and

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dramatically drops, and you sense an uncommanded, steepening descent, wouldn't your first reaction be to apply aft cyclic, rather than releasing the load? And when the nose drops further, wouldn't the contradiction between your aft control movement and the opposing airframe reaction confuse and delay any other response? With only a second or two between initiating event and surface contact, this may preclude any other reaction until it is too late. Is this "time crunch" during pitch over the root cause for these accidents? You might recall how quickly a rollover accident becomes inevitable once collective is increased for comparison. It is a chilling thought.

If your company only conducts external load operations seasonally, such as on forest fires, it is especially important that your training syllabus include some quality hands-on practice to establish competency. Learning slinging skills without a thorough qualification program is a very large gamble. And all pilots are not created equal. Schedulers and management should take into account individual experience and ability before assigning personnel to these activities. Slinging is a specialized skill that not everyone can do well. In fact, some other countries' aviation authorities require special pilot licensing endorsements to conduct external load operations. In Canada, we leave it to the air operators to establish programs and training for this potentially difficult task.

I encourage all pilots and operators who are involved in external load operations, to have a look at the three TSB reports referenced below for starters (A05Q0119 is also profiled in the Recently Released TSB Reports section, on page 29.) Make sure that everyone involved is clear on the dangers and risks of longlining too close to Mother Earth, and delaying the decision to release the load when things start to go wrong. Otherwise, you could be next. △

References:
www.tsb.gc.ca/en/reports/air/2000/a00a0076/a00a0076.asp
www.tsb.gc.ca/en/reports/air/2003/a03p0247/a03p0247.asp
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Use of Incorrect Power-Setting References

An Aviation Safety Advisory *from the Transportation Safety Board of Canada (TSB).*

On July 10, 2007, a Piper PA31-350 departed from Matheson Island, Man., en route to Poplar River, Man. Shortly after liftoff, the right engine (Lycoming LTIO-540-J2BD) lost power. The pilot secured the engine and turned the flight back to Matheson Island. The aircraft lost altitude in the turns, and the pilot carried out a forced landing in a marsh. The pilot and seven passengers exited the aircraft and were taken to a medical facility. One passenger suffered serious injuries. The pilot and three passengers sustained minor injuries. Three passengers were not injured. The aircraft sustained substantial damage. The TSB investigation (A07C0119) into this occurrence is ongoing.

Matheson Island is a registered aerodrome, elevation 725 ft, with one gravel-surfaced Runway 03/21, 3 500 ft long, oriented 028° and 208° respectively. The observed weather at Berens River, Man., 38 NM north of Matheson Island, was as follows: temperature 18°C, winds north-northeast at 4 kt. The winds at Matheson Island were estimated as northwest at 10 kt, gusting to 18 kt, producing a left crosswind component on Runway 03. The aircraft had been modified, and the modification increased the maximum approved gross take-off weight of the aircraft from 7 000 lbs to 7 368 lbs. The aircraft's gross weight at takeoff was 6 978 lbs and the centre of gravity was within approved limits.

On departure, the pilot conducted a rolling takeoff on Runway 03 with a flap setting of 15° and an engine power set to 2 575 rpm and 42 in. of manifold pressure. The aircraft rotated near the departure end of Runway 03 at about 72 kt. Almost immediately after liftoff, the right engine lost power. The pilot raised the landing gear and flaps, shut down the engine, and feathered the propeller. The pilot completed several gradual turns to return to Matheson Island. The aircraft did not climb above about 200 ft during the flight and did not accelerate to its best rate-of-climb airspeed of 107 kt. The aircraft lost altitude during the turns and the pilot was required to carry out a forced landing. The right engine was recovered and examined, and its turbocharger differential pressure controller was found to be faulty. The fault would have shut down the turbocharger and led to a significant power loss. The aircraft was not equipped with any flight recorders, nor were they required by regulation.

The aircraft's engines were equipped with turbocharger controllers designed to set maximum take-off power automatically when the throttles are fully advanced. The approved aircraft flight manual (AFM), Procedures section, indicates that the take-off procedure is, in part: "a. Throttles—full forward," and, "b. Manifold pressure (43 in. normal-static sea level, std. temp.)—checked." The AFM Limitations section indicates that each engine is rated to produce 350 hp at 2 575 rpm and that the maximum allowed manifold pressure below 15 000 ft is 49 in. The single-engine climb performance chart in the AFM is based on a functioning-engine power setting of 2 575 rpm, full throttle, landing gear up and flaps up. The emergency procedure for an engine failure specifies a power setting of "props—forward" and "throttles—

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forward." The ambient temperature and elevation would have induced the turbocharger controllers to increase power above the minimum of 43 in. manifold pressure, had full throttle been selected during the takeoff.

The operator was using a quick reference handbook (QRH) that had been compiled by the previous operator, and which was provided to them when the aircraft was purchased. The QRH listed various procedures and limitations, including a take-off power setting of 2 575 rpm and 37 in. to 42 in. of manifold pressure. The QRH was not approved by Transport Canada for their operation, and it does not supersede the AFM. The operator's use of the QRH procedures had the effect of reducing manifold pressure and engine power during the occurrence takeoff, increasing the take-off distance and reducing the aircraft's airspeed and altitude, thereby placing the aircraft in closer proximity to obstacles at the time of the engine power loss during the initial climb.

It was not determined how many other operators are using unapproved reference material in their flight operations, or how many operators are aware of the differences between approved and unapproved reference materials.

Although this TSB investigation is still in progress and findings as to causes and contributing factors have yet to be determined by the Board, the operator's use of the unapproved QRH may have been a factor in the occurrence, in that the aircraft was likely at a lower altitude and airspeed at the time of the power loss than it would have been had the correct procedures been followed.

Therefore it is suggested that Transport Canada may wish to take action to ensure that operators are aware of the need to use approved flight operations reference material, and that they ensure that crews are using the correct flight operations references. △

I Chose to Live: A Moving Account by an Air Tragedy Survivor

This article is a first for our newsletter; it is the brave and poignant story of the survivor of a serious aircraft accident. Lina Ouellet has graciously agreed to share her harrowing experience with Aviation Safety Letter *(ASL) readers. This was doubly difficult for her because of the physical and emotional damage that she had to face with great courage over the last two years. We often publish articles about tragic events, but rarely about the consequences. This article is intended to fill this void by conveying the human side of the story. But first, a little background.*

A little over a year ago, a resident of St-Ubalde-de-Portneuf, Que., contacted me to ask if she could get a copy of the report on a deadly accident involving a small aircraft that occurred on July 16, 2005, near her home. She had a special interest in this accident because her son was the first witness on the scene and the first one to assist the survivor. After checking with the Transportation Safety Board of Canada (TSB), we quickly identified the accident in question (file A05Q0120), which was not subject to an in-depth Class 3 investigation, but rather a Class 5 investigation (see page 38 to read about the difference between a Class 3 and a Class 5 investigation).

The aircraft was an amateur-built Zenair Super Zodiac CH601-HDS, which was conducting a visual flight rules (VFR) flight between Lac-aux-Sables, Que., and

St-Lambert-de-Lauzon, Que. The pilot, accompanied by his wife and their small dog, reported engine trouble and had to make an emergency landing in a field near Saint-Ubalde. The landing was rough and the aircraft caught fire. The pilot helped his wife evacuate, but he was trapped in the cockpit and died. The passenger was seriously injured, and the aircraft was destroyed by the fire.

Nearly two years later, the woman from St-Ubalde who was looking for the accident report told me that the survivor had spent nearly two years in rehabilitation, including treatment at the severe burn unit in Québec City and a long-term rehabilitation centre, and that she had finally returned home. It was then that I decided to ask this brave woman if she would be willing to share her story. She agreed, and sent me a very moving story. A translated version is reprinted below:

It was July 16, 2005; finally Saturday was here. My husband got up and looked out the window. A wide grin came over his face. The day was going to be nice and hot, which wasn't really surprising, since it was the middle of July. It was the perfect day for a nice flight.

My husband had organized a day of swimming at Lac-aux-Sables. Two couples who were friends of ours joined us in their own aircraft. We left the house around 8:45 a.m. When I closed the door behind me that morning, I never imagined that such a tragedy was about to occur.

Accident aircraft pictured at an air rally prior to the accident
Photo: Pierre Langlois

Once we arrived at our hangar at the St. Lambert airport, we started preparing for departure. As usual, my husband inspected his aircraft. We were ready to leave, and for safety reasons, my husband always puts our little dog, Capitaine Crochet, in his carrier on board the aircraft; but our dog was very hot, so I let him out of his carrier so that he would be more comfortable. I put him on my lap and I buckled him in with me. My husband, our little dog, Capitaine Crochet, and I took off from the St. Lambert airport at about 10:30 a.m. Everything went well during the flight, and I didn't notice anything out of the ordinary.

We arrived at our destination at about 11:30 a.m. All three aircraft landed on the runway at Lac-aux-Sables, and everything seemed perfect for a wonderful day.

Indeed, we did have a wonderful day, and it was now time to leave. My husband walked around the aircraft, going through his checklist. I put Capitaine Crochet on my lap and I buckled him in with me again. We took off at about 5:00 p.m. The takeoff was very smooth and we were flying at 2 000 ft. There wasn't a lot of turbulence and everything was going well. Then the propeller suddenly started to slow down; it was turning very slowly. I couldn't believe what was happening. I told myself that it was going to start turning normally again, but it didn't. There was nothing I could do. It was like being in a nightmare.

First, my husband contacted a friend, who was on board another aircraft, and told him that we had a mechanical problem and that we had to make an emergency landing immediately. Then, my husband said to me, "don't talk to me now. I have to concentrate on making an emergency landing." I looked at the ground and I felt the aircraft moving into position for its approach. I was so scared that I started kissing my grandmother's ring that I had on my finger and I kept repeating, "grandma, grandma please save us." And then…nothing. The stress was so high that I blacked out. When I regained consciousness, the aircraft had crashed and was in flames.

I yelled, "we're on fire! we're on fire!" and tried to undo my seatbelt but I couldn't because it was too hot and it was burning my fingers. I tried again and this time I managed to undo it. My husband opened the door and pushed me out of the aircraft. I fell onto the wing and ended up on the ground. I rolled away from the burning aircraft, afraid that it was going to explode. I yelled to my husband, "hurry, get out! Get out! Please, get out!" But he didn't come out. I was all alone in the middle of a field. I didn't see anything in the distance. There were no houses or people anywhere. My hero couldn't do anything for me now. He was trapped inside the burning aircraft. I knew then that my husband was dead.

I couldn't see the fire, but I could hear it. The aircraft was a few feet away from me, and I had a very strong taste of fuel in my mouth. I heard a sound, a car and finally a voice. About 3 minutes after the crash, Michel Hardy arrived on the scene of the accident. Despite the horrific scene, he didn't hesitate for one second and he came towards me. He stayed behind me, put his hands on either side of my face and he spoke to me in a trembling, but reassuring voice.

He told me to stay calm and that the ambulance and fire trucks were on their way. I asked him if I was seriously burned, and he said, "no." I asked him if I still had my left leg, and he said, "yes." He left me for a few seconds and approached the burning aircraft to try to help my husband. He saw my husband's body in the aircraft, but there were small explosions coming from the aircraft so he couldn't get any closer. He couldn't do anything for my husband and quickly came back to me. He didn't leave me until the ambulance arrived.

Thanks to his composure and courage, my husband did everything he could to save me, and succeeded. It is also thanks to the composure, extraordinary courage and the calm of an Olympian displayed by fire chief Serge Auger and Michel Hardy (who was only 16 years old at the time) that I am alive today.

I was conscious during the entire ambulance ride. I also knew that I was about to begin the biggest fight of my life: to survive, because I had chosen to live. I was admitted to the severe burn unit at Enfant-Jésus Hospital. I had suffered burns to 70 percent of my body—my face, my arms and my legs. I had also suffered a compound fracture of my left ankle. After I woke up from being in a coma for a few weeks, I remembered everything: my husband's death, the details of the accident and that I was severely burned.

On October 18, 2005, after three months in the severe burn unit at Enfant-Jésus Hospital, I was transferred to Centre François-Charron. A few days after I arrived, I started intensive treatment with several therapists. I wore compression garments, a chin strap, a mask, and orthotic devices for over a year and a half. Wearing compression garments helps the skin's healing process. I still wear the chin strap, mask, and orthotic devices even today.

During my rehabilitation, I had to grieve for three deaths: my husband, my mother and my body. The extraordinary support of my family and my many therapists gave me the strength to overcome these challenges. After 18 months of dedication, motivation, determination, physiotherapy, occupational therapy, speech therapy, and 20 surgeries, I left Centre François-Charron on January 27, 2007, and I finally went home.

It has been over two years since the aircraft crash. Today, I have reclaimed my life and my personality. I live in a condo with my little dog. Yes, Capitaine Crochet was found two days after the crash by a woman in St-Ubalde. Capitaine Crochet managed to escape and was wearing a tag on his neck with his address.

I am now driving my car. I have even taken an aircraft twice to visit my brother and his family in Florida. I still go for treatment twice a week at Centre François-Charron. And I will have to have more surgery. I'm very proud of how far I've come so far. I can now say, "mission accomplished." Believe me, people will start calling me a "firecracker" again soon.

With great joy, on July 13, 2007, I was finally able to meet my rescuers Michel Hardy, his father Réginald Hardy and Serge Auger. It was a real privilege for me to share a meal with the entire Hardy family, who are a very special family. At this meal, I also met the fire chief Serge Auger.

I want to give a big thank you from the bottom of my heart to all the people who were involved in any way in helping me through this ordeal. Michel Hardy and his father Réginald Hardy, the ambulance attendants, the fire chief Serge Auger, the firefighters, the police officers, the severe burn unit at Enfant-Jésus Hospital, and the Centre François-Charron. I send my love to my husband Léonard Corbeil and my family. Without you, I wouldn't be here today to tell my story. △

Lina Ouellet,
Québec City, August 2007

A big thank you to Lina Ouellet, and to all the people who helped prepare this special article, especially Dr. Hélène Berlinguet of St-Ubalde, mother of Michel Hardy and partner of Réginald Hardy. Your compassion was the reason this article was written. —Ed.

Inadequate Cargo Restraint
An Aviation Safety Advisory *from the Transportation Safety Board of Canada (TSB).*

On June 2, 2007, a de Havilland DHC-3T was transporting lumber from Mayo, Y.T. During the take-off roll, the aircraft entered an extreme nose-up pitch attitude, rotated to the right, and crashed onto the ramp abeam the runway. The aircraft was substantially damaged. The pilot and sole occupant of the aircraft sustained fatal injuries. The investigation into this occurrence (TSB file A07W0099) is ongoing.

The cargo area for the occurrence aircraft was approximately 16 ft 5 in. long, and the cargo consisted of lumber varying in length from 10 ft to 16 ft. The aircraft's take-off weight was determined to be below the maximum certified take-off weight (MCTOW) for this aircraft, and the centre of gravity was calculated to be about 2 ½ in. aft of the aft limit. The load was secured using one 1-in. cargo strap that was placed over the top of the load. The load was not restrained in a manner that would prevent longitudinal movement. It was determined that during takeoff, the load shifted aft, which resulted in the aircraft entering an extreme nose-up attitude, and stalling. The pilot was not able to recover the aircraft from the stall.

Following this accident, the TSB Aviation Safety Information System (ASIS) database was searched for accidents and incidents that were a result of load shifts. Four such accidents were identified, all of which resulted in substantial aircraft damage, death, or serious injury. These accidents occurred in the period from 1985 to 2007.

The restraint of cargo is critical toward ensuring that the aircraft remains within its certified balance limitations.

Failure to do so can result in the cargo moving outside of these limits. The act of securing the load against vertical movement did not prevent the load from shifting toward the rear of the aircraft.

A Canadian Aviation Safety Board (CASB) [now the TSB] investigation (A83-O30045) issued a safety recommendation to Transport Canada in 1985 (CASB 85-002), where it was recommended that Transport Canada:

1. Review its audit system to ensure emphasis on the area of aircraft weight and balance and security of cargo.

Transport Canada responded that articles on aircraft overloading were included at intervals in Transport Canada publications that are distributed nationally. A national campaign against overloading would continue to be part of Transport Canada's master surveillance plan. However, Transport Canada's response did not specifically address the security of cargo issue raised in recommendation CASB 85-002.

Transport Canada's *Canadian Aviation Regulation* (CAR) 602.86(1) does state in part that "no person shall operate an aircraft with…cargo on board, unless the…cargo [is]

"(b) restrained so as to prevent them from shifting during movement of the aircraft on the surface and during take-off, landing and in-flight turbulence."

The company operations manual stated that all cargo had to be secured to prevent shifting in flight. The aircraft was equipped with multiple tie-down points, and eight cargo straps. The company aircraft ground training exam contained a weight and balance exercise. However, there was no indication of load security training.

While the frequency of this type of event remains relatively low, the result of a load shift as a result of improperly restrained cargo can result in a loss of control, resulting in substantial aircraft damage, serious injury, or death. Transport Canada may wish to inform industry of the significance of load shifting on aircraft performance and the need to effectively secure cargo in order to reduce the risk of in-flight load shift. △

CARs Standards 723.105(q) and 724.121(q) require information on securing cargo to be included in the company operations manual (COM). There are several references to cargo in the Standards, and the most notable one is the requirement to have the securing of cargo in the COM. Since part of the operational training is to cover the contents of the COM, the operator is required to train their personnel accordingly. While the Standards do not specifically state any training on how to secure a load, CAR 602.86(1) is clear that a load must be restrained to prevent shifting. Transport Canada does not believe there is a need to change any regulations or standards.

Operators should develop procedures and provide the appropriate training to their personnel to ensure they understand how to properly secure cargo in their aircraft and verify that load shifting will not take place. —Ed.

The Importance of Proper Weight and Balance

by Gerard van Es, National Aerospace Laboratory (NLR), Amsterdam, The Netherlands

Many pilots (both commercial and private) tend to underestimate the importance of proper weight and balance of their aircraft. Load sheets are taken for granted, and hasty calculations are made of the aircraft's centre of gravity (CG). Unfortunately, each year there are a number of accidents related to weight and balance issues. Many of these occurrences could have been avoided if more attention was given to the weight and balance.

Aircraft are designed and certified to operate within certain weight and balance limits (see *Canadian Aviation Regulations* (CARs) Standard 527.27—*Centre of Gravity Limits*). Exceeding these limits can be dangerous. The regulations provide the stability, controllability, and strength requirements at all allowable CG positions and corresponding weights. The extreme forward and aft CGs must be established for all certified weight limits. The condition that typically determines the forward CG limit is that the aircraft shall be controllable on landing. This means that the aircraft shall be able to be trimmed at the high lift values required for the desired landing speeds (including abuse cases). Other flight control cases that can influence the forward limit of the CG are the capability to make a prompt avoidance pitch-up manoeuvre, the capability to make a prompt nose-down recovery at low speed, and adequate pitch control in abnormal configurations (failure cases). The above-mentioned conditions all apply to free air. On the ground, the forward CG limit is basically determined by the maximum loads on the nose landing gear for an aircraft with a tricycle gear configuration.

Static longitudinal stability is the most important factor in determining the aft CG limit. At the aft CG limit position, the aircraft should demonstrate that a positive natural stability exists, that the aircraft is capable of pitch control at low speeds and high thrust (e.g. during a go-around), and that an adequate control is possible in abnormal configurations. On the ground, the aft CG limit is determined by the minimum loads on the nose landing gear required for good nose wheel steering, the maximum loads on the main landing gears, the tipping tendency of the aircraft, and adequate directional control during the take-off run after an engine failure. These last conditions apply to aircraft with a tricycle gear, and not to those with a taildragger configuration.

What happens if the certified limits as defined in the CG envelope are exceeded? From design, the aircraft flight characteristics will be adversely affected whenever the certified limits are exceeded. For instance, as the CG moves aft, the aircraft will become less stable as the CG approaches the neutral point. If the CG lies aft of the neutral point, the coordination and control motions required to maintain a stable flight condition will exceed the capability of the pilot, and the aircraft will become uncontrollable. On the ground, CG aft of the aft limit can result in a tail strike due to the pitch-up of an aircraft with a tricycle gear configuration (even at low speeds during the take-off roll when power is applied to the engines). The effect of a CG position forward of the forward limit is evidenced by a decrease in elevator control capability. Because of excessive stability, the elevator control required to manoeuvre the aircraft is increased. At some point, elevator control might become insufficient to perform required manoeuvres, such as the flare during landing and a go-around. During takeoff, the CG position can be moved forward until it reaches the point where the aircraft is very stable but cannot be rotated, or can only be rotated

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with great difficulty because the elevator has reached its maximum deflection. An adverse CG position can also have significant effects on the loads imposed on the aircraft's structural components and could cause structural failure. Exceeding the maximum weights as specified in the aircraft flight manual (AFM) does not necessarily adversely affect the flight characteristics. For instance, exceeding the maximum landing weight could result in a landing gear collapse. However, the landing gear structure is designed with a standard safety margin assuming a higher load than obtained during a normal landing at maximum landing weight. With this, it could be possible to land the aircraft somewhat beyond the maximum landing weight. Overweight landings are often made during emergency or precautionary landings. Exceeding the maximum take-off weight (MTOW) will affect the flight performance characteristics. The take-off ground-roll distance increases and the climb performance decreases. As long as the aircraft is not significantly overweight, it should be able to take off safely. However, the margins reduce rapidly when an engine failure occurs during an overweight takeoff, if the runway is short for the aircraft, or if there are high obstacles along the take-off flight path that the aircraft has to clear.

Aircraft that have wing-mounted propellers can be faced with a unique problem when flying with a CG close to the aft limit. Control can be lost during the approach after selecting landing flaps followed by the initiation of power increase and/or a go-around. Lowering the flap will move the neutral point forward and change the pitching moment (this effect is not limited to propeller aircraft). The pilot feels this as a tendency for the aircraft to pitch-up, and needs to push forward on the control column to hold a steady flight path by lowering the elevator. The pilot will re-trim the aircraft by winding the trim wheel forward, which moves the trim tab to keep the elevator in the new position without the pilot having to maintain a push force on the control column. One feature of aircraft with wing-mounted propellers is that when the engines accelerate from idle power to full power, the neutral point moves forward (up to 10 percent of the mean aerodynamic chord!). When the actual CG position is close to or slightly aft of the certified aft limit due to incorrect loading, the aircraft may be just stable during takeoff and cruise. However, this situation can change during landing, in which case the aircraft may become unstable after lowering the flaps to landing position, and may show a very strong pitch-up tendency. The normal reaction to increase power to recover from the pitch-up or to make a go-around will make things even worse as the neutral point moves forward significantly with the increase in power on aircraft with wing-mounted propellers. △

More information on weight and balance issues can be found in a safety study conducted by the author, "Analysis of aircraft weight and balance related safety occurrences," (Report No. NLR TP-2007-153). —Ed.

David Charles Abramson Memorial (DCAM) Flight Instructor Safety Award

The recipient of the 2007 DCAM Flight Instructor Safety Award is **John Robertson**, Chief Flight Instructor and Professor of Human Factors and Safety Systems at the School of Aviation and Flight Technology, Seneca College, Toronto, Ont. Jane and Rikki Abramson presented the award on November 5, 2007, at the Air Transport Association of Canada's (ATAC) Annual General Meeting and Convention held in Halifax, N.S.

John had an extensive career in the Canadian military, where he trained on the Sea King helicopter and the Tutor Jet. Among many of his distinguished accomplishments in the military was being the chief flight instructor (CFI) at the Moose Jaw, Sask., military flight training base. "His passion for flight, vast amount of knowledge and enthusiasm for teaching has made him a role model," quote his students. He is also a designated Transport Canada pilot examiner.

The annual DCAM Award promotes flight safety by recognizing exceptional flight instructors in Canada, and has brought much recognition and awareness to the flight instructor community. Recognition of excellence within this segment of our industry upholds a safety consciousness that hopefully will be passed on for many years to come.

The deadline for nominations for the 2008 award is September 14, 2008. For details, please visit www.dcamaward.com. △

From left to right: Rikki Abramson, John Robertson, Jane Abramson, and Mike Doiron, Acting Chairman of ATAC

Flight Operations

MAINTENANCE AND CERTIFICATION

Hot Air Balloon Fuel Cylinders

by Peter von Moos, Senior Engineer—Domestic Regulations, Aircraft Certification Standards, Standards, Civil Aviation, Transport Canada

Attention hot air balloon owners, operators, and maintainers!

Did you know that the transport of propane to a hot air balloon launch site, or from a hot air balloon landing site, as well as filling a cylinder with propane for the purposes of such transportation are activities subject to the *Transportation of Dangerous Goods Regulations* (TDGR)?

Under the TDGR, the kind of cylinder that may be used for propane transport, and requirements for its filling and maintenance, are strictly prescribed. The TDGR requirements are in addition to the certification of the cylinders pursuant to the *Canadian Aviation Regulations* (CARs) 511 and 513, and in accordance with *Airworthiness Manual* (AWM) Chapter 531, the airworthiness standard for manned free balloons.

Recently, a Canadian balloon operator was fined for illegal land transport of balloon fuel cylinders that did not meet TDGR requirements. The operator was unaware that AWM 531 compliance was not sufficient to transport and fill fuel cylinders.

Road, railway, ship or aircraft transport of balloon fuel in cylinders is an inherent characteristic of hot air balloon operations. However, balloon operators should be aware that compliance with AWM 531 alone is NOT sufficient to permit the transportation, inspection, maintenance, and filling of the fuel cylinders outside their intended use as fuel storage during balloon flight. In the certification of aircraft, Transport Canada Civil Aviation (TCCA), just like other airworthiness authorities, is responsible only for the airworthiness aspects of an aircraft or any of its installed components. It is the user's responsibility to meet any additional requirements, e.g. the operating regulations, and in the case of hot air balloons, the TDGR requirements for the surface transportation of propane.

Balloon owners and operators should verify that they satisfy the requirements of the TDGR for surface transport of propane, including the requirements pertaining to the cylinders used for that purpose.

The TDGR require that cylinders manufactured after 1992, and used to transport compressed gas must comply with, and be certified to, the Canadian Standards Association (CSA) Standard CAN/CSA B339. Such cylinders can be recognized by their stamp markings, which begin with the letters "TC." Requirements for periodic re-inspection are included within Standard CAN/CSA B339. Cylinder use, including pre-fill and post-fill inspection, and limits on the degree of filling, are specified in a companion Standard, CAN/CSA B340. These standards may be purchased from the CSA, while the *Transportation of Dangerous Goods Act, 1992* (TDG Act) and TDGR may be viewed on the Transport Canada Web site.

If your current cylinders do not comply with the TDGR, i.e. have no "TC" stamp markings, you may apply for a permit for equivalent level of safety under the TDGR. The Transport Canada Transportation of Dangerous Goods Directorate may, through such a permit, allow existing non-conforming hot air balloon cylinders to continue to be used during a phase-out period of specified duration. A permit may be granted to members of an association or to an individual. It is important to realize that such a permit applies only to the cylinders, and does not relieve the holder from their obligation to have a balloon configuration that conforms to the approved type design.

For more information on applying for a permit of equivalent level of safety, see Part 14 of the TDGR at the following Web address: www.tc.gc.ca/tdg/clear/part14.htm.

You may submit an application for a permit along with supporting rationale and documentation, by mail, fax, or e-mail to:

> Director, Regulatory Affairs
> Tower C (ASDD)
> Place de Ville, 330 Sparks St.
> Ottawa ON K1A 0N9
>
> Fax: 613-993-5925
> E-mail: TDGPermits@tc.gc.ca

If not covered under a permit, non-conforming cylinders may not be used for the transport of compressed gas within the scope of the TDGR. △

CL-215 Water Door Up-Lock Actuators: The SDR is for Your Benefit

by Rob Adamchuk, Civil Aviation Safety Inspector, Aircraft Maintenance and Manufacturing, Prairie and Northern Region, Civil Aviation, Transport Canada

Human factors training teaches us that an aviation incident or accident typically involves more than one causal factor. The events are like layers of Swiss cheese in which the holes eventually line up, allowing the final margin of safety to be penetrated. This penetration permits the incident or accident to occur. A positive action by one person can disrupt the layers, block the holes, and stop the sequence of events. The filing of a service difficulty report (SDR) can be that one positive action.

Recently, an operator of CL-215 water bombers was involved in a scheduled C-check of one of their aircraft. The type certificate holder's recommendations do not call for a non-destructive testing (NDT) inspection of the water door up-lock actuators in this particular check. The actuators do, however, have a 5 000-hr time between overhauls (TBO), which had not yet been reached. The operator contracted a local NDT-rated approved maintenance organization (AMO) to do the NDT inspection portions of the C-check. The NDT technician informed the operator that he had recently been contracted by another operator to inspect their water door up-lock actuators, and had found some actuator piston shaft defects. The operator immediately requested that the NDT technician check their actuators. The result was that defects were discovered in approximately 83 percent of the actuator shafts in their fleet. At this point, the operator filed an SDR with Transport Canada.

In the course of a routine Transport Canada follow-up, several aspects of this SDR were revealed, some unexpected. Quite often, there are two cracks on each shaft at the chamfer between the body of the shaft and the threaded end. The two cracks are typically about 180° from each other. The type certificate holder's recommendations call for magnetic particle inspection (MPI). All of the NDT-rated AMO shops contacted stated that they do this type of inspection on these parts, but have also found, through experience, that the fluorescent liquid penetrant inspection (LPI) method gives a stronger and more positive indication of a defect in this part.

They all stated that they do the inspection twice: once with the recommended MPI method for initial indications, and then the second time with the LPI method for confirmation and fail-safe purposes. Even though the type certificate holder's recommendations call for a 5 000-hr TBO for the up-lock actuator, some operators are overhauling, and NDT inspecting, their actuators annually. This is a significant reduction of time between overhauls. This would also suggest the operator evaluated the information, and modified their maintenance requirements to ensure the reliability of the parts involved, and thus, safety. Another aspect revealed was that some operators have been aware of the defect issue since about 2004, apparently having communicated the relevant information amongst themselves. Unfortunately, not all operators are equally aware. It appears to depend on who is on individual e-mail and telephone lists, rather than a national information system such as the SDR database.

The Transport Canada routine follow-up included checking the SDR national database. Including the most recent submission, only three SDRs regarding this part have been filed. The first two were in the early months of 2000. The relatively small number of reports in the database raises several questions. Is the type certificate holder aware of the actual rate of defects found in this part, and the average time in service? Are they aware of the different NDT processes being used in the field, and why they are used? The SDR reporting process would allow them to assess what is happening, evaluate the data, and take appropriate action, if necessary. Are all the operators of this aircraft type in Canada aware of the additional information? Unless another operator happened to inform them in some way, it is not likely. Is there a way a new or foreign operator can obtain this information in a readily-accessible fashion? Again, unless another operator happened to inform them in some way, it is not likely.

It is logical to conclude that, at some point in time, an operator not having all the necessary information readily available to fully evaluate the maintenance requirements
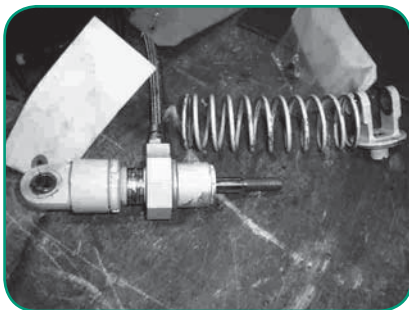
Up-lock actuator, part number 215750098
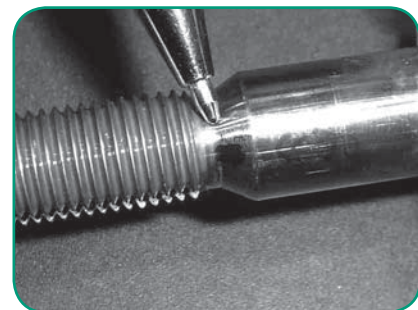
Shaft, part number 33130131, with a defect shown

of their aircraft will experience an unexpected failure of the up-lock actuator shaft. If the failure occurs, in this case, during a high force-loaded part of the flight, such as takeoff, landing or while scooping water, the result may be catastrophic. If everyone shares information using the available process, which is the SDR database, then the information is available to everyone. That action of filing an SDR may close the holes in one or more layers of the Swiss cheese. If someone downplays or complains about filing an SDR, ask yourself one question: "is all the relevant information readily available to me?" The SDR is for everyone's benefit. △

Inspection Levels Part 2: Detailed Inspection Please!

by John Tasseron, Civil Aviation Safety Inspector, Aircraft Evaluation, Standards, Civil Aviation, Transport Canada

This is the second of three articles on the topic of inspection levels.

This is the second article concerning aircraft maintenance inspection levels. The first covered the term "general visual inspection" (GVI). When discussing inspection levels, it must be remembered that the topic concerns how closely an item is inspected, which in turn translates into how small a defect or unsatisfactory condition we hope to find. The idea is to first assign an appropriate level of inspection to a task, and then prescribe an effective inspection interval.

The term detailed inspection has been assigned the acronym DET. This does not conform to the usual concept of using the first letter of each word of a term to derive the acronym, but has come into common usage through the Air Transport Association of America (ATA). Perhaps the intent was to differentiate between this term and the term daily inspection (DI). The problem is partially caused by the fact that the word "visual" has been deleted from the term. Had this been retained, DVI would have been the result. The definition of the term detailed inspection is as follows:

"An intensive examination of a specific item, installation or assembly to detect damage, failure, or irregularity. Available lighting is normally supplemented with a direct source of good lighting at an intensity deemed appropriate. Inspection aids, such as mirrors, magnifying lenses, or other means, may be necessary. Surface cleaning and elaborate procedures may be required."

Some key words in this definition are intended to differentiate this level of inspection from that of the GVI. Let's look at these words more closely.

The word "intensive" alerts us to the fact that this inspection demands a higher level of scrutiny in order to find unsatisfactory conditions that are more difficult to detect. The emphasis has shifted from general inspection to detailed inspection. An assumption is made here that an intensive examination would only be possible by moving the eyeball closer to the surfaces to be inspected, and that the need for specifying a distance is therefore waived. Furthermore, the intensive examination is directed towards "a specific item" (note the singular). Since this is not the same as looking at a number of items, as is done during a GVI, the specific item to be inspected needs to be clearly identified as part of the inspection task. Supplemental lighting is specified as a "normal" requirement here, so one can assume that at least a flashlight should be available. The intent is to direct the light to a specific area so that smaller defects can be more easily detected. The reference made to "surface cleaning" relates to having to pay particular attention to the fact that the general cleaning carried out prior to the start of the inspection may not have been adequate to permit intensive examination of a small detail. Finally, the mention of "elaborate procedures" raises an awareness of a possible need to gain additional access by moving adjacent items, defuelling tanks, etc.

The definition for the term "detailed inspection" appears to be fairly concise and easy to understand, and has not been the subject of significant controversy. This is partly due to the fact that it is almost automatically compared to the definition of GVI because both terms are used frequently in large aircraft maintenance schedules. Note that the term lends itself to use in any maintenance schedule, as long as the corresponding definition is clearly explained. Since problems occur when a definition is chosen to describe a term not normally associated with it, or vice versa, it is best to maintain consistency in the applicability of ATA terms and their definitions, before using them in other maintenance schedules.

The final article will look at the highest inspection level, and how it sometimes creates controversy in the inspection level selection process. △

The following summaries are extracted from Final Reports issued by the Transportation Safety Board of Canada (TSB). They have been de-identified and include the TSB's synopsis and selected findings. Some excerpts from the analysis section may be included, where needed, to better understand the findings. We encourage our readers to read the complete reports on the TSB Web site. For more information, contact the TSB or visit their Web site at www.tsb.gc.ca. —Ed.

TSB Final Report A04A0110—Runway Excursion

On August 31, 2004, a Boeing 727-200 cargo aircraft was on a scheduled cargo flight from Toronto, Ont., to Halifax, N.S., with stops at Montréal, Que., and Moncton, N.B. The aircraft landed on Runway 29 at Moncton at about 12:22 Atlantic Daylight Time (ADT). After touchdown, the aircraft hydroplaned and departed the runway at the Taxiway Charlie intersection. It crossed the taxiway and came to rest on an abandoned runway threshold, a short distance from the taxiway. Damage was limited to tread damage to the four main landing gear tires, and destruction of a taxiway light. There were no injuries.

Aircraft moments after runway excursion

Findings as to causes and contributing factors
1. The crew did not anticipate the effects of the adverse landing conditions and elected to continue the approach and landing.
2. The pilot was unable to maintain directional control of the aircraft because of the combination of hydroplaning and a crosswind.
3. Once the tires contacted the runway, there was insufficient time for the pilot to avoid the runway excursion.

Finding as to risk
1. The flight data recorder (FDR) portion of the cockpit voice and flight data recorder (CVFDR) had not been checked in accordance with regulations, and therefore, poor data quality with some of the parameters on the recorder had not been identified.

Safety action taken
Since the occurrence, the operator has modified flight operations procedures and training with respect to slippery runway conditions. Also, flight crew and maintenance procedures have been amended for the maintenance and testing portions of the CVFDR.

TSB Final Report A05Q0008—Collision with Terrain

On January 24, 2005, at approximately 15:00 Eastern Standard Time (EST), the pilot of an Aérospatiale AS 350 BA helicopter, with four hunters and one guide on board, was conducting an approach to an unserviced landing area on the edge of a lake, located in the James Bay area, 60 NM from La Grande-4, Que. At the end of the approach, the helicopter began to hover, and then started to descend into whiteout and loose snow conditions. The downdraught of the main rotor lifted the snow, causing a total loss of visual reference. After the left ski touched the snow-covered surface, the helicopter rolled onto its left side into snow that was several feet deep. During the rollover, the rotor blades struck the ground and the gearbox partly separated from the fasteners. Some blades penetrated the cockpit, fatally injuring the guide and the pilot, who was wearing a helmet. The four passengers sitting it the rear seats were not wearing seat belts, and received minor injuries. Two of the passengers were ejected from the aircraft, and ended up approximately 10 ft from the wreckage; the two others remained in the cabin. The survivors were evacuated by two other helicopters at approximately 16:30 EST.

View of wreckage and accident site

Findings as to causes and contributing factors

1. The pilot did not detect that the slope on the landing area exceeded the maximum bank angle allowed for the aircraft, because the existing whiteout conditions made him lose his sense of depth. The helicopter rolled onto its left side following a dynamic rollover.
2. The pilot did not notice the helicopter's lateral displacement because the snow lifted by the rotor downdraught and the icing on the aircraft's windows prevented him from seeing external references.

Findings as to risk

1. The front seats did not conform to Service Bulletin 25.00.63, and separated from their anchorages when the helicopter rolled onto its left side.
2. The occupants seated in the rear seats were not given a safety briefing before departure. They were not wearing seat belts, did not know where the emergency locator transmitter (ELT) is found or how to use it, and they did not know that the helicopter had survival equipment on board.

Other findings

1. Service Bulletin 25.00.63, relating to the strengthening of the front seats, had not been carried out on the helicopter, but this did not contribute to the injuries suffered by the occupants of those seats.
2. The investigation found that the other pilots who transported the occupants of the accident helicopter did not give the passengers a safety briefing, as required by the *Canadian Aviation Regulations* (CARs.)
3. The survival equipment, which was in the left-hand baggage hold, was not accessible after the accident because the aircraft was resting on its left side.

TSB Final Report A05A0059—Stall and Loss of Control During Climb

On May 27, 2005, a de Havilland DHC-8-100 (Dash-8) aircraft was a passenger revenue flight from St. John's, N.L., to Deer Lake, N.L., with 36 passengers and 3 crew on board. During the climb-out from St. John's, the indicated airspeed (IAS) gradually decreased to the point that the aircraft entered an aerodynamic stall. The aircraft descended rapidly, out of control, losing 4 200 ft before recovery was effected, approximately 40 s later. The incident occurred during daylight hours in instrument meteorological conditions (IMC). There were no injuries, and the aircraft was not damaged.

Findings as to causes and contributing factors

1. During the climb, the captain inadvertently selected vertical speed (VS) mode on the automatic flight control system (AFCS) instead of the intended IAS mode, and neither flight crew detected the selection error.

2. The operator's standard operating procedures (SOPs) did not have a prescribed method for ensuring the correct selection of AFCS climb modes.
3. The flight crew did not activate the pneumatic de-ice equipment while climbing in icing conditions.
4. The flight crew did not detect the decreased airspeed until the aircraft was near the stall.
5. The aircraft stalled at a higher-than-normal airspeed, with little advance warning, most likely due to accumulated ice on critical surfaces.
6. The captain, believing that they had encountered severe turbulence, did not recognize that the aircraft had stalled, and did not apply the standard stall recovery technique.

Findings as to risk

1. Typically, flight crews receive only limited training in stall recognition and recovery, where recovery is initiated at the first indication of a stall. Such training does not allow pilots to become familiar with natural stall symptoms, such as buffet, or allow for practice in recovering from a full aerodynamic stall.
2. A significant proportion of Dash-8 pilots may hold outdated beliefs on the use of pneumatic de-icing equipment.

Safety action taken

The TSB issued Safety Advisory A050019-1 on July 22, 2005, on the subject of inadvertent selection of inappropriate AFCS modes of operation. The letter suggested that Transport Canada (TC) ensure that operators have incorporated measures into their procedures to ensure the correct selection and monitoring of AFCS climb modes. On October 4, 2005, TC responded, advising that a copy of the advisory had been passed on to all TC Regions, and that the Department would take the necessary action, as required. Since the occurrence, the operator has revised its SOPs to contain a challenge and response action whenever AFCS modes are engaged in the climb.

The TSB also issued Safety Advisory A50018-1 on July 22, 2005, on the subject of timely selection of pneumatic de-icing equipment. The advisory suggested that TC consider additional action to ensure that pilots are conforming to published de-icing procedures, and to dispel old beliefs about the proper use of pneumatic de-icing equipment. On October 4, 2005, TC responded, advising of additional efforts to move this information into published guidance material in the near future. As well, TC published an article in *Aviation Safety Letter* (ASL) 2/2006. This article informed pilots of the need to conform to published de-icing procedures, and attempted to dispel old beliefs about the use of pneumatic de-icing equipment.

Since the occurrence, the operator has directed its trainers to re-emphasize procedures for activation of pneumatic boots, as described in its SOPs and the aircraft flight manual (AFM). To reduce the likelihood of monitoring errors, the operator has directed all crews not to conduct paperwork during critical phases of flight. These duties are to be performed during level flight only while en route.

As a result of recent stall and upset occurrences in turbojet airplanes, TC has reinforced the need for appropriate training for the prevention of an airplane stall and for stall recovery. TC released Commercial and Business Aviation Advisory Circular (CBAAC) No. 0247—*Training and Checking Practices for Stall Recovery* on August 24, 2005.

TSB Final Report A05O0120—Aircraft Control Difficulty

On June 9, 2005, a Cessna TU206G was departing Hamilton, Ont., for Burlington Airpark, Ont. The aircraft departed from Runway 30 at approximately 12:00 Eastern Daylight Time (EDT) with only the pilot on board. During the take-off rotation and the initial climb, the aircraft had an increasing tendency to pitch nose-up. The pilot applied full nose-down trim, but the aircraft tendency to pitch nose-up continued. Excessive forward pressure on the control wheel was required to maintain an appropriate pitch attitude during the climb-out, and subsequent return to the Hamilton airport. The aircraft landed without further incident.

Findings as to causes and contributing factors
1. The aircraft maintenance engineer (AME) misinterpreted the elevator trim tab travel limits and mis-rigged the elevator trim tab such that limited nose-down trim was available.
2. The second AME did not detect the rigging error during the independent inspection because he relied on the first AME's explanation of the rigging procedure.

Safety action taken
In an effort to minimize the risk of a mis-rigged control system, the operator included the requirements of Airworthiness Notice (AN) C010 in the maintenance control manual.

TSB Final Report A05Q0119—Collision with Water

On July 16, 2005, a Bell 205 A-1 helicopter, with a pilot and a loadmaster on board, was engaged in forest fire suppression operations at Solitude Lake, Que., about 25 NM northwest of Port-Cartier, Que. At approximately 12:20 Eastern Daylight Time (EDT), the helicopter hover taxied from a fuel cache site located at the south end of the lake. The helicopter was slinging an empty water bucket on a 100-ft longline. While decreasing power to bring the helicopter to a hover, the pilot felt a vibration, followed by a loud bang, and what seemed to be a loss of power. The helicopter quickly lost altitude and pitched nose down and to the right before striking the water. The pilot and loadmaster managed to exit the helicopter while it was sinking, and were rescued by nearby firefighters. The pilot-in-command was seriously injured. The loadmaster sustained minor injuries. The helicopter was substantially damaged.

Findings as to causes and contributing factors
1. The helicopter was positioned too far from shore to provide adequate visual references for longline operations, and it is likely that the water bucket inadvertently entered the water while the helicopter was transitioning from a hover taxi to a hover.
2. The anchor effect of the water bucket may have caused the helicopter to swing downwards, and there was insufficient time, altitude, or visual references to prevent the helicopter from striking the water.
3. The pilot was not wearing the available shoulder harness during longline operations, which likely contributed to the severity of his injuries.

Findings as to risk
1. Although there was no effect on engine performance, the presence of unauthorized parts and the unbent first stage compressor blade locking tabs denote a lack of quality control on the part of both maintenance facilities involved.
2. Although the fuel product identifying stickers met provincial regulations, the similarity between the stickers may lead to misidentification of the fuel product.
3. The crew members were not wearing lifejackets, as stipulated in the company operations manual. Although both survived their injuries, the pilot did not know how to swim, and may have drowned had he not been rescued by nearby firefighters.

Other findings
1. Many military and commercial parts share the same part numbers, and therefore, the accompanying tag is not sufficient to confirm that the part is authorized for commercial use. Its validity must be cross-

referenced with the Commercial and Government Entity (CAGE) code. It is not mandatory to indicate the CAGE code on the accompanying tag.
2. The lack of a CAGE code on the accompanying tag resulted in the issuance of a certificate of airworthiness (C of A) without the benefit of complete and adequate documentation.

Safety action taken
On June 5, 2006, the TSB issued Safety Information Letter A060026-1—*Inadequate Identification of Fuel Barrels* to the Director General of Civil Aviation. The Safety Information Letter highlighted the criticality of proper identification of fuel barrels. The use of fuel barrels for remote helicopter operations is widespread throughout Canada.

On April 11, 2007, the TSB issued Aviation Safety Information Letter A070004—*Inadequate Identification of Parts* to the Director General of Civil Aviation. The Aviation Safety Information Letter highlighted the fact that the identification on a data plate or the scribe on a part, along with its tag confirming its traceability, are not sufficient to attest that the part is authorized for commercial use. Its validity must be checked against a CAGE code, which identifies the manufacturer and the purchaser. These codes are available on the Business Identification Number Cross-reference System (BINCS) Web site.

Transport Canada published an article entitled "Inadequate Identification of Fuel Barrels" in the *Aviation Safety Letter* (ASL) 4/2006. The ASL is distributed worldwide to over 90 000 readers.

TSB Final Report A05A0161—Wing Contact with Runway During Landing

On December 25, 2005, a Boeing 737-700 was on a scheduled passenger flight from Toronto, Ont., to Halifax, N.S. Just before touchdown on Runway 14, in low-visibility conditions, the aircraft rolled right and moved toward the right side of the runway. The aircraft then rolled to the left, and the left wing struck the runway. None of the passengers or crew members was injured, and the aircraft taxied to the terminal. The incident occurred at 19:24 Atlantic Standard Time (AST), during the hours of darkness.

Findings as to causes and contributing factors
1. The crew did not carry out a pilot-monitored approach in accordance with company procedures, and therefore, disabled a critical safety defence established to manage landing safely in the low-visibility conditions.
2. The transition from the approach to the landing phase became destabilized when the co-pilot disconnected the autopilot, resulting in the aircraft wing contacting the runway when the aircraft was being manoeuvred to correct the situation.
3. The co-pilot's inability to keep the aircraft stabilized during the transition to landing and his selection of the take-off/go-around (TOGA) mode were likely the result of his limited experience on type, and the stress from the low-visibility and relatively-high workload conditions.
4. The captain did not take control or command a go-around once the transition became destabilized.

Finding as to risk
1. The touchdown point, in conjunction with the delay in application of reverse thrust, increased the risk of a runway overrun.

Other finding
1. Significant data were lost to the investigation because the cockpit voice recorder (CVR) was not shut down after it was determined that the aircraft wing had struck the ground, depriving the investigation team of possible important information.

Safety action taken
Operator
The flight crew were given simulator training in low-visibility approaches, and completed line checks with a company check pilot.

A memorandum was issued to all dispatch personnel, advising them that, when passing on runway visual range (RVR) information to flight crew, they must also include the applicable runway along with the time and

date. The memorandum will be included in the next flight dispatch operations guide revision. Guidance on the required information will be given during training for dispatch personnel.

Revisions to flight crew training procedures have been introduced that place additional emphasis on hazards associated with low-visibility transition to visual references during instrument approaches, and on the requirement to use monitored approach procedures in these conditions. In addition, training will involve discussion of procedures to be carried out in the event of loss of visual reference below decision height (DH), such as missed approach and rejected landing procedures.

The approach procedures for Category I and II instrument landing system (ILS) approaches are being harmonized to make both procedures as similar as possible.

Amendments to the operator's company operations manual have been issued, outlining the changes to the approach ban limits.

The operator has completed an internal risk assessment and has entered into discussions with NAV CANADA, Transport Canada, and other industry organizations to explore the possibility of conducting auto-landings on Category I ILS approaches.

Transport Canada
Aviation regulations have been amended to prohibit commercial air operators from beginning an approach when visibility is so poor that a successful approach to a landing is unlikely.

The regulations establish, for all runways where visibility is reported, the minimum visibility for the crew to begin an approach in what is termed an approach ban.

The amendments also extend the requirements to runways where conditions are reported by an instrument-rated pilot or qualified person rather than a sensor. In addition, the regulations help harmonize Canadian regulations with international standards, and respond to recommendations from the TSB.

These changes came into force December 1, 2006, and affect commercial air operators. The most significant changes to the approach ban affect commercial air operators holding operating certificates under the Subparts 702, 703, 704 and 705 of the *Canadian Aviation Regulations* (CARs), operating airplanes in instrument flight rules (IFR). Minimal changes to the approach ban affect IFR commercial helicopter operations, and IFR aircraft operations by private operators and general aviation.

For more information regarding the new approach ban regulations, visit the Transport Canada Web site.

TSB Final Report A06W0104—Loss of Control and Collision with Terrain

On July 3, 2006, a Bell 206B Jet Ranger helicopter was departing from a prepared helicopter landing area adjacent to the Nose Mountain, Alta., fire observation tower at approximately 18:15 Mountain Daylight Time (MDT). A pilot and three initial attack firefighters were on board. The landing area was located in a clearing, on a mountain plateau, situated at the north edge of a steep escarpment. After lifting off, the pilot hover taxied around a pile of brush on the west side of the clearing and departed in a westerly direction, toward the escarpment. When the helicopter overflew the rim of the escarpment, it began to yaw to the right. The pilot was unable to control the yaw with the application of full left pedal. As the helicopter rotated through 180°, the pilot lowered the collective to regain directional control. The helicopter descended onto the escarpment, rolled over, and came to rest on its left side. One firefighter sustained fatal injuries and another firefighter sustained serious injuries. The pilot and the third firefighter sustained minor injuries. The impact forces activated the onboard emergency locator transmitter (ELT). The helicopter was substantially damaged, but there was no post-impact fire.

Findings as to causes and contributing factors
1. The conditions of a shifting tailwind, over-gross weight, and high-density altitude collectively exceeded the rotor and engine performance limits of the helicopter, and the helicopter was unable to take off in the distance available.
2. Rotor performance was further lost when the helicopter flew out of ground effect over the rim of the escarpment, precipitating a degenerating situation of insufficient power available, and the helicopter could not sustain flight.

3. In the conditions encountered during the takeoff, the helicopter entered a vulnerable regime where unanticipated right yaw occurs. There was insufficient tail rotor thrust to counter the torque from the main rotor, and the helicopter turned right.

4. Although the pilot's recovery actions arrested the right turn, there was insufficient height to prevent the helicopter from striking the terrain.

5. The inhospitable characteristics of the terrain immediately below the helicopter prevented the pilot from carrying out an uneventful landing, and the helicopter rolled over on touchdown.

6. The weight of the helicopter at takeoff was incorrect because of inaccurate estimates of the weights of the firefighters, their gear, and the equipment. For the existing conditions, the take-off weight exceeded both the maximum gross weight limit and the hover out of ground effect (HOGE) ceiling limit.

7. The main rotor penetrated the left-side cockpit and cabin, contributing to the severity of the injuries to the passengers.

8. It is probable that the passenger in the rear left seat was not wearing the available shoulder harness; this likely increased the severity of his injuries.

9. There was no system in place for the Alberta Ministry of Sustainable Resource Development, Forest Protection Branch (ASRD-FPB) to provide helicopter pilots with actual individual weights of fire crew and their personal gear.

Forward left view of main rotor strike damage to cockpit

Safety action taken

On December 11, 2006, the TSB issued Safety Information Letter A060041—*Passenger and Equipment Weights in Helicopter Fire-Fighting Operations* to the Director, Wildfire Operations, Alberta Ministry of Sustainable Resource Development. The Safety Information Letter identified that assiduous monitoring of passenger and equipment loads is the sole solution to prevent overloading of helicopters, and that a process to provide pilots with accurate firefighter crew and gear weights may help to ensure that helicopters involved in firefighting activities in Alberta are flown within prescribed weight and balance limits. In response to Safety Information Letter A060041, the ASRD-FPB advised that it was taking the following actions:

- The "Equipment List and Weights" in the ASRD-FPB's pilot's handbook will be reviewed.
- The elevation of the tower and fuel cache sites will be added to the ASRD-FPB publications and 2007 air operations maps.
- High-quality weigh scales will be purchased for use by crews at the primary fire bases and warehouses.
- A copy of the Safety Information Letter has been distributed to all ASRD-FPB area offices.
- The pilot responsibilities and ASRD representative responsibilities have been clarified in sections 6.10 and 6.11 of the ASRD-FPB standard operating procedures (SOPs), as follows:
  - The pilot is responsible for completing the load calculation correctly, using the proper performance chart information, as per the company's operations manual, *Canadian Aviation Regulations* (CARs) and the *Commercial Air Service Standards* (CASS).
  - The pilot is responsible for computing the allowable payload.
  - The pilot shall check, or be informed of, any subsequent passenger/cargo manifested weights completed under the initial load calculation, to ensure that allowable payloads are not exceeded.
  - The ASRD representative responsible for a flight (for example, crew leader, loadmaster, wildfire ranger, forest officer) is responsible for providing the pilot with a complete passenger/cargo manifest, including accurate weights, and advising the pilot of all dangerous goods being carried.
  - The passenger/cargo manifest/weights form can be used to record the information given to the pilot.

On May 14, 2007, the FPB advised that all the proposed remedial actions had been implemented. As well, aviation audits were conducted at three of the four major Mountain Pine Beetle controls within Alberta, and the issue of providing accurate weights was reviewed and stressed at a recent training course for Type 1 and Type 1F initial attack leaders. △

REGULATIONS AND YOU

Regulatory File on the Extension of Validity Periods for Certain Medical Certificates

In the "Regulations and You" article published in issue 4/2007, we mapped out the steps that a regulatory initiative has to follow before it can be incorporated into the *Canadian Aviation Regulations* (CARs). In this article, we will explain the process followed by the regulatory file dealing with the extension of validity periods of medical certificates attached to private pilot licences (aeroplane and helicopter), balloon pilot licences, and gyroplane pilot permits.

On December 7, 1944, Canada signed the Chicago Convention, committing to bring its regulations and standards in line with the standards proposed by the United Nations agency that later became the International Civil Aviation Organization (ICAO). Canadian standards regarding medical requirements associated with Canadian aviation documents for personnel are, therefore, based on the standards proposed in ICAO's Annex 1.

When ICAO changed the validity periods of medical certificates required to obtain a licence, Canada wanted to harmonize its standards with those proposed. Thus, in 1998, the Canadian Aviation Regulation Advisory Council (CARAC) Part IV Technical Committee commissioned a working group to study the possibility of reducing the frequency of medical examinations required for Canadian pilots to validate their licences and permits.

Following consultations held by the working group with, among others, Canadian aviation industry representatives, Civil Aviation doctors, and other medical experts, it was recommended that CARAC propose a regulatory modification that would increase the validity periods of medical certificates attached to private pilot licences (aeroplane and helicopter), balloon pilot licences, and gyroplane pilot permits, from 24 months to 60 months for pilots under the age of 40, and from 12 months to 24 months for pilots age 40 and over.

Notices of Proposed Amendment (NPA) were presented to the members of the CARAC Part IV Technical Committee on March 28, 2000, and were approved by the members of the Civil Aviation Regulatory Committee (CARC) on April 25, 2000.

The Part IV Technical Committee is made up of representatives of the government, pilot associations (e.g. the Air Line Pilots Association—Canada [ALPA]; the Canadian Owners and Pilots Association [COPA]; the Ultralight Pilots Association of Canada [UPAC]; the Aircraft Owners and Pilots Association [AOPA]), unions (e.g. Teamsters Canada), airlines (e.g. Air Canada), and air transport associations (e.g. the Air Transport Association of Canada [ATAC]). CARC is made up of the Director General and various Civil Aviation directors.

On July 14, 2000, following the approval of the NPAs, the Director General of Civil Aviation at the time issued a ministerial exemption under subsection 5.9(2) of the *Aeronautics Act* to allow for a reduction in the frequency of medical examinations that validate the four documents concerned to periods similar to those proposed by ICAO.

The table below shows the validity periods for medical certificates attached to private pilot licences (aeroplane and helicopter), balloon pilot licences, and gyroplane pilot permits before and after the ministerial exemption, as well as ICAO's proposed periods. Please note that the gyroplane pilot permit is a national document, and therefore, there is no equivalent ICAO proposal.

At the end of the summer, a triage, a Regulatory Impact Analysis Statement (RIAS)[1] and the regulatory amendments were submitted to the Treasury Board of Canada Secretariat (TBS) for approval and publishing in the *Canada Gazette*. Barring any unavoidable circumstances, this regulatory file should be closed soon. △

Validity Periods (months)	Canada (before the exemption)		ICAO		Canada (proposal)	
Type of document	Pilots under the age of 40	Pilots age 40 and over	Pilots under the age of 40	Pilots age 40 and over	Pilots under the age of 40	Pilots age 40 and over
Pilot Permit—Gyroplane	24	12	N/A	N/A	60	24
Pilot Licence—Balloon	24	12	60	24	60	24
Private Pilot Licence—Aeroplane	24	12	60	24	60	24
Private Pilot Licence—Helicopter	24	12	60	24	60	24

1 An explanation of the regulatory process in which the triage and RIAS are defined and explained was published in the "Regulations and You" section of *Aviation Safety Letter* (ASL) 4/2007.

Dangerous Goods in Transport: Reporting Requirements

by Roger Lessard, Inspector, Dangerous Goods Standards, Standards, Civil Aviation, Transport Canada

The *Transportation of Dangerous Goods Act, 1992* (TDG Act, 1992) and the *Transportation of Dangerous Goods Regulations* (TDGR) provide the Canadian legislative environment for handling, offering for transport, transporting or importing dangerous goods. In Canada, anyone handling, offering for transport, or transporting dangerous goods must be trained or working under the direct supervision of a trained person, as stipulated in the TDGR Part 6—*Training*.

Only a trained person may classify, select the means of containment, package, label, mark, and document a shipment of dangerous goods in compliance with the TDGR, therefore, mitigating the risks associated with dangerous goods in transport. In Canada, the consignor, also called the shipper, is responsible for the dangerous goods shipment from the time it is offered for transport until it reaches the consignee, referred to as the receiver. The consignor is also responsible for submitting an emergency response assistance plan (ERAP) for the most hazardous dangerous goods for approval before considering any transport activities, domestically or internationally. Under the TDGR, a person is also a consignor when requesting that a foreign entity ship dangerous goods or other dangerous articles or substances into Canada.

The air operator must also be trained to recognize, load, and secure dangerous goods according to Canadian standards; display the dangerous goods safety marks in compliance with TDGR Part 4—*Dangerous Goods Safety Marks*; and report dangerous goods accidents/incidents in compliance with TDGR Part 8—*Accidental Release and Imminent Accidental Release Report Requirements*.

The TDG Act, 1992 and TDGR adopt by reference other documents that can be used as an alternative way of complying with the regulations, as long as the TDGR requirements are met. This is the case for the International Civil Aviation Organization (ICAO) Doc 9284—*Technical Instructions for the Safe Transport of Dangerous Goods by Air* (ICAO TIs). Anyone handling, offering for transport, transporting, or importing dangerous goods by air must be trained to meet the TDGR requirements and the ICAO TIs provisions.

A person is an individual, a corporation, or any other entity carrying on a business, who has possession of dangerous goods for the purposes of transportation, or for the purposes of storing them in the course of transportation. A person must report accidental release or imminent accidental release found on an aircraft, at an aerodrome, or in an air cargo facility to CANUTEC (613-996-6666) and the nearest Transport Canada Regional Civil Aviation Office.

If the aerodrome is an airport, a report must also be made to the airport operator, in compliance with TDGR Part 8. A 30-day follow-up report must be made in writing to the Director General, Transportation of Dangerous Goods Directorate if an immediate report was required to be made on an accidental release.

The ICAO TIs Part 7—*Operator Responsibilities* requires the air operator to report undeclared and misdeclared dangerous goods found on passenger or cargo-only aircraft. It also requires reporting of articles or substances that are dangerous goods not permitted in passenger carry-on or checked baggage under the ICAO TIs Part 8—*Provisions Concerning Passengers and Crew*. What is a passenger? The definition is different between the TDG Act, 1992 and the *Aeronautics Act*. When dealing with dangerous goods, however, a passenger is defined in section 1.4 of the TDGR, and reads:

"(b) for a road vehicle, a railway vehicle or an aircraft, a person carried on board the means of transport but does not include
   (i) a crew member,
   (ii) a person who is accompanying dangerous goods or other cargo,
   (iii) an operator, owner or charterer of the means of transport,
   (iv) an employee of the operator, owner or charterer of the means of transport, who is acting in the course of employment, or
   (v) a person carrying out inspection or investigation duties under an Act of Parliament or of a provincial legislature."

The 1996 crash of a ValuJet aircraft into the Florida Everglades is an example of a reportable dangerous goods accident, which, by definition, results in fatal or serious injury to persons or major property damage. This particular accident was caused by the improper handling, offering for transport, or transporting of oxygen generators. Dangerous goods incidents or undeclared/misdeclared dangerous goods shipments are also reportable. A dangerous goods incident is an occurrence, other than a dangerous goods accident, associated with, and related to, the transport of dangerous goods by air, not necessarily occurring on board an aircraft, which results in injury to a person, property damage, fire, breakage, spillage, leakage of fluid or radiation, or other evidence that the integrity of the package has not been maintained. Any occurrence relating to the transport of dangerous goods that seriously jeopardizes an aircraft or its occupants is also deemed to be a dangerous goods incident.

Regulations and You

The Dangerous Goods Standards Division of the Transport Canada Civil Aviation Directorate published Dangerous Goods Standards Notices No. 2—*Dangerous Goods Carried by Sports Teams*; No. 3—*Hand, Body and Filming Equipment Warmers*; No. 12—*Quick Lighting Charcoal Tablets*; No. 15—*Dangerous Goods Carried by Passengers—Outdoor Activities*; No. 16—*Dangerous Goods Carried in Toolboxes*; No. 17—*Carriage of Ammunition on Board an Aircraft*; No. 19—*First Aid Kits*; and No. 24—*Individual Meal Packages, Flameless Ration Heater, and Self-Heating Beverages* to inform the travelling public and air operators of targeted prohibited items in passenger carry-on or checked baggage. Such items must be reported to Transport Canada if they are found in passenger baggage or as undeclared shipments.

The Notices may be consulted at the following Web site: www.tc.gc.ca/CivilAviation/commerce/DangerousGoods/news/notices/menu.htm.

The TDG Act, 1992 does not occupy the whole field of aviation safety. The *Aeronautics Act*, for instance, requires Canadian air operators to hold a valid air operator certificate (AOC). To obtain an AOC, the air operator must meet the *Canadian Aviation Regulations* (CARs) and the *Commercial Air Services Standards* (CASS), such as submitting the procedures for the carriage of dangerous goods, with the corresponding training programs part of its company operations manual, including the reporting requirements, for review and approval by Transport Canada. As such, Transport Canada recently published Advisory Circular AC 700-001—*Procedures for the Carriage of Dangerous Goods to the Company Operations Manual* to assist air operators in documenting such procedures. It is available on the following Web site: www.tc.gc.ca/CivilAviation/IMSdoc/ACs/700/700-001.htm.

The following is a list of phone numbers for Transport Canada Civil Aviation Regional Dangerous Goods Offices:

Atlantic	506-851-7247
Quebec	418-877-8868
Ontario	416-952-0000
Prairie and Northern	780-495-4022
Pacific	604-666-5655
Airline Inspection	514-633-3116 △

Enforcement Case Study: Suspension Under Section 7.21 of the *Aeronautics Act*

by Jean-François Mathieu, LL.B., Chief, Aviation Enforcement, Standards, Civil Aviation, Transport Canada

Peter awoke early one morning after a long tour in northern Quebec. He was troubled by a call from his wife the night before. She had just received a Notice of Suspension from Transport Canada, Aviation Enforcement. Peter's commercial pilot licence—helicopter had been suspended for non-payment of a monetary penalty, and the suspension would remain in effect until the monetary penalty was paid in full.

Four months before, Peter had received a Notice of Monetary Penalty for contravening *Canadian Aviation Regulation* (CAR) 602.101 because he had landed at a mandatory frequency (MF) aerodrome without communicating his intentions.

Peter had not fully appreciated that the clock had started ticking the moment he received the Notice of Monetary Penalty. Upon receipt of that Notice, Peter ignored the invitation for an informal meeting with the Regional Manager, Aviation Enforcement. Further, he did not file a request for a Transportation Appeal Tribunal of Canada (TATC) review within 30 days and was then, under the *Aeronautics Act*, deemed to have committed the contravention for which he was charged.

Peter was not aware that the Act addresses the matter of unpaid fines. Under section 7.21 of the Act, a person's Canadian aviation document, in this case Peter's commercial pilot licence—helicopter, can be suspended for not paying an assessed monetary penalty. The suspension meant that Peter could not exercise the privileges of his licence.

On receipt of the Notice of Suspension for non-payment of a monetary penalty, Peter would be well advised to pay the amount of the penalty immediately. A failure to do so invokes the suspension of his licence and requires him to return his document. If Peter elects not to surrender his licence, he will expose himself to a further contravention of CAR 103.03, and additional punitive enforcement action could be brought against him.

At this point, Peter understood that the matter was serious and that he should have dealt with it in a timely fashion. He then decided to immediately pay the fine and have the suspension lifted. △

The Hazards Are Wild

by Bruce MacKinnon, Program Manager, Wildlife Control, Aerodrome and Air Navigation Standards, Standards, Civil Aviation, Transport Canada

No matter how much flight time you've logged as a pilot, chances are that you're not among that small group of aviators who have experienced the shock of a bird strike firsthand. It's more likely that you know of someone who has. And without a doubt, you've noticed hawks perched on runway markers, flocks of Canada geese taking flight from fields adjacent to runways, or even deer lurking in the woods on the edge of airport properties.

Key factors on the rise

Birds and other animals are a growing aviation hazard across Canada and around the world. In particular, goose and deer populations are skyrocketing in North America, and lands on and around airports are often attractive locations that offer food and protection for these species.

The animal population isn't the only factor that is increasing; the number of aircraft operations is on the rise. As a result, the risk of collisions between aircraft and wildlife continues to grow—and the potential severity associated with such collisions is high.

More than 70 percent of all bird strikes, and more than 65 percent of strikes that cause substantial aircraft damage, occur below 500 ft above ground level (AGL). Since aircraft at these altitudes are most likely to be at or near airports, Transport Canada's recent efforts to reduce safety risks include *Canadian Aviation Regulation* (CAR) 302—*Wildlife Planning and Management*. In full force since December 30, 2006, CAR 302 requires most certified Canadian airports to develop, implement and maintain plans for the management of wildlife.

These plans are based on site-specific risk—a recognition that each airport faces unique wildlife challenges and must have the capacity to implement site-appropriate mitigation. Where risk is determined to be low, wildlife management intervention can be minimal. As the level of risk rises, so too must airport operators' ongoing actions to minimize risk.

A few words about the words

The words *risk* and *hazard* are often used interchangeably, but in safety lingo there's an important distinction between them. A hazard is a factor that may lead to risk. Put another way, risks arise from encounters with hazards. For example, a ring-billed gull is generally not a hazard and poses little risk. But in the airport environment, it is a potential hazard because the risk of striking aircraft exists. Flying in the path of a B727 on approach, the gull is a definite hazard at high risk of causing a strike.

The goal of an airport wildlife management plan is to keep risks to a minimum, primarily by identifying and countering

resident hazards. This process of pinpointing hazards and measuring the risks they pose is called risk analysis.

Assessing the risks

A risk analysis is a crucial first step in the creation of an airport wildlife management plan—and mandatory under CAR 302. Pilots should be aware of two key related points: first, risk analyses must include consultations with representative samples of airport users, such as flight schools, airlines and pilots. Second, airport operators cannot conduct thorough risk analyses without current wildlife strike data, which is made available through Transport Canada. This data is vital to national and international airport wildlife management efforts, and one of the most important tools in tracking wildlife trends and determining hazards at locations across Canada.

The data is compiled from wildlife strike reports submitted to Transport Canada. (More on reporting at the end of this article.) Under the new regulation, all airports must report all wildlife strikes to Transport Canada and keep records of these events. But anyone can file a wildlife strike report: airlines, ground crews and pilots. It's one of the most valuable contributions you can make to the effort to reduce wildlife risks.

Be sure to report any knowledge of wildlife strikes—no matter how inconsequential the events may seem. Even information about a near miss can help authorities learn more about the presence of potentially hazardous species, and the nuances of encounters between aircraft and animals.

An important regulatory trigger

Unfortunately, estimates indicate that approximately 80 percent of wildlife strikes go unreported in some jurisdictions—a statistic that points to a glaring loss of valuable knowledge and suggests a great deal more could be done to improve safety. CAR 302 helps bridge this gap by requiring airport operators to amend their wildlife management plan and submit it to Transport Canada for review within 30 days of a strike if a turbine-powered aircraft:

- suffers damage as a result of a collision with wildlife other than a bird;
- collides with more than one bird; or
- ingests a bird through an engine.

For pilots, this is a compelling reason to file a wildlife strike report. In cases where CAR 302.305(6)(b) is called into force, the process of review and amendment helps ensure wildlife management plans are as current as

possible, addressing continual fluctuations in the wildlife hazards at airports.

During the fall of 2006, serious wildlife strikes triggered enforcement of CAR 302.305(6)(b) at no less than four Canadian airports—including three of the country's largest. Transport Canada inspectors have instructed these airport operators to revisit their wildlife management plans and address any shortcomings that may have contributed to the strikes.

The review-and-amendment process is also set in motion under CAR 302.305(6)(c), when a variation in the presence of wildlife hazards is observed in an airport's flight pattern or movement area. You can help mitigate risk by reporting to Transport Canada any significant changes in the numbers or behaviour of hazardous wildlife at airports you visit regularly.

Keeping you informed

Provisions of the new regulation also require airport operators to put in place effective communication and alerting procedures to quickly notify pilots of wildlife hazards. These communications may be provided through air traffic services (ATS), direct radio contact, broadcast of airport advisories, and UNICOM.

Collision Course

Building on the benefits of CAR 302, Transport Canada is currently developing new training resources to help pilots gain a better appreciation of wildlife hazards. The *Collision Course* package will feature an introductory video that outlines the scope of the wildlife-hazard problem. An interactive CD-ROM will also be included, featuring many operational tips for avoiding and responding to wildlife strikes.

Collision Course is the first product of its kind—the result of a unique partnership between Transport Canada and the Federal Aviation Administration (FAA), and clear acknowledgement that wildlife hazards are a cross-border concern.

Pilots are also encouraged to read *Sharing the Skies: An Aviation Industry Guide to the Management of Wildlife Hazards*. Chapter 10 targets pilots directly, outlining their roles and responsibilities, flight-planning tips, and operating techniques for avoiding and responding to wildlife strikes.

What else can you do?

The aviation industry in Canada is increasingly undertaking the management of risk by incorporating safety management systems (SMS). Essentially, this approach holds that aviation safety can be best achieved through system-wide, non-punitive efforts in which all stakeholders contribute—whether they are pilots, ATS providers or ground personnel.

Pilots' roles in SMS are defined in part by aviation regulations in both Canada and the U.S.—regulations that require you to familiarize yourself with all potential risks and to operate aircraft in a manner that minimizes the probability of wildlife strikes. From an operational point of view, pilots can meet this obligation through prudent flight planning. For instance, avoid flights over areas that are known to attract birds, such as wildlife sanctuaries, landfills, and shorelines. Aim to achieve cruise altitude as soon as possible, since the probability of bird strikes decreases dramatically above 3 000 ft AGL. And remember that birds tend to be more active at dawn and dusk, and that risks peak during spring and fall migration periods.

If you encounter wildlife at an airport, notify ATS immediately and take appropriate steps to minimize the risk. For example, if you observe birds on the runway while taxiing, do not hesitate to take position and hold until the hazard is removed. Those birds may not occupy your flight path, but they could well stray directly into the path of another aircraft. In one of the worst bird strike accidents on record, 24 lives were lost when an aircraft on takeoff flushed geese into the path of an E-3B AWACS at Elmendorf air force base (AFB), Alaska.

Take the time to report

By conducting risk assessments, developing management plans and training staff, airports across Canada have been doing their part to address wildlife hazards and meet the requirements of CAR 302. Pilots can take three simple steps to help accelerate this move to safer skies: raise your awareness of wildlife and the hazards they pose to aviation; learn what measures are in place at the airports you frequent; and take a few minutes to become familiar with the quick and easy-to-complete bird/wildlife strike report form (see below), and be sure to file a report in the event of any wildlife encounter.

Bird/wildlife strike report form

Hard copy forms (form number 51-0272) are available in bulk from the Transport Canada Order Desk:

Web site: www.tc.gc.ca/transact
Toll-free (North America):   1-888-830-4911
Local (Ottawa):   613-991-4071
Fax: 613-991-2081
E-mail: mps@tc.gc.ca

Bird/wildlife strike reports may be submitted online at: www.tc.gc.ca/aviation/applications/birds/en/default.asp

Reports can also be made through a toll-free hotline: 1-888-282-BIRD △

Regulations and You

ACCIDENT SYNOPSES

Note: All aviation accidents are investigated by the Transportation Safety Board of Canada (TSB). Each occurrence is assigned a level, from 1 to 5, which indicates the depth of investigation. Class 5 investigations consist of data collection pertaining to occurrences that do not meet the criteria of classes 1 through 4, and will be recorded for possible safety analysis, statistical reporting, or archival purposes. The narratives below, which occurred between August 1, 2007, and October 31, 2007, are all "Class 5," and are unlikely to be followed by a TSB Final Report.

— On August 6, 2007, a **Cessna 188B** was manoeuvring during an application flight, when the aircraft struck a wire with its vertical fin. The aircraft then crashed into a stand of trees, and sustained substantial damage; there was no post-impact fire. The pilot sustained minor injuries. *TSB File A07C0145.*

— On August 7, 2007, the pilot of a **Hughes 369D helicopter** was about to leave a logging site to refuel, when he was requested to pull a small stump down the hill to a safer position. He noted his fuel quantity and believed he had adequate fuel to complete this job. The pilot hooked onto the choker and pulled backwards downhill, with the helicopter facing uphill in a nose-high attitude, but was unable to move the stump. He began to reposition over the load to release the choker when the engine flamed out and the main rotor RPM began to decrease. Due to the steep terrain, the helicopter contacted the ground and rolled over to the left three times. There was no fire, but the helicopter was substantially damaged. *TSB File A07P0271.*

— On August 18, 2007, a privately-owned **Lake LA-4-200** was taking off from Lake Rosseau, Ont., when, at approximately 40 mph, the aircraft struck a boat wake, bounced, and struck the water hard in a nose-down attitude. Engine power was reduced as the pilot noted water entering through the hull area. The pilot applied power and was heading to shore in an effort to beach the aircraft, but the water level in the aircraft was increasing rapidly. The pilot shut down the engine and electrical power, and all three occupants exited the aircraft and were picked-up by nearby boaters. The aircraft eventually sank. *TSB File A07O0232.*

— On August 18, 2007, a **Cessna 172** was rented from a flying school, and departed the Pitt Meadows, B.C., airport for Squamish, B.C., a flight of about 50 NM through mountainous terrain. The weather at the time of the flight was marginal VFR. Search and rescue (SAR) teams found the accident site in relatively high terrain. There were three survivors, two with serious injuries. The pilot sustained fatal injuries. *TSB File A07P0286.*

— On August 22, 2007, a **Piper Warrior PA-28-151** was on final approach to land at Cape Argos, N.S., for a full-stop landing on a privately-owned turf airstrip.

The pilot flew the approach at 70 kt and full flap for a planned short field landing on Runway 32. The main wheels of the aircraft touched down about one foot short of the runway edge, which tore both main gears rearward, then the aircraft slid to a stop on the runway surface. *TSB File A07A0093.*

— On August 30, 2007, the private pilot of a **Cessna 172N** was conducting night solo circuits in Medicine Hat, Alta. While touching down for a full-stop landing, a mule deer ran in front of the aircraft. The pilot was able to apply the brakes, but unable to avoid contacting the deer at approximately 45–50 knots indicated airspeed (KIAS). The deer hit the front-left portion of the cowling, causing substantial damage to the engine, firewall, and cowling. The pilot was able to maintain directional control, and kept the aircraft on the runway. *TSB File A07W0159.*

— On August 31, 2007, during the turbine cooling period after a **Bell 206 B3 helicopter** landed on a roundwood platform, one of the skids slid off a log while the passengers were unloading their belongings. The back of the helicopter sagged, and the tail rotor touched some dried branches. Since one of the blades was slightly bent, all the dynamic components connected to the tail rotor had to be removed and checked. *TSB File A07Q0177.*

— On September 3, 2007, a **Cessna 140** was taxiing from the Edmonton, Alta., Flying Club ramp to Taxiway Alpha, when the aircraft collided with a tractor attached to a helicopter dolly, which was parked on the access road. The propeller, engine, and cowlings were damaged, but the pilot (sole occupant) was uninjured. *TSB File A07W0160.*

— On September 12, 2007, a **Hughes 369E helicopter** was being used to move exploration crews to and from a base camp situated near MacIntyre Lake, Sask. The pilot picked up three passengers for a flight back to the camp. After takeoff from a confined area, the helicopter descended into the trees and rolled onto its left side. The pilot and passengers were not injured. The helicopter was operating near its maximum gross weight. *TSB File A07C0173.*

— On September 16, 2007, a privately-owned, float-equipped, **BushCaddy L-160** touched down on Wolverine Lake, Ont., and immediately a gust of wind lifted the aircraft off the water surface. A second touchdown attempt was also unsuccessful. The aircraft began to veer towards some cottages near the shoreline, and the pilot managed to get the aircraft to fly over the cottages, before the aircraft pitched nose down and struck the ground. Both occupants evacuated the aircraft and received no injuries. *TSB File A07O0256.*

— On October 2, 2007, the **Back Bone Silver 125 powered parachute** was on takeoff, when the pilot noticed that his aircraft was drifting. He compensated by using the opposite elevator to maintain control of his aircraft, and at the same time, attempted to reposition himself in his harness. While doing this, he accidentally reduced the engine power, and the aircraft stalled at approximately 15 ft above ground. The pilot broke his shoulder. *TSB File A07Q0196.*

— On October 4, 2007, the pilot of a **Champion Aeronca 7AC** tried to start the engine with the propeller because the aircraft is not equipped with a starter. Beforehand, the pilot had put chocks in front of the main wheels. The engine did not start on the first attempts, which led to the need to use the priming pump and readjust the throttle. When the engine started, it was at high power. The main wheels jumped over the chocks and the aircraft turned and struck a parked advanced ultralight. *TSB File A07Q0197.*

— On October 5, 2007, an **EC120B helicopter** was in cruising flight when the engine (a Turbomeca Arius 2) chip detector light turned on. Since the aircraft was only two minutes away from its destination, the pilot continued the flight. A few seconds later, the low engine oil pressure light turned on, followed by the low main rotor rpm warning horn. The pilot conducted an autorotation toward an old logging road. During the flare, the vertical stabilizer under the enclosed tail rotor broke. The aircraft occupants were not injured. The chip detector had turned on three weeks prior to this incident. *TSB File A07Q0198.*

— On October 6, 2007, a **Bell 204C helicopter** was heli-logging when the pilot smelled something burning. The burning smell very quickly became stronger and the helicopter began to rotate. The rotation increased abruptly. The pilot rolled off the throttle and entered an autorotation from about 200 ft above ground level (AGL). The rate of descent increased during the approach, and collective had little effect. The helicopter landed hard in the chosen landing area and was substantially damaged. There was no fire.

The pilot sustained back injuries, but was released from hospital a day later. Inspection of the helicopter revealed that the tail-rotor drive had disconnected from the main transmission. *TSB File A07P0344.*

— On October 11, 2007, the pilot of a **Cessna U206F** was circling Kearns Lake, Ont., to look for a missing boat for an outpost camp. Hunters in the area observed the aircraft circle the lake several times at low altitude. During one tight turn at low altitude and high engine power, the nose of the aircraft dropped and the aircraft struck the lake. The pilot, who was alone in the aircraft, sustained fatal injuries. *TSB File A07C0189.*

— On October 13, 2007, a **Piper J-3 floatplane** stalled while circling a moose at 500–600 ft above ground level (AGL). The pilot increased power, but there was insufficient altitude to avoid hitting the trees. The floats hit the trees first, then the aircraft flipped over. The two occupants were not injured. *TSB File A07Q0206.*

— On October 28, 2007, a **Cessna 172L** took off VFR from Golden, B.C., for Edmonton City Centre, Alta. The weather was poor with low ceilings and visibility. A severe lee wave significant meteorological information (SIGMET) advisory was in effect. The aircraft was located by a ground search in the Redburn Creek, B.C., area about 10 NM north of Golden. The pilot and one passenger were fatally injured. The second passenger sustained serious injuries. *TSB File A07P0369.*

— On October 30, 2007, an **Aerospatiale Astar AS350 D helicopter** was executing longline geodetic surveying operations with a "bird" (an aerodynamically-shaped pod full of electronic gear and sensors carried on a longline). While manoeuvring to regain sight of the sling load, the longline struck the tail rotor; a loss of control ensued. The aircraft was destroyed when it crash-landed in a swamp. The pilot and passenger were not injured. *TSB File A07Q0220.*

— On October 31, 2007, a **Beech 99** was departing from the John F. Kennedy International Airport in New York City, N.Y., for Hamilton, Ont., on a scheduled cargo flight, with two pilots on board. The flight crew were cleared for an intersection takeoff on Runway 31R from Taxiway Echo. On the take-off roll, both pilots heard and felt a single bang, followed shortly after by several more intense noises and bangs. The aircraft was aligned with the runway lights on the right edge of the runway, instead of the runway centerline lights. The crew aborted the takeoff and taxied clear of the runway. Initial inspection revealed damage to the nose landing gear wheel and the propellers. *TSB File A07F0186.* △

DEBRIEF

Goodbye, 121.5: Major Changes Are Coming to the SAR Satellite System on February 1, 2009

by Nancy Lugg, Aerodrome Safety Engineer, Policy and Regulatory Services, Civil Aviation, Transport Canada

On February 1, 2009, the international search and rescue (SAR) satellite system, COSPAS-SARSAT, will no longer process signals from 121.5 or 243 MHz emergency locator transmitters (ELT). Why? As of that date, the system will complete its transition to digital 406 MHz-only technology, which presents a faster, more capable, and more reliable form of distress alerting. The switch to 406 MHz emergency beacons has been made across Canada and around the world by marine and land-based users.

With these changes, after February 1, 2009, the 121.5 MHz ELT from a downed aircraft will not be detected by the satellite system. Alerting of the SAR system could be significantly delayed, adversely affecting the survival of pilots and passengers and causing anguish to friends and families. Since the Government of Canada has an obligation to search for missing aircraft, delayed notification and the possibility of extended visual search missions also strains resources and increases the exposure to risk for SAR personnel, including the Canadian Forces and the volunteers of the Civil Air Search and Rescue Association (CASARA). While equipping aircraft with 406 MHz ELTs ensures uninterrupted access to the COSPAS-SARSAT system, concerns have been expressed by aircraft owners about the high cost to buy and install this equipment.

The International Civil Aviation Organization (ICAO) *Convention on International Civil Aviation*, to which Canada is a signatory, currently requires that aircraft engaged in international operations carry at least one automatic ELT that operates simultaneously on both 406 MHz and 121.5 MHz. Since Canada has an obligation to adopt these standards, Transport Canada's Civil Aviation Directorate convened an Issue Analysis and Risk Assessment Team on February 5, 2007, to determine how the *Canadian Aviation Regulations* (CARs) can best accommodate these changes, while being 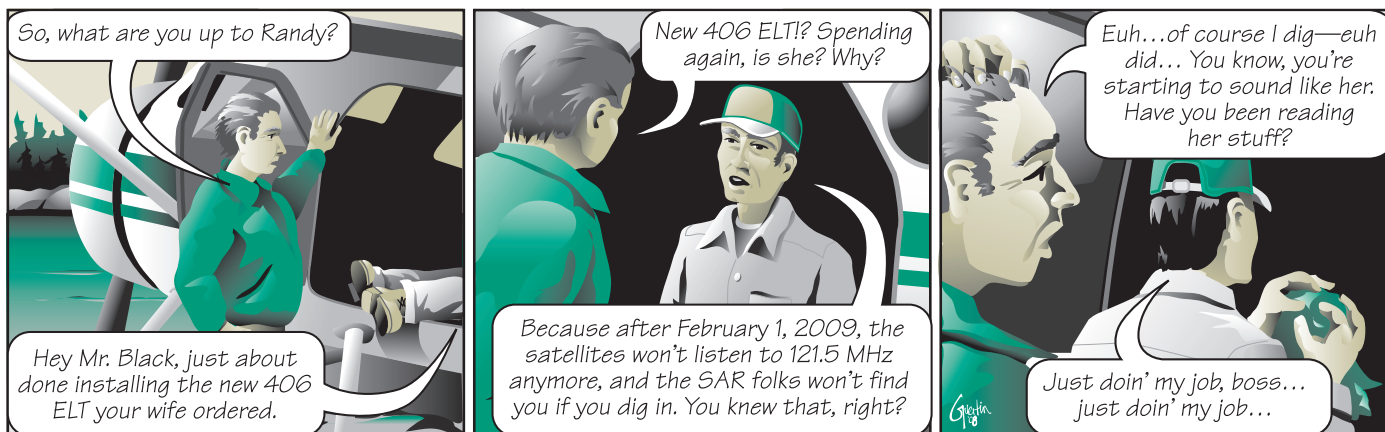responsive to the concerns of the aviation community. This included evaluating alternative technologies for ensuring the prompt notification and location of downed aircraft.
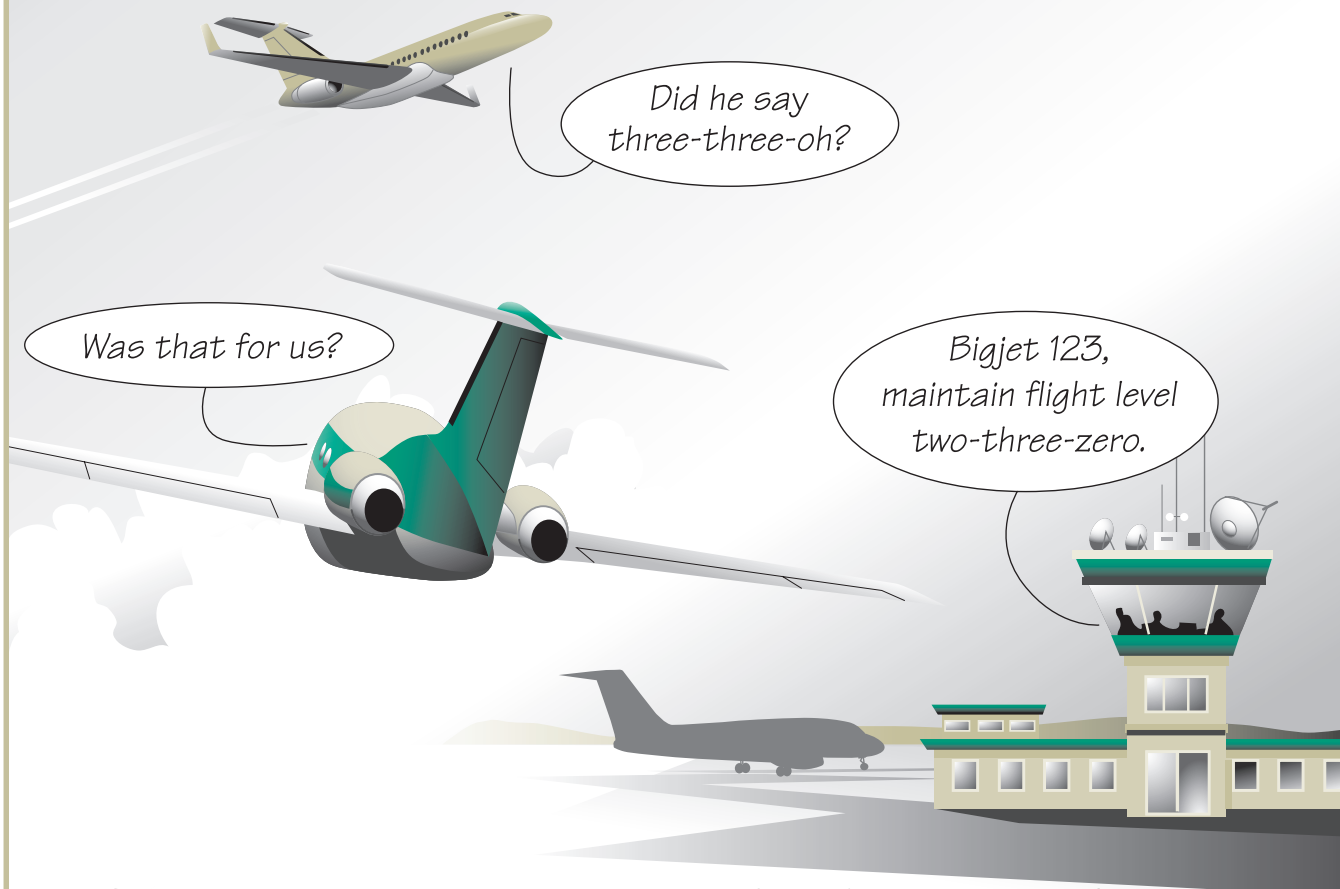
Twenty-eight highly qualified participants from industry and government, having a wide range of technical and operational expertise, met over eighteen formally scheduled meetings between February and June 2007. The Team consisted of representatives from the Canadian Forces, the National Search and Rescue Secretariat (NSS), Transport Canada, the Canadian Owners and Pilots Association (COPA), the Air Line Pilots Association (ALPA), the Air Transport Association of Canada (ATAC), and the Air Canada Pilots Association (ACPA).

Based on the results of their work, Transport Canada has drafted a performance-based regulation to include 406 MHz ELTs as well as acceptable alternative systems. The ultimate objective is to ensure that after February 1, 2009, SAR authorities can continue to be promptly notified of the occurrence and location of an aircraft accident. The proposed changes to the CARs were presented in Ottawa on November 20, 2007, at a special meeting of the Canadian Aviation Regulation Advisory Council (CARAC) Part VI Technical Committee—General Operating and Flight Rules. The regulatory proposal is currently being prepared for submission to the Department of Justice for subsequent publication in the *Canada Gazette*.

Updates on the regulatory process will be covered in future issues of the *Aviation Safety Letter* (ASL), and are available on the CARAC Web site at: www.tc.gc.ca/civilaviation/regserv/affairs/carac/menu.htm. For more information on the COSPAS-SARSAT system and the switch to 406 MHz, visit www.cospas-sarsat.org and the NSS Web site at: www.nss.gc.ca. △

BLACKFLY AIR

So, what are you up to Randy?

Hey Mr. Black, just about done installing the new 406 ELT your wife ordered.

New 406 ELT!? Spending again, is she? Why?

Because after February 1, 2009, the satellites won't listen to 121.5 MHz anymore, and the SAR folks won't find you if you dig in. You knew that, right?

Euh…of course I dig—euh did… You know, you're starting to sound like her. Have you been reading her stuff?

Just doin' my job, boss… just doin' my job…

Communication errors are leading contributors to losses of separation and runway incursions

You can help to prevent them!

- Always use proper phraseology.
- Give full readbacks, including your call sign.
- Reduce multi-tasking while communicating:
  - Pilots—have both crew members listen to clearances whenever possible;
  - Air traffic services—actively listen to readbacks.
- If in doubt—ask! Do not clarify ambiguity within the cockpit and do not use a readback as confirmation.
- If you think a transmission has been blocked, say something.
- Be vigilant for similar call signs on the frequency.
- Do not accept poor communication practices from others—insist on proper phraseology.

Air Traffic Services–Pilot Communications Working Group

TAKE FIVE...

for safety
Five minutes reading
could save a life

Look out — Listen out — Speak out

The risk of mid-air collision is greatest from takeoff to top of climb, and again from start of descent to landing. Don't assume you'll always be able to "see and avoid." You, the pilot, are responsible for your own separation and lookout. These tips will help.

Look out: Stay focused on looking outside.

Don't let routine tasks (programming GPS, paperwork, etc.) or familiarity with an aerodrome cause you to relax your lookout. Consider adopting "sterile cockpit" procedures while climbing or descending. Cockpit activities should focus on lookout.

Complete most checks and briefings prior to descent so you can concentrate on procedures and lookout.

Listen out: Let your ears be your eyes.

Always monitor the recommended or mandatory frequency (MF).

Get on frequency well before entering the aerodrome traffic frequency (ATF) or MF zone to establish traffic awareness.

Monitor the ATF or MF throughout climb and descent.

Speak out: By verbal, visual and electronic means.

Keep others aware of your position.

Transmit initial advisories and updates on the recommended or mandatory frequency giving your position, altitude, intentions and estimated time of arrival (ETA).

Be conspicuous. Select position/strobes/landing lights "ON." Transponders provide ATS and traffic alert and collision avoidance system (TCAS) equipped aircraft with traffic avoidance information. Turn them "ON."

You can make flying safer—remember to:

Look out, Listen out, Speak out.

Canada