Transport Canada Transports Canada

TP 185E
Issue 3/2005

AVIATION SAFETY LETTER

In this Issue...

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

TC-1001617

Canada

The *Aviation Safety Letter* is published quarterly by Transport Canada, Civil Aviation. It is distributed to all holders of a valid Canadian pilot licence or permit, and to all holders of a valid Canadian aircraft maintenance engineer (AME) licence. The contents do not necessarily reflect official policy and, unless stated, should not be construed as regulations or directives. Letters with comments and suggestions are invited. All correspondence should include the author's name, address and telephone number. The editor reserves the right to edit all published articles. The author's name and address will be withheld from publication upon request.

Please address your correspondence to:

Editor
Aviation Safety Letter
Transport Canada (AARQ)
Place de Ville, Tower C
Ottawa ON K1A 0N8
E-mail: ssinfo@tc.gc.ca
Tel: 613 990-1289
Fax: 613 991-4280
Internet: www.tc.gc.ca/ASL-SAN

Reprints of original *Aviation Safety Letter* material are encouraged, but credit must be given to Transport Canada's *Aviation Safety Letter*. Please forward one copy of the reprinted article to the Editor.

Note: Some of the articles, photographs and graphics that appear in the *Aviation Safety Letter* are subject to copyrights held by other individuals and organizations. In such cases, some restrictions on the reproduction of the material may apply, and it may be necessary to seek permission from the rights holder prior to reproducing it. To obtain information concerning copyright ownership and restrictions on reproduction of the material, please contact the Editor.

Sécurité aérienne — Nouvelles est la version française de cette publication.

© Her Majesty the Queen in Right of Canada, as represented by the Minister of Transport (2005).

ISSN: 0709-8103

TP 185E

Publication Mail Agreement Number 40063845

Transport Canada Introduces New *Transact* Web Site!

Transact consists of an online storefront for Transport Canada publications (both free and chargeable) and an e-billing Web site. Watch for a notice accompanying your next invoice, inviting you to pay those invoices online, 24 hours a day, through a secure connection from anywhere with Internet access. Once registered in *Transact*, you can also change your billing address, sign up for e-mail notification of invoices, print receipts, order or download publications, and more.

For further information on *Transact*, visit our Web site at www.tc.gc.ca/transact/ or call 1 866 949-2262. △

Transact: It is easy to use, convenient and secure.

WELCOME MESSAGE

I am pleased to introduce the first edition of Civil Aviation's "new" *Aviation Safety Letter* (ASL).

In an effort to broaden the scope of safety messages across aviation disciplines and to reach a larger audience, we have combined articles that would previously have been released in separate newsletters and communiqués—such as the *Aviation Safety Vortex*, the *Aviation Safety Maintainer* and the *Airspace Newsletter*—into one publication; the new ASL.

Building on over 30 years of excellence in safety communication, I have full confidence that the new ASL will continue to deliver meaningful, practical and timely safety messages. Everyone has a valuable story to tell to stimulate safety dialogue, so I encourage you to continue to contribute your stories to make this new publication as successful as its predecessors.

Aviation is a complex and interdependent system. Errors committed in one area can quite often have an effect on another. In today's aviation environment of managing safety risks to acceptable levels, it is critical that all aviation disciplines communicate with and learn from each other. These are important steps towards improving safety and enhancing the public's confidence in the safety of Canada's aviation system.

Merlin Preuss
Director General
Civil Aviation

Table of Contents

Doing two jobs while flying

Dear Editor,

I have been flying VFR for more than 10 years. I fly from the Buttonville Airport, and about one third of my flying time is spent below the floor of the Lester B. Pearson International Airport class C airspace. In these 10 years, the most important lesson I have learned is that flying VFR is all (more than 90%) about looking for others who are having fun, as I am.

These days, I see more planes than ever before, though the number of flights and planes in this part of the country hasn't changed significantly in the last 10 years. Even if one tries their best, they will probably miss a plane or two passing by too close; flying VFR takes a little bit of luck as well.

Here is one of my experiences: I am on the right base and the controller tells me, "you are number three, one is on the final and the other is on the left base," and I can't see either of them. Now, how is one going to see it in uncontrolled airspace, where a plane can come from any direction at a closing-in speed of up to 300 ft/s? Despite all this, mid-air collisions are rare, thanks to the "third dimension," which is not available to highway drivers.

I am writing all this to discuss the job of the traffic-reporting pilot, who single-handedly flies the plane, observes the highway/city traffic, communicates with the base, and broadcasts the details of the traffic accidents, police car and tow truck arrival, lane closures, etc. Are these pilots from a special breed, or do they hold a special license allowing them to do two jobs at once?

Three years ago, here in Toronto airspace, one of those special pilots rear-ended another aircraft; fortunately, the contact was minor and both aircraft were able to land safely. As I recall, the occurrence report did not consider the fact that the pilot was doing two jobs, and that he didn't have enough time to watch for air traffic. The message should be clear: if you want to report highway traffic, hire a pilot; if you want to fly, hire a traffic reporter—these are two different full-time jobs.

Mario Gasparovic
Scarborough, Ont.

For those interested in reading more about this accident, it was discussed in ASL 3/2002, and refers to Transportation Safety Board of Canada (TSB) file A00O0057. —Ed.

Pilots still prefer paper

Dear Editor,

Call me old fashioned, but I am genuinely concerned about the end of the *A.I.P. Canada* (AIP) in its current format, with the amendment service. I was told that going to a Web-based service was in the best interest of the larger pilot group and was preferred by most pilots, as they did not like adding the paper amendments to their AIP. I do not often refer to my AIP, but I am kept up to date of all the latest changes while adding the dreaded amendments.

My previous employer provided all pilots with their own *Flight Crew Operating Manual* (FCOM). The amendments were frequent, and I am sure that none of the pilots, myself included, enjoyed adding them. However, during the process of updating the manuals you would be brought up to date on all the changes. At the company where I currently work, the pilots are not issued with a paper copy of the FCOM, but are issued a CD. Every time there is an amendment, the pilots are issued with a new CD, and the old one goes in the garbage. I am embarrassed to say that the new CD often tends to go to the office unopened. It may truly be the most convenient way, but I believe it is very counterproductive to the process. The other problem with a CD is that it is not the preferred way to "study." A book in your lap is still preferred by most pilots. Looking up information on a Web-based product is quick and easy with search engines. Looking it up in the paper copy is not as easy but the side benefit is that you tend to get a lot more information than you initially bargained for as you fumble your way through the manual searching for the tidbit you need.

I can see that there is going to be some cost saving associated with making these changes, but I do not agree that this is an improvement in the supply of information services, as stated in the *Aeronautical Information Circular 5/05*. I think the pilot group would be better informed with the AIP as it was, than under the new system.

Bob Austin
Coldwater, Ont.

Thank you. ASL Issue 2/2005 had an article on page 4, which explained the transition from the current AIP to the NAV CANADA State AIP and the Transport Canada Aeronautical Information Manual *(TC AIM) in detail. The Transport Canada AIM will remain available in a paper version and both the Web and paper versions will have an explanation of the changes made with every new edition. This should ensure every pilot has easy access to the pertinent information. —Ed.*

PRE-FLIGHT

Geoff Goodyear Wins the Transport Canada Aviation Safety Award

Mr. Geoff Goodyear of Newfoundland and Labrador has received the 2005 Transport Canada Aviation Safety Award for his commitment to accident prevention. The award was presented to Mr. Goodyear on April 19 at the 17th annual Canadian Aviation Safety Seminar (CASS) in Vancouver.

"Mr. Goodyear's contribution to aviation safety has been demonstrated over many years," said Transport Minister Jean C. Lapierre. "He has shown a strong commitment and exceptional dedication through the promotion of safe operating practices in a wide-ranging aviation career."

Mr. Goodyear is currently president and chief operating officer of Universal Helicopters Newfoundland Limited. Over the years, Mr. Goodyear's leadership on safety issues has spread throughout the Canadian aviation community by way of his role as founding chair of the Helicopter Association of Canada Safety Committee; long-standing director and past chairman of the Helicopter Association of Canada; co-chair of the Safety Sub-Committee and vice chairman of the NAV CANADA Advisory Committee;

Mr. Geoff Goodyear delivering his acceptance speech at CASS 2005.

contributing editor to *HELICOPTERS Magazine*; and as a guest speaker at numerous aviation events. △

Call for Nominations for the 2006 Transport Canada Aviation Safety Award

Do you know someone who deserves to be recognized?

The Transport Canada Aviation Safety Award was established in 1988 to foster awareness of aviation safety in Canada, and to recognize individuals, groups, companies, organizations, agencies or departments that have contributed to this objective in an exceptional way.

You can obtain an information brochure explaining award details from your Regional System Safety Offices, or by visiting the following Web site: www.tc.gc.ca/CivilAviation/SystemSafety/brochures/tp8816/menu.htm.

The closing date for nominations for the 2006 award is December 31, 2005. The award will be presented during the 18th annual edition of the Canadian Aviation Safety Seminar, CASS 2006, which will be held at the Casino Nova Scotia, in Halifax, N.S., April 24–26, 2006.

CASS is an international event organized annually by Transport Canada for all sectors of the aviation community. It features safety workshops and presentations by leading Canadian and international safety experts. For more information about CASS, visit the following Web site: www.tc.gc.ca/CASS. △

The Canadian Business Aviation Association Column

The Canadian Business Aviation Association (CBAA) is pleased to become a regular contributor to the *Aviation Safety Letter* by furnishing regular articles of interest to the aviation community.

The CBAA was incorporated in 1962. Our mission is to represent and promote the Canadian business aviation community globally, advocating safety, security and efficiency. Our vision is to:

- foster safety, security, efficiency, and innovation for Canada's business aviation community;
- lead in the utilization of performance-based concepts;
- promote a regulatory and policy environment which fosters the growth of business aviation;
- adapt and align our resources and systems to grow and serve our membership; and
- promote the value of business aviation and shape its distinctive identity.

Since January 2003, the CBAA, in collaboration with Transport Canada (TC), has become the issuing authority in Canada for private operator certificates (POC). With funding assistance from TC, extensive studies were completed that validated the feasibility and created a framework that would allow the CBAA to manage private operator certification under *Canadian Aviation Regulation* (CAR) 604. These activities were managed and directed by the CBAA through a team of experts who created a concept, communicated and consulted with the operators, and developed an implementation plan. Following comprehensive implementation by CBAA staff, the transition of private operator certification from TC to the CBAA was authorized.

Fundamentally, the CBAA POC Program requires operators to develop a performance-based safety management system (SMS) that is verified through an independent audit process. The CBAA's mandate is to develop and manage procedures to:

- ensure that approved standards are available to all operators;
- certify operators to the approved standards;
- verify operator compliance through audits;
- consider applications for exemptions and deviations;
- suspend and/or cancel operator certificates for cause;
- provide operators with an appeal process if their certificates are suspended or cancelled;
- publish the standards and procedures in both official languages;
- collect and analyze safety data and indicators; and
- refer cases of non-compliance with the business aviation operational safety standards to the Minister.

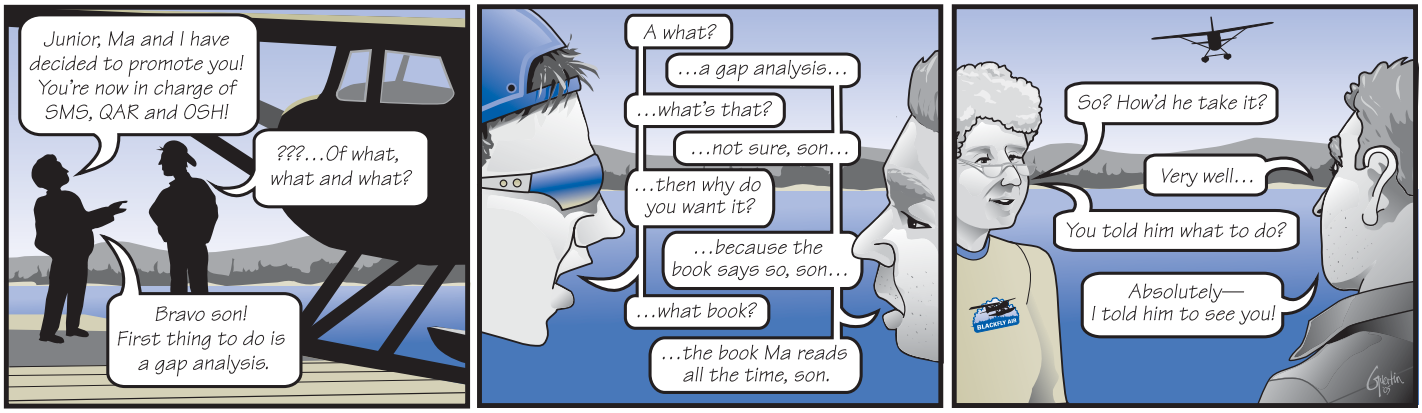
This program of performance-based standards linked to an SMS is designed to manage the risks associated with the business aviation operating environment and to be flexible enough to meet the particular needs of operators in a wide range of operations. It allows TC to re-assign human and financial resources to areas with demonstrated higher levels of risk. When the Minister of Transport is of the opinion that the systems and procedures established and maintained by the CBAA have deficiencies that represent a threat to aviation safety, the Minister may issue a directive to the CBAA to take the necessary corrective measures.

The planned project objectives have been achieved on time and within budget. There are over 180 POCs that have been issued by the CBAA. The success of the CBAA POC Program validates the merit of the directives announced in the National Civil Aviation Management Team's *Flight 2005: A Civil Aviation Safety Framework for Canada* (TP 13521).

The cornerstone of the CBAA POC Program is the establishment of a systematic, effective and appropriate flight department management system, commonly known as SMS. The premise of the POC Program is that proactive operator involvement will achieve the gains in safety and efficiency required for the road ahead in this ever-changing environment.

The CBAA hopes to share its experiences with the POC Program in forthcoming issues of the *Aviation Safety Letter*. △

BLACKFLY AIR ON SMS



Another Look at the Safety Management System (SMS) "Gap Analysis"

It is very rewarding to witness the goodwill of *Blackfly Air* managers in their attempt to implement an SMS. This time, they are tackling the need for a thorough gap analysis. Here are some expanded thoughts on this important SMS tool.

Management commitment and a company policy are needed to get the "ball rolling." Once you have a good understanding of the required components for an SMS, you can start to plan the development of your system. To start with, find out what components and elements you already have in place and identify the elements that are missing. This is called a gap analysis, and is an excellent way to identify the areas you will need to address. It is also one of Transport Canada's requirements for the initial SMS certification process. You can use one of the self-assessment tools in the toolkit to help with this analysis. With a documented list of items that are required to meet the SMS regulations, you can plan how you intend to develop your own system.

The components and processes can then be put in place following the Transport Canada three-year phase-in approach described in the toolkit.

For further information, consult *Safety Management Systems for Small Aviation Operations—A Practical Guide to Implementation* (TP 14135), and *Safety Management Systems for Flight Operations And Aircraft Maintenance Organizations—A Guide to Implementation* (TP 13881). △

Aircraft Owners—The Importance of a Correct Address

by Bobbie Rawlings, Aircraft Registration Specialist, Aircraft Registration and Leasing, General Aviation, Civil Aviation, Transport Canada

There are several reasons for keeping one's mailing address up-to-date.

First of all, it is the law. *Canadian Aviation Regulation* (CAR) **202.51** states, "Where the name or address of a registered owner of a Canadian aircraft changes, the registered owner shall, by not later than seven days after the change, notify the Minister in writing of the change."

The Canadian Civil Aircraft Register Computer System-Evolution (CCARCS-E) is a live database. Changes made in the system are available immediately. CCARCS-E supports several mailings from various Divisions of Transport Canada. Airworthiness Directives (AD), Annual Airworthiness Information Reports (AAIR), Service Bulletins (SB), and other types of information that pertain to aircraft owners, their aircraft and the safety of flight in Canada, are mailed using CCARCS-E. If an aircraft owner does not adhere to CAR 202.51, then the information in CCARCS-E is outdated. When information is mailed to the owner, it will not reach them and will be returned to Transport Canada. This important safety information is not getting to the appropriate destination. This also incurs added costs for mailing, time to locate the aircraft owner, and to update CCARCS-E with the correct information.

With up-to-date information, Transport Canada can ensure that aircraft owners in Canada will be notified of safety information pertaining to their aircraft. △

A Photocopy is Good Enough or… "How Much Could Have Changed in Five Years?"

What's the problem?

Out-of-date publications can be a killer, or at a minimum, they can cause confusion and embarrassment. Make sure that your maps and *Canada Flight Supplement* (CFS) are current. Failure to do so can have some nasty consequences.

Frequencies, obstructions, availability of fuel, and even the airport itself can change from issue to issue.

A couple of years ago at a western Canadian airport, a Saab 340, with 20 people on board, had a close encounter of the first kind with an R 22 helicopter. The helicopter pilot had not been in communication with any agency at the airport, and when asked about the error of his ways after he landed, the pilot stated that he had called on the frequency listed in his GPS, but had received no reply, so he pressed on. The frequency he called on had changed three years before, and his GPS data had not been updated in four years.

In another instance, the pilot called 1 mi. final at an airport served by a flight service station (FSS). The FSS specialist acknowledged the call, but when the pilot called on the ramp shutting down, the specialist was unable to visually spot the aircraft. After much discussion, it was determined that the aircraft had landed at an old decommissioned airport located 16 km away. The pilot had a very old map.

What's the solution?

1. Consider the cost of subscriptions as an investment in your personal safety. The CFS is $99.00, plus applicable taxes and handling charges, for a seven-issue subscription (see page A6 of the CFS). Additional information on publications and maps is available in the CFS General section, or in the MAP section of the Transport Canada *Aeronautical Information Manual* (TC AIM). Remember, the CFS update is issued every 56 days. The information depicted on VFR charts is also constantly changing, but at present is not revised on a fixed cycle basis, although this is a long-term objective. The VFR Chart Updating Data section of the CFS (found in the Planning section) provides a means of notifying VFR chart users of significant changes. How current are your charts or publications? Does the company you work for provide you with the latest in charts and publications? If not, why?

2. Add "publications—date valid" to your pre-flight checklist. If you find they are out of date, get a current issue, or as an interim measure, go into the nearest FSS and check yours against theirs.

3. Destroy all publications that have expired so that no one else can use them and get caught in a deadly trap. △

Aviation Meteorology Tip for Pilots! ATC Weather Assistance

from the Transport Canada Aeronautical Information Manual *(TC AIM), MET 1.3.8*

ATC will issue information on significant weather and assist pilots in avoiding weather areas when requested. However, for reasons of safety, an IFR flight must not deviate from an assigned course or altitude/flight level without a proper ATC clearance. When weather conditions encountered are so severe that an immediate deviation is determined to be necessary, and time will not permit approval by ATC, the pilot's emergency authority may be exercised. However, when such action is taken, ATC should be advised as soon as practicable of the flight alteration.

When a pilot requests clearance for a route deviation or for an ATC radar vector, the controller must evaluate the air traffic situation in the affected area and co-ordinate with other controllers before replying to the request when ATC operational boundaries have to be crossed. It should be remembered that the controller's primary function is to provide safe separation between aircraft. Any additional service, such as weather avoidance assistance, can only be provided to the extent that it does not detract from the primary function. Also note that the separation workload for the controller generally increases when weather disrupts the usual flow of traffic. ATC radar limitations and frequency congestion is also a factor in limiting the controller's capability to provide additional services. *For additional information, consult your TC AIM MET Section.* △

RECENTLY RELEASED TSB REPORTS

The following summaries are extracted from Final Reports issued by the Transportation Safety Board of Canada (TSB). They have been de-identified and include only the TSB's synopsis and selected findings. For more information, contact the TSB or visit their Web site at www.tsb.gc.ca. —Ed.

TSB Final Report A02Q0005—Collision with Terrain

On January 20, 2002, a Piper PA-28-161 took off from Gaspé, Que., at 16:30 Eastern Standard Time (EST) on a flight to Québec, Que., making a night flight in accordance with VFR. At 16:35 EST, the pilot notified the Québec flight service station (FSS) that he was 5 NM west of the Gaspé airport and confirmed that he was going to the en route frequency. That was the last message received from the aircraft. The plane was reported missing after its flight plan expired. Almost 11 months later, on December 8, 2002, an airliner flying high over the area of L'Ascension-de-Patapédia, N.B., picked up a signal from an emergency locator transmitter (ELT). The search and rescue (SAR) team dispatched to the site identified the missing aircraft. The two occupants were fatally injured; the aircraft was destroyed.

Findings as to causes and contributing factors

1. The pilot's lack of experience, combined with poor weather conditions, resulted in spatial disorientation that led to a loss of control.

Other findings

1. The ELT did not transmit an emergency signal, probably because debris struck the reset button, interrupting transmission. This could have had serious consequences had there been any survivors.

2. Having a global positioning system (GPS) on board possibly affected the pilot's decision to take off even though poor VFR conditions were forecast along the route.

TSB Final Report A03P0194—Collision With Terrain

On July 16, 2003, at about 12:10 Mountain Standard Time (MST), a four-engine Lockheed L-188 Electra took off from Runway 16 at the Cranbrook Airport, B.C. Two pilots were on board to conduct a fire-management mission on a small ground fire 2 NM southwest of the township of Cranbrook. Seven minutes earlier, the partner "bird dog" aircraft, a Turbo Commander, also departed Cranbrook to assess the appropriate aircraft flight path profiles and to establish the most suitable fire-retardant delivery program for the ground fire.

Following the flight path demonstrations by the bird dog aircraft, the Electra proceeded to carry out the retardant drop on the fire. After delivering the specified retardant load, the Electra was seen turning right initially then entering a turn to the left. At 12:21 MST, the Electra struck the terrain on the side of a steep ridge at about 3 900 ft above sea level. The aircraft exploded on impact and the two pilots were fatally injured. An intense post-crash fire consumed much of the wreckage and started a forest fire at the crash site and in the surrounding area. The on-board ELT was damaged by the impact forces and did not activate.

The Electra seen delivering retardant to target fire moments prior to the accident.

Findings as to causes and contributing factors

1. For undetermined reasons, the Electra did not climb sufficiently to avoid striking the rising terrain.

2. Given the flight path and the rate of climb chosen, a collision with the terrain was unavoidable.

3. The characteristics of the terrain were deceptive, making it difficult for the pilots to perceive their proximity and rate of closure to the rising ground in sufficient time to avoid it.

Other findings

1. Performance calculations show that the Electra—in the absence of limiting mechanical malfunction—could have climbed at a rate that would have allowed the aircraft to avoid the terrain.

2. Although a functional cockpit voice recorder (CVR) was installed in the aircraft, it was not required by regulation and it was not used; as a result, vital clues that could have shed light on the circumstances of this accident were not available.

3. The ELT could not transmit a signal as a result of severe impact forces that exceeded the design criteria.

TSB Final Report A03P0199—Collision with Terrain

On July 18, 2003, a Cessna 172M departed Boundary Bay Airport, B.C., at 18:48 Pacific Daylight Time (PDT). There was a flight instructor, a student pilot, and an observer on board to conduct mountain flying training in the areas around Stave Lake and Harrison Lake. About one hour later, during a practice forced approach conducted west of Harrison Lake, the aircraft struck the ground and was destroyed. There was no fire. The two front seat occupants were seriously injured, and the rear seat occupant received minor injuries. An emergency locator transmitter (ELT) signal was reported about three hours after the accident, and the aircraft was located about 24 NM north-northwest of Harrison Hot Springs, B.C. All three occupants were evacuated from the site by helicopter.

Findings as to causes and contributing factors

1. The instructor did not brief the student on forced-approach procedures and allowed the student to continue the forced approach to a height from which the aircraft could not avoid rising terrain.

2. The aircraft was near gross weight, which, combined with the effects of altitude, outside air temperature, and aggressive manoeuvring, degraded the aircraft's ability to out-climb the terrain.

Other findings

1. Shadows and lack of visual cues, such as trees, in the area of the forced approach may have adversely affected the pilot's ability to estimate the aircraft's height above ground.

2. The risk of a fuel-fed post-crash fire was significant; ejection of the aircraft's battery eliminated one potential ignition source.

Safety action taken

As a result of this accident, the flight school has made the following changes:

1. Aircraft will no longer be dispatched into the mountains in the evening;

2. Safe flying limits for mountainous terrain have been established.

TSB Final Report A03H0002—Collision with Terrain

On September 11, 2003, at 20:57 Eastern Daylight Time (EDT), a Cessna 208B Caravan departed Pickle Lake, Ont., for Summer Beaver, Ont., on a charter flight with seven passengers and one crew member. The flight proceeded on a direct routing to destination at 3 500 ft above sea level, under night visual flight conditions. On approach to Summer Beaver, the aircraft joined the circuit on a downwind leg for a landing on Runway 17. When the aircraft did not land, personnel at Summer Beaver contacted the Pickle Lake flight dispatch to inquire about the flight. The aircraft was declared missing following an unsuccessful radio search by the Pickle Lake flight dispatch staff. Search and rescue personnel found the wreckage in a wooded area 3 NM northwest of Summer Beaver. The aircraft had been nearly consumed by a post-crash fire. All eight people on board had been fatally injured.

Findings as to causes and contributing factors

1. The aircraft departed controlled flight and struck terrain for undetermined reasons.

Findings as to risk

1. The company's flight-following procedures for flights operating in remote areas were impractical and were not consistently applied; this could compromise timely search and rescue operations following an accident.

Other findings

1. The aircraft did not carry flight recorders. Lack of information about the cause of this accident affects the TSB's ability to identify related safety deficiencies

and to issue safety communications intended to prevent accidents that could occur under similar circumstances.

TSB investigator analysing the Cessna Caravan's propeller.

Safety action taken

1. Flight instruments—The operator has provided maintenance personnel with additional training for handling gyro instruments.

2. Emergency locator transmitter (ELT) maintenance requirements—The operator has revised its tracking of ELT maintenance requirements.

3. Flight following capability—Prior to the accident, the company had started to equip their aircraft with an automatic tracking system. This system updates aircraft position every three minutes and allows operations dispatchers to track the location of an aircraft throughout the duration of its flight. Since the accident, this modification has been completed on all but two of the company's aircraft.

4. Crew requirements on passenger flights—Although not required by regulation, the company has instituted a policy of crewing all passenger flights with two pilots.

TSB Final Report A03O0273—Runway Excursion

On September 26, 2003, an Astra SPX aircraft, with two crew and four passengers on board, was landed on Runway 05 at Toronto/Lester B. Pearson International Airport at 18:26 Eastern Daylight Time (EDT). As the nose wheel touched down, a severe nose wheel shimmy developed, and the flight crew had difficulty controlling the aircraft. As the flight crew attempted to steer the aircraft, an uncommanded full-left steering input was experienced, and the aircraft began to veer to the left. The first officer attempted to turn the steering control to the right, but was unable to move the control. The flight crew attempted to correct for the full-left input using differential braking and reverse thrust, but were unable to keep the aircraft on the runway. The aircraft skidded off the north side of the runway and came to rest in the infield between Runway 05 and Taxiway Juliet, just before the intersection at Runway 15R.

The captain contacted the tower and requested emergency services. Meanwhile, the first officer exited the aircraft to check for damage and to ensure there was no further danger to crew or passengers. Assessing the situation to be safe, the first officer re-entered the aircraft, and the flight crew and passengers waited for emergency services to arrive. There was minor damage to the aircraft.

Findings as to causes and contributing factors

1. It is most likely that the occurrence aircraft was towed beyond the steering limits with the scissors connected, resulting in the fracture of the upper bracket.

2. A nose wheel shimmy on landing stressed the remaining lower attachment bracket to overload and failure, which allowed the steering assembly and nose gear to rotate uncontrollably.

3. The aircraft became uncontrollable and exited the runway after the steering assembly failed.

Findings as to risk

1. Although the aircraft manuals caution against exceeding steering limitations with the scissors connected, there are no external markings which identify the steering limitations of the aircraft nose gear.

Other findings

1. Although Service Bulletins (SB) were issued that might have prevented the initial failure, there was no regulatory requirement to comply with them.

Safety action taken

On October 21, 2003, the State of Israel, Ministry of Transportation, Civil Aviation Administration, issued *Airworthiness Directive* (AD) 32-03-10-05, effective October 28, 2003, requiring a one-time inspection of the upper and lower steering assembly brackets within 50 flight hours or 25 landings, whichever comes first. This AD was endorsed by Transport Canada on November 17, 2003.

TSB Final Report A03O0285—Engine Power Loss—Forced Landing

On October 9, 2003, at approximately 13:00 EDT, a Cessna 172N aircraft departed from the Toronto/Buttonville Municipal Airport on a sightseeing flight over Toronto, Ont. The pilot and three passengers were on board. Before takeoff, an engine ground run revealed no anomalies. The pilot applied full power for the takeoff, climbed to an altitude of 2 000 ft ASL (1 300 to 1 400 ft above ground), levelled off, and selected the Toronto/City Centre Airport tower radio frequency. Shortly after that, the engine (Lycoming O-320-H2AD) began to lose power. The pilot informed the tower of the power loss and the intention to return to the Toronto/Buttonville Municipal Airport.

Trying to regain power, the pilot ensured that full throttle was selected, checked the positions of the primer and magnetos, and switched fuel tanks. When these attempts were unsuccessful, the pilot selected the carburettor heat to the hot position, observed a further decrease in engine power, and reset the carburettor heat to the cold position. The engine was not producing enough power to maintain level flight and return to the airport, so the pilot searched for a suitable location for a forced landing. The aircraft was over a densely populated area, and the only suitable clearing was surrounded with trees and nearby buildings. The engine lost power on final approach. The pilot selected the flaps to the full-down position, overflew the clearing, and stalled the aircraft into the trees. The aircraft was substantially damaged and one passenger received minor injuries.

Findings as to causes and contributing factors

1. Ambient temperature and dew point conditions during the flight most likely resulted in carburettor icing, which caused the engine to lose power.

2. When the engine began to lose power, the pilot applied carburettor heat, but noted it resulted in a further decrease in engine power and selected the carburetor heat off. The heat was not on long enough to remove any ice.

Other findings

1. The pilot was unable to find a suitable landing area and intentionally stalled the aircraft into the trees, resulting in substantial damage to the aircraft.

TSB Final Report A03O0341—Loss of Control After Takeoff

On December 16, 2003, at approximately 09:00 EST, the pilot arrived at the airstrip and prepared the ski-equipped de Havilland DHC-3 (Otter) aircraft for the morning flight. This Otter was equipped with a turbine engine. Two passengers, with enough supplies for an extended period of time, including a snowmobile and camping gear, were to be flown to a remote location. The pilot loaded the aircraft and waited for the weather to improve. At approximately 12:00 EST, the pilot and passengers boarded the aircraft and took off in an easterly direction. The aircraft got airborne near the departure end of the airstrip, and shortly after takeoff, the right wing struck a number of small bushes and the top of a birch tree. The aircraft descended and struck the frozen lake surface, approximately 70 ft below the airfield elevation in a steep, nose-down, right-wing-low attitude. When it came to rest, the aircraft was inverted and partially submerged, with only the aft section of the fuselage remaining above the ice. All of the occupants were wearing lap belts. The pilot and front seat passenger received fatal injuries. The rear seat passenger survived the impact and evacuated the aircraft with some difficulty due to leg injuries. The following morning, about 22 hr after the accident, a local air operator searching for the missing aircraft located and rescued the surviving passenger.

Findings as to causes and contributing factors

1. The pilot attempted to take off from an airstrip that was covered with approximately 18 in. of snow, and the aircraft did not accelerate to take-off speed because of the drag; the aircraft was forced into the air and was unable to climb out of ground effect and clear the obstacles.

2. The pilot did not abort the takeoff when it became apparent that the aircraft was not accelerating normally and before the aircraft became airborne.

Findings as to risks

1. Unidirectional G switches, which are found on many types of ELTs, do not always activate the unit when impact forces are not aligned with the usual direction of flight.

Other findings

1. The validity of the aircraft's certificate of airworthiness was affected while it flew more flights than allowed by the ferry permit issued by Transport Canada.

2. The rear passenger seat was found to be installed incorrectly, contrary to de Havilland *Alert Service Bulletin* A3/49, dated 19 July 1991.

TSB Final Report A04C0064—In-flight Break-up / Collision With Terrain

On March 20, 2004, the Baby Belle amateur-built helicopter departed from a farm located near Ralph, Sask., on a local VFR flight. The purpose of the flight was to inspect grid road and highway intersections for snow accumulation.

Shortly after takeoff, debris began to fall from the helicopter while it was flying in a northwesterly direction at approximately 500 ft AGL. The helicopter dropped vertically; the nose pitched down; and the helicopter, while in a steep, nose-down attitude, crashed on a farm field. The pilot, the sole occupant, was fatally injured. The helicopter was destroyed by a post-impact fire. The accident occurred at approximately 10:00 Central Standard Time (CST).

Findings as to causes and contributing factors

1. Separation of the tail-rotor blade during a previous flight had induced an excessive amount of vibration in the stabilizer, resulting in bending of the horizontal stabilizer spar.

2. Cold straightening the stabilizer spar, which was not a recommended maintenance practice, concentrated stresses at the first rivet hole, resulting in fatigue cracking. Subsequent tail-rotor strikes aggravated localized stress concentrations.

3. Separation of the horizontal stabilizer resulted in a loss of control and in a sudden upward pitch of the tail boom, resulting in the bending of the rotor blades, and causing interference of the tail-boom structure with the rotor disc.

Findings as to risk

1. Installation of the end cap at the root end of the stabilizer spar hid the fatigue crack.

Other findings

1. No record of the stabilizer spar repair was found in the maintenance records, contrary to the *Canadian Aviation Regulations* (CARs).

Safety action taken

The TSB completed and distributed an occurrence bulletin to the manufacturer and to recreational aircraft organizations, advising of the stabilizer failure.

The manufacturer of the Baby Belle kit has issued a technical bulletin informing operators of the occurrence and of the recommended inspection criteria. The bulletin also advises operators to comply with the design by removing the end cap, if installed, at the root end. △

"Aviation in itself is not inherently dangerous. But to an even greater degree than the sea, it is terribly unforgiving of any carelessness, incapacity or neglect."

— Captain A. G. Lamplugh, British Aviation Insurance Group, London. Circa early 1930's.

ACCIDENTS INVOLVING CANADIAN-REGISTERED AIRCRAFT: JANUARY TO MARCH 2005

Source: Transportation Safety Board of Canada (TSB).
Occurrence summaries have been edited for space.

Date, Occurrence Number and Classification	Province or Country of Occurrence	Damage Level	Fatalities/ Injuries	Aircraft Type Make/Model	Occurrence Summary
3-Jan-05 A05P0002 Class 5	British Columbia	None	1 serious injury	Aeroplane Boeing 737-200 Aeroplane Shorts SD3-60	A customer service attendant on the ramp at Victoria, B.C., was exposed to the jet exhaust blast of a departing Boeing 737. The attendant perceived a signal to proceed and crossed behind the jet. The jet blast threw her about 10 ft to the ground. The direction that the jet was parked made it necessary for the pilot to apply thrust into an area where other aircraft were parked.
6-Jan-05 A05P0007 Class 5	British Columbia	Substantial		Aeroplane Cessna 182P	On an IFR flight to Boundary Bay, B.C., the aircraft began accumulating airframe ice at a rate that concerned the pilot. The flight diverted to Nanaimo, B.C., for an approach to Runway 16. A missed approach was initiated due to low visibility. The aircraft stalled, but a recovery was made. In an attempt to clear terrain and trees ahead, a second stall was induced, resulting in contact with the trees. A forced landing was made into a soft field beyond the trees. The aircraft was damaged but all occupants were restrained by lap belts with shoulder straps and were not injured.
7-Jan-05 A05O0005 Class 5	Ontario	Substantial		Aeroplane Cessna 185A	The Cessna landed at the St. Catharines, Ont., airport on Runway 24 and started a ground loop at Taxiway B. The right wing touched the ground and the aircraft righted itself, facing the grass. The pilot shut the aircraft down, got out and pushed the aircraft onto the taxiway, re-started the aircraft and taxied to the ramp. There was substantial damage to the right wing.
10-Jan-05 A05C0008 Class 5	Manitoba	Substantial		Aeroplane Cessna 185F	The Cessna departed on a wildlife survey flight with three on board. A little over an hour later, at an altitude of 400 to 500 ft AGL, the engine emitted a loud bang, followed by a slight vibration and a complete loss of power. The pilot turned the aircraft towards a swampy snow-covered clearing, pumped the wheel skis part-way down, and extended partial flap to slow the aircraft just before landing. The forced landing resulted in damage to the propeller and wing leading edges. The occupants were not injured.
15-Jan-05 A05O0011 Class 5	Ontario	Substantial		Aeroplane Piper PA-22-160 Aeroplane Beech 23	The Piper was standing with the engine running when the pilot exited to guide a friend who was taxiing in a second aircraft. When he was about 25 ft away from his aircraft, he turned around and observed it moving towards him. He attempted to enter it to regain control, but could not open the cockpit door. The uncontrolled aircraft struck a parked Beech 23, damaging the horizontal stabilizer with its propeller and engine cowling. Both aircraft sustained substantial damage. The pilot reported locking the throttle at idle position and setting the parking brake before exiting the aircraft.

Date, Occurrence Number and Classification	Province or Country of Occurrence	Damage Level	Fatalities/ Injuries	Aircraft Type Make/Model	Occurrence Summary
17-Jan-05 A05O0008 Class 5	Ontario	Substantial		Aeroplane Cessna 421C	On departure from Peterborough, Ont., the red "in transit" light remained on when the gear was selected up. The gear was recycled several times and checklist items were completed, but the pilot could not get a down and locked indication for the right main gear. The pilot declared an emergency and continued to Toronto, Ont. In Toronto, ATC said that the gear appeared fully extended. Prior to landing, the right engine was shut down and the propeller feathered. On landing, the pilot kept the aircraft on the left main and nose gear as long as possible, but as the weight settled onto the right gear, it began to collapse. The aircraft came to a stop on the runway, resting on the right wing tip. There were no injuries, and damage was limited to the right wing, aileron, and flap.
21-Jan-05 A05O0017 Class 5	Ontario	Substantial		Aeroplane Cessna 185F	A Cessna with Tundra tires was en route to Moosonee, Ont. About 10 mi. west of destination, the pilot deviated to have a look at a trail and camp. Whiteout conditions prevailed. As the aircraft was manoeuvring at low altitude, the wheels contacted the snow and the aircraft nosed down and over turned. The aircraft was substantially damaged; however, the pilot escaped without injury.
24-Jan-05 A05Q0008 Class 3	Quebec	Substantial	2 fatalities; 4 minor injuries	Helicopter Aerospatiale AS-350-B (Squirrel)	An AS350B, with the pilot and five passengers on board, crashed 60 mi. southeast of La Grande-4, Que. The pilot and one passenger were fatally injured. The four other passengers received minor injuries. The aircraft was substantially damaged.
25-Jan-05 A05W0016 Class 5	Alberta	Substantial		Aeroplane Piper PA-28-160	A student and a flight instructor took off in a Piper for circuits. During the initial takeoff, at less than 100 ft AGL, the engine lost all power. The instructor took control for the forced landing. The aircraft contacted snow-covered ground and a fence, causing substantial damage to the aircraft, but no injuries. Weather was partly cloudy with light winds, temperature 0.8°C and dewpoint -2.7°C. The engine was re-started by maintenance, and troubleshooting is on-going.
30-Jan-05 A05O0025 Class 5	Ontario	Substantial		Ultralight Quad City Challenger II/A	The ultralight on skis departed Cochrane, Ont., with two occupants on board. Upon landing on snow-covered ice on the Abitibi River, the nose landing gear collapsed. The aircraft battery died a short time later, leaving the uninjured occupants with no communication. The airplane was reported missing when it failed to return later in the day. A search and rescue (SAR) helicopter found the aircraft the following morning. Both occupants were rescued.
1-Feb-05 A05F0020 Class 5	North Carolina, USA	Destroyed	1 fatality; 1 minor injury	Aeroplane Cessna T210M	A Canadian-registered Cessna 210 departed Atlantic City, New Jersey, and while in cruise flight at 3 000 ft, the engine lost power. A forced landing was attempted on a highway east of Charlotte, North Carolina. During the landing attempt, the aircraft crashed after striking trees and wires, and then caught fire. The pilot was able to escape with minor injuries, but the passenger was fatally injured. The accident is being investigated by the U.S. National Transportation Safety Board (NTSB).
2-Feb-05 A05W0022 Class 5	Alberta	Substantial		Aeroplane Cessna 182D	As the aircraft was taxiing along Taxiway "A" at Lethbridge, Alta., with only the pilot on board, the wind blew the aircraft onto its back in the infield. The aircraft was substantially damaged, but the pilot was not injured. Winds at the time of the occurrence were reported to be 39 kt, gusting to 52 kt.

Date, Occurrence Number and Classification	Province or Country of Occurrence	Damage Level	Fatalities/ Injuries	Aircraft Type Make/Model	Occurrence Summary
3-Feb-05 A05P0025 Class 5	British Columbia	Substantial	1 minor injury	Aeroplane Amateur-built Van's RV6	The aircraft was at about 800 ft (altitude) over the threshold of Runway 13 at the Courtenay, B.C., airpark when the engine stopped because of fuel starvation. The pilot attempted to re-start the engine by selecting the other fuel tank and turning the boost pump on; however, the restart was unsuccessful. The pilot attempted to complete a 360° forced landing pattern, but this was also unsuccessful. The aircraft crashed into a river adjacent to the runway.
6-Feb-05 A05F0025 Class 5	Guyana	Substantial		Helicopter Eurocopter AS-350-B2	The helicopter was in a 10-ft hover when the pilot could not prevent it from turning right with the anti-torque pedals. At the same time, he experienced difficulty in moving the cyclic and the collective. After 15 seconds of considerable attitude excursions, the pilot retarded the throttle and the helicopter descended and landed hard. The pilot was not injured, but the helicopter was substantially damaged. The State of Occurrence, Guyana, has delegated the investigation to Canada and the investigation is being conducted in Vancouver, B.C.
7-Feb-05 A05Q0016 Class 5	Quebec	Substantial		Aeroplane Cessna 150L	The pilot was practising soft-field takeoffs on Runway 11 at the Mascouche, Que., airport. Shortly after the beginning of the take-off roll, the aircraft deviated to the left. The pilot tried in vain to correct the path using the tail rotor control pedals. The aircraft ran off the runway and nosed over in the snow. The pilot escaped the accident without injury. The aircraft was substantially damaged.
9-Feb-05 A05Q0019 Class 5	Quebec	Substantial		Aeroplane Piper PA-34-200T	The private aircraft was conducting a recreational flight from Rivière Rouge (Mont Tremblant) to Mont Laurier. After landing on Runway 26 at Mont Laurier, the aircraft could not stop in time; it stopped in the snow 200 ft past the end of the runway. The aircraft was substantially damaged. The occupants escaped the accident without injury. The runway was 100% covered in ice. No aircraft malfunction was reported.
11-Feb-05 A05P0032 Class 3	British Columbia	Substantial		Helicopter Bell Helicopter 212	The helicopter was carrying out heli-skiing operations near Whistler, B.C., on the Spearman Glacier in strong down-flowing winds. During takeoff from the toe of the glacier, with one pilot and eleven skiers, the helicopter settled as it turned downwind, and the skids struck the snow in a level attitude. Before the helicopter came to a stop, it turned over and came to rest on its right side. There was no fire, and the passengers and pilot were able to escape with only minor injuries.
12-Feb-05 A05W0029 Class 5	Alberta	Substantial		Aeroplane Piper PA-24-250	The aircraft landed gear up on Runway 29 at Grande Prairie, Alta., during a training flight. The lower fuselage and propeller sustained substantial damage. The landing gear retraction system was inspected, and two gear swings were performed after the aircraft was recovered. No pre-occurrence mechanical discrepancies were identified. Two flight instructors were on board the aircraft at the time of the occurrence. Neither sustained injury.
14-Feb-05 A05A0020 Class 5	New Brunswick	Substantial		Aeroplane Diamond DA 20-C1	During recovery from a practice power-off stall, the pilot could not advance the throttle lever. Manipulating the throttle lever did not have any effect on the engine RPM, which remained at idle. When the pilot released the throttle lever, it would spring back to the idle position. The pilot declared a Mayday with Moncton ATC and landed on a snow-covered field. The pilot was uninjured and rescue personnel were on the scene minutes after the event. The throttle cable servo rod end bearing was found to be seized, which prevented any movement of the attached arm and the associated butterfly valve. The rod end was removed and is being examined.

Date, Occurrence Number and Classification	Province or Country of Occurrence	Damage Level	Fatalities/ Injuries	Aircraft Type Make/Model	Occurrence Summary
18-Feb-05 A05W0033 Class 5	British Columbia	Substantial	1 minor injury	Aeroplane Cessna 185E	The ski-equipped aircraft was on takeoff from the surface of Muncho Lake, B.C., when the right ski dug into the snow. The aircraft nosed over onto its back, and was substantially damaged. The pilot sustained minor injuries, and the sole passenger was uninjured. Winds were calm at the time, and the lake was covered with about 8 in. of wet snow.
22-Feb-05 A05C0029 Class 5	Saskatchewan	Substantial		Aeroplane Cessna 172RG	During the initial climb from the Saskatoon, Sask., airport, the engine began to run rough. The pilot applied carburetor heat and the engine then lost all power. The aircraft was landed within city limits on a snowmobile trail. The landing gear did not have time enough to fully extend. There were no injuries, but the aircraft sustained substantial damage. The pilot advised that there was a large oil slick on the side of the aircraft's cowling.
24-Feb-05 A05P0038 Class 3	British Columbia	Substantial		Helicopter Bell Helicopter 212	The helicopter was on approach for a pick-up at 7 000 ft ASL, when the collective pitch was increased and the engines did not respond. The low rotor RPM warning sounded, the engine throttles were confirmed fully opened, and the pilot auto-rotated from 150 ft AGL. The rotor RPM was not recovered, and the sink rate could not be arrested in the flare or by increased collective pitch before touchdown. The helicopter landed hard, but remained upright. The deep snow absorbed some of the impact forces. The pilot did not appear to be injured, but the helicopter incurred substantial damage, mostly to the tailboom.
28-Feb-05 A05P0039 Class 5	British Columbia	Destroyed		Aeroplane de Havilland DHC-2 MK I	The aircraft departed the Campbell River Spit, B.C. to deliver one passenger to Frances Bay, B.C., and to transport the remaining three passengers to a camp at the head of Knight Inlet, B.C. There was no further contact with the aircraft after its departure. Search party found one seat cushion and one deceased passenger, but the wreckage was not located until early July in about 830 feet of water just east of Quadra Island. Seat belts were found to be unbuckled rather than broken, seven of the eight life vests were in the fuselage containers, and none of the missing occupants were on board the recovered wreckage.
4-Mar-05 A05C0037 Class 5	Manitoba	Substantial		Aeroplane Cessna 207A	During takeoff from the ice strip at Pauingassi, Man., the left wheel of the aircraft caught a snowdrift built up against a windrow, bordering the side of the ice strip. The aircraft spun around and went up onto its right wing tip, causing damage to the wing tip and lower right portion of the engine cowling. At the time of the occurrence, grey overcast conditions existed, causing a poor visual contrast between the snow-covered lake and the cleared portion of the runway, which had drifted in with heavy snow.
6-Mar-05 A05F0047 Class 2	Cuba	Substantial		Aeroplane Airbus A310-300	Shortly after departing Varadero, Cuba, aircraft control problems were encountered. The flight returned to Varadero, and on arrival, it was discovered that the aircraft rudder was missing. The TSB sent two investigators to Cuba, accompanied by a Transport Canada technical advisor. It appears that the occurrence commenced over international waters. In accordance with ICAO Annex 13, Canada, as the State of Registry, will be investigating. Cuba has offered assistance.
6-Mar-05 A05P0043 Class 5	British Columbia	Substantial	1 fatality	Helicopter Bell Helicopter 206B	The helicopter was operating out of a farmer's field. As the pilot attempted to take off, the right skid dug into the soft ground and the helicopter rolled over on its right side. A main rotor blade struck the left seat passenger, inflicting fatal injuries. There was no fire.
7-Mar-05 A05P0044 Class 5	British Columbia	Destroyed		Helicopter Aerospatiale AS-350-B2	As the pilot approached a glacier to pick up a party of heli-skiers, he lost visual reference due to a fog bank. As he could still see the skiers, he continued towards them, but the tail contacted the ground. The tail broke off and the helicopter pitched forward and rolled over. There was no fire.

Date, Occurrence Number and Classification	Province or Country of Occurrence	Damage Level	Fatalities/ Injuries	Aircraft Type Make/Model	Occurrence Summary
9-Mar-05 A05W0048 Class 5	Yukon	Substantial	1 minor injury	Ultralight	The ultralight aircraft was flying circuits at a private airstrip northwest of Whitehorse, Y.T. On the final approach of the second circuit, a windshear was encountered, resulting in a hard landing. The aircraft then swerved to the side of the runway and impacted a snowdrift.
12-Mar-05 A05Q0037 Class 5	Quebec	Substantial	1 minor injury	Ultralight Spectrum Aircraft Inc. Beaver Rx-28	The basic ultralight had been bought by the pilot one month earlier. The pilot was taxiing on the frozen surface of the lake in order to familiarize himself with the aircraft. The ultralight took off unexpectedly, nosed over and hit the surface of the lake. The aircraft was substantially damaged. The pilot did not have a pilot's licence. He had never taken any flying courses.
14-Mar-05 A05C0046 Class 5	Ontario	Substantial		Aeroplane Piper PA-18A	As the aircraft was manoeuvred on final approach to a company outpost camp along the English River, the left wingtip struck the ice. The aircraft remained upright and landed heavily on the skis, which collapsed. The aircraft skidded to a stop with substantial damage to the propeller, the landing gear and wingtips. No injuries were reported.
14-Mar-05 A05F0056 Class 5	Ohio, USA	Substantial	1 serious injury	Aeroplane Piper PA-32-300	The aircraft crashed short of Runway 27 at the Holmes County Airport while executing a forced landing. Both wings separated from the airframe, causing substantial damage. The pilot, the only person on board, was seriously injured. The NTSB is conducting a limited investigation. Canada has assigned an accredited representative in accordance with ICAO Annex 13.
16-Mar-05 A05C0047 Class 5	Manitoba	Substantial		Aeroplane de Havilland DHC-2 MK I	As the aircraft touched down at the Grace Lake, Man., ice strip, witnesses observed the right wing drop and possibly contact the ice surface. The pilot aborted the landing, believing that he had entered deep slush. After takeoff, the right ski was observed flailing in the slip stream and then falling from the aircraft. The pilot elected to fly to the nearby The Pas, Man., to have emergency crews on standby. The pilot also noted that the left ski appeared to be insecure. The pilot landed safely alongside Runway 13. A required retaining washer was not installed on both ski fittings.
17-Mar-05 A05O0066 Class 5	Ontario	Substantial		Aeroplane Mooney M-20J Aeroplane Piper PA-28-160	The Mooney aircraft was parked with the engine running and the parking brake not set. The pilot was focusing on adjusting his seat, when the aircraft began to roll forward and collided with a parked Piper PA-28-161. The parked aircraft was not occupied at the time of the occurrence. There were no injuries to the occupants in the Mooney, but both aircraft were substantially damaged.
17-Mar-05 A05O0067 Class 5	Ontario	Substantial	1 fatality	Advanced Ultralight PPHU Ekolot JK-05 Junior	The advanced ultralight departed Kitchener/Waterloo, Ont., on a VFR flight to Port Huron, Michigan. Weather was favourable for the flight. The aircraft did not reach destination, was reported missing and a search was initiated. The aircraft was found on 18 March 2005 at approximately 16:30 EST in a field approximately 10 NM north of London, Ont. The pilot was fatally injured.
18-Mar-05 A05O0068 Class 5	Ontario	Substantial		Aeroplane Cessna 180K	The pilot overflew a private strip prior to landing and judged that it was firm and suitable. On landing on the 2 400 ft runway, the aircraft drifted right. Power was added and the aircraft got airborne again for about 100 ft before touching down again with the right wheel on softer ground. The aircraft was then pulled to the right into the softer ground. The right wheel struck a snowbank, causing the aircraft to stop suddenly and flip over. The pilot, who was wearing a lap belt and shoulder harness, was not injured.

Date, Occurrence Number and Classification	Province or Country of Occurrence	Damage Level	Fatalities/ Injuries	Aircraft Type Make/Model	Occurrence Summary
19-Mar-05 A05C0048 Class 5	Manitoba	Substantial		Aeroplane Beech B99	The gear was selected down and slowly a 3-green gear down indication was displayed. When full flaps were selected prior to landing, the gear unsafe aural warning sounded and the crew executed a missed approach. On overshoot, the gear was selected up, the 3-green indication remained and the landing gear unsafe light was illuminated. The crew diverted to Winnipeg, Man., completed the relevant checklist items and declared an emergency. In Winnipeg, ground personnel advised that the gear appeared to be down. The landing was successful. A crew member noticed that the nose gear was not fully extended, and attempted to move it into the locked position by pushing on it. The nose gear did move; however, the left main gear collapsed.
19-Mar-05 A05Q0041 Class 5	Quebec	Substantial		Aeroplane Cessna 120	The ski-equipped aircraft, with the pilot and one passenger on board, was landing on the frozen surface of Lac Noir in the Saint-Jean de Matha area, Que., when the left wing hit the ground. The landing gear and left wing were substantially damaged.
21-Mar-05 A05O0072 Class 5	Ontario	Substantial		Advanced Ultralight Quad City Ultralight Aircraft Challenger II/A	An advanced ultralight aircraft was on a local flight when the drive belt from the engine to the propeller failed. The pilot carried out a forced approach to a laneway.
22-Mar-05 A05W0054 Class 5	British Columbia	Substantial		Helicopter Bell Helicopter 206B	The helicopter was landing at a well site, when the pilot lost visual reference in snow raised by the rotor wash. The helicopter rolled onto its side and was substantially damage.
23-Mar-05 A05Q0043 Class 5	Quebec	Substantial	2 fatalities	Advanced Ultralight Skystar Kitfox IB	The ultralight aircraft was found crashed approximately 20 mi. northeast of Mirabel, Que. The two occupants were fatally injured.
25-Mar-05 A05O0071 Class 5	Ontario	Substantial		Aeroplane Piper PA-22-150	The pilot/owner was flying circuits at Toronto, Ont., Buttonville Airport, with an instructor. While landing on Runway 33, after the second circuit, the aircraft ground looped and entered a ditch on the left side of the runway. There were no injuries. The right main landing gear and wing were substantially damaged.
31-Mar-05 A05Q0046 Class 5	Quebec	Substantial		Helicopter Robinson Helicopter R22 Beta	During a training flight, the aircraft rolled over onto its side when the left skid remained stuck in some mud. The takeoff was being conducted in a field at the Beloeil airport.

Helicopter Cold Weather Flying Quiz

Note: This quiz was previously published in the last issue of Aviation Safety Vortex, *with a promise to publish the answers in the "next" issue. Given there was no next Vortex, and the significant time lapse between then and now, we felt it was appropriate to repeat the quiz, in addition to providing the answers. —Ed.*

1. The last autorotation RPM adjustment was done on my helicopter in August. Now that the weather is colder, I can expect the RPM to _____ for the same flight conditions.
   (a) increase
   (b) remain about the same
   (c) decrease

2. The electrolyte in a lead-acid battery will freeze at _____ temperature if the battery is discharged.
   (a) a warmer
   (b) a colder
   (c) the same

3. ATC issues an IFR clearance that would put your flight in a non ice-protected helicopter at an altitude above the freezing level, and in cloud. You should:
   (a) Accept the clearance, as ATC probably has more current information than you.
   (b) Refuse the clearance and inform ATC as to why.
   (c) Accept the clearance and request the change once you've reached the assigned altitude.

4. Ice adhering to rotor blades will degrade their aerodynamic efficiency, requiring an increase in power to produce an equivalent amount of lift. During autorotation, this will result in a higher-than-normal rate of descent and it may not be possible to maintain safe rotor RPM during the descent and flare. The main reason for the loss of autorotation RPM is:
   (a) The ice forming on the blade will decrease your forward speed.
   (b) The ice will be first forming on the outboard section of the blade. Since this is the autorotative zone, the effect will be devastating if you enter autorotation.
   (c) The ice will be first forming on the inboard section of the blade. Since this is the autorotative zone, the effect will be devastating if you enter autorotation.
   (d) The ice will be first forming on the tail rotor, reducing the amount of thrust, requiring you to add more left pedal.

5. Graphic area forecasts (GFA) are always issued in pairs and for the same validity period. One is called the Clouds & Weather, the other one is called:
   (a) GFAN33 CWUL
   (b) Turbulence, Icing & Freezing level
   (c) Icing in clouds & Mechanical turbulence

6. What is the procedure for flight into icing conditions, if your aircraft is not certified to fly into icing conditions?
   (a) Nothing until the windshield gets all covered.
   (b) Turn-on the heater, the pitot heat and the anti-ice.
   (c) Leave the area immediately or land as soon as possible and turn on the heater, the pitot heat and the anti-ice.
   (d) Call ATC and ask for a higher altitude.

7. What are the main indications of ice forming on the main rotor during flight?
   (a) Ice forming on the windshield.
   (b) An increase of torque and possible vibrations.
   (c) Ice forming on the tail rotor.
   (d) An increase of airspeed and possible vibrations.

8. What do the abbreviations ICGIC and ICGIP stand for?
   (a) Ice Clear Generally In Cloud and Icing In Precipitation.
   (b) Icing In Cumulus and Icing Probability.
   (c) Icing In Cloud and Icing In Prescott.
   (d) Icing In Cloud and Icing In Precipitation.

Answers to Helicopter Cold Weather Flying Quiz

(1) c, (2) a, (3) b, (4) c, (5) b, (6) c, (7) b, (8) d.

Answers to Self-Paced Study Program (tear-off)

(1) TSB Regional
(2) X
(3) No.
(4) displaced threshold; NOTAM
(5) holding position
(6) 4 000
(7) 5
(8) key the activating sequence
(9) steering; bearing; homing
(10) Advise ATC, and, if necessary, revert to using traditional aids for navigation.
(11) 12 hours
(12) 9900
(13) true
(14) AUTO
(15) 5/8 SM, 700 ft AGL
(16) A, B, C, plus all D and E airspace that are specified as "Transponder Airspace."
(17) 2 200
(18) 2 miles, 1 mile for helicopters; clear of cloud
(19) 25; VFR flight plan or a VFR flight itinerary
(20) Departure intentions before moving onto the take-off surface, and departing the aerodrome traffic circuit.
(21) five
(22) A sensitive altimeter that is adjustable for barometric pressure.
(23) 4; 1
(24) FAL
(25) one hour
(26) 5; UTC; 5
(27) SAR 3.9
(28) Monthly.
(29) TC AIM
(30) .34; -7; Celsius
(31) 2.5 cm (1 in.)
(32) 5 000
(33) 0.3
(34) free and dispersed water; finely divided dirt particles
(35) explosion and fire
(36) 10
(37) refraction error
(38) an inability to concentrate; dizziness; headache
(39) retina of the eye
(40) avoided

Integrated Pilot Training

The Canadian Aviation Regulations *(CARs) will be amended in the coming months to include a new approach to pilot training in Canada. The new approach is the* ***integrated course****.*

The integrated course is a continuous course based on principles of the systems approach to training. The Canadian Aviation Regulation Advisory Council (CARAC) first endorsed this concept in October 1997, following the regulatory model for integrated courses that had already been established in Europe, in the *Joint Aviation Requirements* (JAR).

Military pilot training in Canada has been based on a systems approach for decades. In civil aviation, a systems approach has been used by some airlines in the recurrent training of airline pilots through the Advanced Qualification Program (AQP), but this is not widespread. However, for traditional pilot training, we have relied on traditional means, prescribing the training requirements and relying heavily on written examinations and flight tests to control quality, rather than using performance-based requirements and building quality principles into the whole training process.

The traditional approach has served us quite well. Compared to a systems approach, it's much simpler. Many flight schools are producing good results with it, especially those that have gone far beyond the minimum requirements in building their course structures and good documentation for the training, and ensuring close supervision. We don't want to lose sight of the success we have had with the traditional approach.

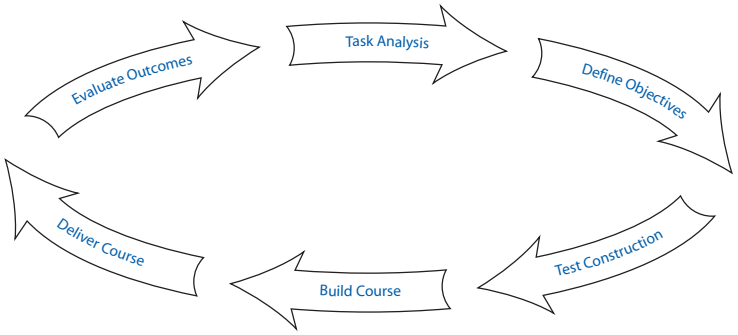
The systems approach tells us that training should be competency-based, sequenced so that lessons are integrated, tracked so that changes and updates to training documentation can be performed efficiently, and evaluated so that evaluation and corrective actions allow continuous improvement. The systems approach proposes that training should be based on a systematic analysis of the job; an analysis of what people do and how they do it. And if you can, you want to get beyond the surface and learn how the job of flying is managed at the cognitive level; the strategizing, planning, prioritizing, discriminating, and problem solving. This analysis is then used to identify the training needs. The training needs are used to develop the learning objectives. The objectives are used to develop the tests and to build the course. The course, once delivered, is evaluated and the results are fed back into the design, creating a process of continuous improvement. The loop is closed, creating a powerful system.

Flight schools conducting integrated courses are required to have documentation that other schools don't require. The documentation comes in the form of two essential control manuals that are developed by the company. One is the operations manual. This manual is used to control the operation of the company's aircraft. It gives direction to everyone who operates the aircraft on such things as flight-following procedures, requirements for individuals performing flight following, flight authorization and preparation procedures, fuel and oil requirements, accident/incident reporting procedures, and use of checklists.

The second manual is the training manual. Whereas the concept of an operations manual is well-understood in this country, the training manual is new. This manual is used to control the conduct of training; specifically to control the conduct of the integrated course, by setting out the detailed syllabus of flight and ground training, including "synthetic" flight training. The manual also requires a training plan. The training plan sets out such details as pre-entry requirements, credits for previous experience, course constraints in terms of maximum student training times, duty period restrictions for students, maximum flying hours in any day/night period, minimum rest periods, rules for attendance records, the form of training records to be kept, policies for the conduct of progress checks and written examinations, procedure for changing instructors, procedures for identifying and managing unsatisfactory student progress, and the internal feedback system for reporting training deficiencies.

The fact that Canada has already begun to adopt the integrated course model has captured attention in Europe and the United States. In matters of pilot training, we are beginning to speak the same language of a *systems* approach. As the International Civil Aviation Organization (ICAO) moves ahead with changes to Annex 1 to the *Convention on International Civil*

Aviation—Personnel Licensing, advancing the idea of control manuals for flight training and even embedding the systems approach in the proposed multi-crew pilot licence, Canada will be familiar with the underlying concepts. We will have experience in making them work. If we don't learn the language of a systems approach to training, we will risk being left behind as the approach gains ground around the world, and we will lose the opportunity to gain the benefits of a systems approach—stronger competencies for our flight crew.



The systems approach is not rocket science; it's just systematic. It does involve a lot of hard work on the part of the training organization to do the analysis and build the documentation. It requires effort to monitor the training to ensure that the syllabus and policies and procedures are being followed. It requires effort to update the documentation when it is seen that some aspects of the flight operations and training are not working as hoped. In looking at all the requirements for an integrated course (the manuals, the control systems, and the quality system), it's important to always keep in mind what's at the centre. It's the student. The whole system is intended to serve the learning needs of the student who wants to enter the world of aviation. In serving these needs, we will serve the larger purpose of strengthening our defences against human errors and their contribution to accidents. △

Breaking The Chain

*In the past couple of years, the **Aviation Safety Vortex** attempted to go beyond the nuts and bolts of accidents, and dig deeper into the human performance issues that contribute to poor decision making, and subsequently to bent helicopters. The following article, submitted by a Canadian helicopter pilot, deals with a classic dynamic rollover event—nothing new there. What is very interesting is that the pilot recognized, albeit too late, that his own fatigue, dehydration and malnourishment were significant contributing factors in the accident. Two of these topics were recently covered in **Vortex** articles **I Need a Drink** (issue 3/2002) and **Perchance to Dream** (issue 2/2003). Remember, including some self-study into the physiological factors that affect our bodies while flying, is a good idea for our "recurrent training".*

After twelve accident- and incident-free years flying single engine helicopters across western Canada and the U.S., I was feeling quite confident about my abilities as a pilot. I enjoyed my work, I was receiving regular compliments from customers for getting their work done safely and efficiently, and my company recognized my hard work with promotions, endorsements, cash bonuses, and pay-raises. Life was treating me well.

I hadn't had a visit from the proverbial "Murphy" yet.

The fire season had just started when I returned from a relaxing three-month holiday with my family. My first two days back to work were on a remote forest fire with a Bell 206—a routine task in familiar territory. I had hauled firefighters and their equipment many times before, and dumped countless buckets of water on fires. I flew the allowed maximum of 8 hr* on each of the first two days. At the end of each day, I flew my helicopter to the nearest company base, where I filled out my logbooks, had supper, and had a good sleep in an air-conditioned motel room. The summer was looking busy and profitable.

On the third day, I went back to the same fire after having had a good breakfast and feeling well rested. It was an unusually hot day with some wind, so I was hoping for some of my favourite work on a fire—water bucketing. However, after I set 20 firefighters out to work, the fire boss had me sling in camp gear, as he expected this to be a campaign fire. I was a bit sceptical of this, as I was worried that I might be expected to stay in the rough camp. The truck driver had dumped all the camp gear at the staging area, and I had nobody to help load up the nets and roll barrels. That meant that every time I arrived at the staging point, I had to get out of the helicopter, load the nets and attach my longline. It was hot, dry, and smoky, and I was getting hungry and irritated. But I wasn't going to let the fire boss know that my frustration level was getting high, as I enjoyed the job and didn't want any complaints about me. I certainly wasn't going to allow another pilot—or worse, a competitor—take this dream job away from me. By the time I had all the camp gear flown in from the nearest road staging point and picked up the crews, my flight log showed I had flown 7.6 hr—just enough time remained for me to return to base. I was hungry, thirsty,

** Maximum flight times and duty times as established by Forest Service, not Transport Canada.*

hot, tired, and dirty, and looked forward to a shower, dinner, and an air-conditioned motel room.

I informed the fire boss of my pending "time-exed" status. He said that the camp cook had seen some bears in the area, and asked me to stay at the camp for a few more hours, even though I was nearing the end of my 12-hr duty day. So, in the spirit of cooperation, I put on a brave face and helped the fire crew set up the tents. While they were eating, I carried boxes of groceries, rolled barrels of fuel, cleaned up my helicopter, and fixed a loose wire on my longline. I didn't worry about getting something to eat, because, after all, I was going back to town for a hot meal and a shower at the motel.

After my 12-hr duty day had expired, the fire boss asked me to stay the night, as he was concerned about bears in the area. I made one more round trip to the staging area with him for some more firefighting equipment and to look for the bears. Twenty-four revenue hours in three days would be a good pay cheque. When we got back to camp, the camp cook told me that there was nothing left for supper. As it was now getting dark and I had flown my maximum hours as well as exceeded my duty day, I had no choice but to grin and bear it. There was no hot supper, shower, or air-conditioned motel room for me that night, but I wasn't going to complain. No supper was just the start of the bad news, as I was then told that there was not sufficient room for me in any of the sleeping tents, but I could sleep in the supply tent. Being a resourceful pilot, I pulled out the emergency sleeping bag from the helicopter, and looked in the supply tent. Nothing but gravel and some broken boxes of dry macaroni. I didn't want to be called a whiner, so I made the best of it.

I spent a cold, uncomfortable night lying on gravel with no mattress or pillow, listening to rodents eat the spilled macaroni. I was up at 3 a.m., wishing I had never taken this particular job. I was hungry, dirty, sweaty, and in desperate need of a shower and a change of clothes. Everybody else was sleeping, and I didn't want to make any noise in the kitchen tent looking for something to eat and drink, so I cleaned my helicopter some more, carried out a real thorough pre-flight inspection, and stood up some fuel barrels in anticipation of another busy day.

At about 6 a.m., the cook was up, and I asked if I could get something to eat or at least to drink. "Get out of here! You (expletive deleted) pilots think you are so important! I'll call you when breakfast is ready and not a minute sooner!" Good morning to you, too.

At 7 a.m., just as the regular firefighters were sitting down for breakfast, the local fire centre called on my handheld VHF-FM radio to inquire if I was available for initial attack on another fire. I checked with the fire boss, who decided to accompany me. The helicopter was full of fuel, but my stomach wasn't. Still, getting out of that grumpy cook's way was most appealing.

We worked on the second fire for about 4 hr before another helicopter showed up to relieve me, and the fire boss and I returned to our camp low on fuel. By this time, there were 20 firefighters ready to go to work. I re-fuelled and set out the crew and their equipment in about 2 hr of flying time. The crews understood that I needed to refuel the helicopter, but I still had not had supper, breakfast, a shower, or anything to drink. Just as I was about to shut the helicopter down for some badly needed nourishment, the fire boss came running over and informed me that I had to go to the staging area to pick up a radio operator and some more supplies. OK, one more trip, and then I could get something to eat and drink.

I began to give the new radio operator my standard safety briefing, but she informed me that she didn't need one. *One of those types*. Back at camp, a pressing need to deliver some lunches to the fire line meant another delay in getting some food and drink. My level of frustration was getting a little bit higher every minute.

By this time, fire activity was picking up, and I was confident I could keep going. The radio operator was cluttering up our already congested radio frequency with many requests to "say again." The impatience in the voices of the firefighters echoed my frustration with her incompetence and poor attitude.

Back at camp, I politely asked for a break so I could get something to eat and drink. The fire boss wasn't happy about my request, as he only had one helicopter to work with, but he accepted. In the middle of my two-minute cool-down, a very excited firefighter with an irritating high-pitched voice screamed on the radio, "Help me! I'm getting burned to death!" I quickly did another hot re-fuelling, and the fire boss jumped back in. A quick reconnaissance of her area showed she was in no immediate danger, but the fire boss advised me to keep an eye on her. Then the usual requests were coming in to us by radio, "Tell Dave to turn up the pump." "Bring me a strangler." "I need some water buckets over here." "Bring me some more hose." By this time, my mouth was very dry and my stomach was feeling like it was going to collapse. The possibility of fatigue and frustration getting in the way of sound judgment never crossed my mind, as I just wanted to please the customer.

As we were circling the fire, the fire boss told me he needed me to work late that night, as he was going to require me to sling in some more groceries and camp supplies after I picked up the crews. I thought, "Marvellous. Here I go again, another day without being able to sit down for a real dinner. By the time I finish, there won't be enough daylight left to fly back to town for a good

night's sleep, so it'll be another night in that tent. And how am I going to fudge my logbooks to avoid showing that I exceeded my flight and duty time limitations?"

The next task was to move a firefighter and some hose from the top of a hill to another location. As we approached the the grassy knoll, I could see the firefighter carrying the hose across a steep slope with some burned-out stumps. Not an ideal location, but picking him up there would save him walking 200 ft up the hill, and get me that much closer to food and drink.

At this point, it seemed like my peripheral vision was getting rapidly narrower. The area was tight, and there were a lot of stumps, but nothing I recognized as being overly hazardous. I was not able to advise the firefighter of my plans because of the steady radio chatter, but as I approached, I saw him crouch down. My thoughts were, "Perfect, this guy is a pro. He can see that I am going to pick him up here, and he's making it easy for me. This will go really smoothly. I'll do a quick toe-in landing with him at my left rear door, and he can jump right in. What a way to impress the fire boss!"

I was hot, hungry, thirsty, and sweaty, my shirt and helmet were sticking to me like glue, and I hadn't slept for about 34 hr. Not a very glamorous situation. I informed the radio operator that we were picking up Bravo 10 at pad 7. After what seemed like an eternity on a very busy radio, I got the reply, "Roger, copy you picking up Bravo 7 at pad 10." More frustration.

Just as I was about to settle the front of the skids between some stumps, I remembered that I still needed to correct the radio operator's misunderstanding. Then the high-pitched voice came over the radio again, "Hurry up! Help me! I'm getting burned to death!" The radio chatter really picked up now, as all 20 firefighters offered their advice at the same time. The fire boss, who was sitting on my left side, said, "Let's hurry and check up on her!" Fatigue, hunger, thirst, and high mental workload combined to turn me into an unthinking robot. Compulsive instinct was replacing sound decision making.

As I closely monitored the position of my main rotor near a tree, and the front right skid inches from a stump, I heard the fire boss gasp on the live intercom. I looked up to see what the problem was, and the firefighter who had seemed to be making my toe-in landing so easy had just stood up and was moving up the hill with the roll of hose, just as he had been told to do, right under the main rotor!

I was now out of options. My brain failed to function, and it seemed like I was viewing the world in black and white. I was completely out of energy. All I could do was pull on the collective and hope I could lift the helicopter up before the unsuspecting firefighter walked into the rotor. This is the time that Murphy decided to pay his visit. My right skid hooked the stump, and even though I had been well trained to avoid pulling collective in this situation, the combination of an impending decapitation and sheer fatigue meant that this long chain of events resulted in a classic dynamic rollover.

One fine helicopter destroyed, but thankfully no injuries.

Looking back on the situation now, I had had every opportunity to shut the flight operations down until I had something to drink and eat, or I could even have requested a relief pilot because I was very tired. It's funny how customers tolerate delays to refuel the helicopter, as they see running out of fuel as a serious hazard, but the pilot is regarded as a machine who doesn't need to sleep, eat, or drink.

"Now when I read accident reports … I imagine there were usually a lot of human factors that resulted in the accident besides just the last few seconds before the terrible sound of the rotor blades hitting the ground; …"

This account of the events leading up to a preventable accident is not an attempt to blame the firefighters. The cause of this accident was my decision to perform a tight toe-in landing among some stumps, rather than wait one or two minutes to pick the firefighter up at a much better location. This was a day when normal decision-making processes were affected by hunger, dehydration, accumulated stress and fatigue—factors that I have personally found to be in abundance on many job sites, but especially fires. The regulators at Transport Canada have tried to enforce rest time with complex flight and duty time regulations, but this was a situation where the pilot was severely fatigued, but well within the regulations.

Now when I read accident reports in the Vortex, I imagine there were usually a lot of human factors that resulted in the accident besides just the last few seconds before the terrible sound of the rotor blades hitting the ground; customer pressures, company pressures, or worst of all, self-imposed pressures. One thing I have learned from my experience on that terrible day is that I never want to be hanging in an upside down helicopter again.

Recognize that fatigue is hazardous, admit when you are tired, and break the chain of events! △

Author's name withheld on request

Tips and Tails...All Tied-up...

Names of the client, crew and fellow pilot have been changed for obvious reasons.

The scene is: New commercial helicopter pilot, first job, first contract, and first year of flying...

Things are going great, I've got about 30–35 hr of spray time to start my career out now, and I'm thinking I'm pretty damn good at this pilot stuff! Time for a little ground check—LITERALLY!

We (Ace and I) had just finished for the morning because the wind had become too strong for spraying; gusting 20 km/hr by the time I landed. When I landed, Ace had already pushed his machine into the hangar. He and our chubby little ground crew, Junior, were waiting for me to go have a late breakfast with them. I landed and shut down, tied up, and pulled the battery connection, and that was when it all began...

Just then, the client representative, Knuckles, came running over to me. He said he had gotten authorization from his boss to go for a reconnaissance (recce) flight and take a look at the spray area and get some pictures. Since he was in a rush, and my machine was still outside, we decided that I'd be the guy to fly him. COOL! A REAL LIVE PASSENGER! "Sure, I'll take you out," I said with the cool cockiness that only a 135-hr pilot possesses, as my good buddy Ace watched jealously from the hangar.

Getting ready to go, I fuelled up, untied, pulled the stack covers, and plugged in the battery. I was just about to start when Knuckles realized that the batteries in his digital camera were dead. He had to run back to the city office to get re-supplied. I got out and, because it was pretty windy, I tied up again. Then I went to water the grass behind the hangar while I waited for Knuckles, and told Ace and Junior to go to breakfast without me. Back comes Knuckles in a mad rush, re-supplied with batteries. We take the passenger door off to help him get good pictures, get all belted in, and we're ready to go. My machine didn't like to start if the engine was still warm, or hot, from a previous shutdown. It seemed to start better if you cranked it over for a bit with the magnetos (mag) off, and then flipped the mag on while cranking. So here I was, cranking her over with the mag off, just applying pressure to the mag switch with my fingers to turn it on when chubby little Junior comes running out of the hangar, like I'd never seen the hefty little bugger move in my life; flailing his arms madly in an effort to get me to stop...

Stop I did, and jumped out of the helicopter to give him hell for running up to the machine like a madman, just as I was about to start. He reached my side of the machine as I exited, and pulled me around to the side of the machine out of view of my passenger, Knuckles. Then he pointed to the tail of my helicopter. There flapping madly in the breeze was the end of my tie-down cord, which was all knotted up nicely in a perfect hitch knot, tying the main rotor blade down to my tail rotor gear box.

At that moment the little bugger redeemed himself immensely in my eyes and saved me from starting the machine while tied down. In a turbine engine machine, this wouldn't have been good. In a piston engine machine, I think this would have had catastrophic consequences, especially since the tie-down was one of those ones with the thick, round, tie rope made of the pull-cord type material, which I'm sure wouldn't have broken before the mounting bolts on the tail rotor gearbox. You all know how violently they start, when they decide to. If Junior hadn't stopped me, I am sure the tail rotor gearbox and blades would have made a hell of a ruckus as they were torn off and flung around the machine in a nice circular path 2 ft off the end of my rotor blade. It would have ruined the day for everyone I'm sure, and quite likely brought my career to a screeching halt!

Well, I was highly embarrassed in front of Junior, yet, also quite appreciative. I even bought the lazy bugger breakfast for about a week straight. As far as the passenger, I sheepishly climbed back in and concocted some cock and bull story about Junior wanting to check the fuel cap or some other bologna, and we went and did our flight. No worries, right? I think the passenger was already worried enough about flying with the door off (judging by how tightly he had yanked his seatbelt) and flying with a "still wet behind the ears" 100-Hour-Wonder!

Well since that time, I'm a believer of putting the blades in the 10 and 4 o'clock position EVERY time, EVERY start! Also, if I'm interrupted from my regular schedule of events, or something is "out of the norm" as it was here, I have developed my own little safety technique. EVERYTIME I shutdown, I pull the battery, tie the blades down and put the stack covers on. ALL of it on, or ALL of it off! IF, for some reason I know that I'll only be shut down for a few minutes, but because of wind conditions I need to tie down, I drape the stack covers over the cyclic grip. This way, if I hop into the machine without untying, AND don't look out to verify that my

blades are untied, I still have the stack covers over the cyclic reminding me that I'm tied down. If I now still try to start the machine, then at least I'll have the strap that is sewn between the stack covers to strangle myself with after I wreck the helicopter!

Anyways, hope you can learn something from my mistake, or at least gain a little entertainment from it. Hope you guys all find something to share! △

CDW

Commercial Helicopter Pilot (now 2 000 hr and still going—thankfully)
Pacific Region

COPA Corner—It's Still Here!

by Adam Hunt, Canadian Owners and Pilots Association (COPA)

It has been years since I have seen this old hazard in aviation—I was beginning to think that it had disappeared, but, surprise, it is back when you least expect it! January 16, 2005, started as a sunny Sunday morning in the Ottawa area. The temperatures were forecast to reach -8°C, so many pilots decided to take advantage of the slightly warmer weather and go flying. By early afternoon, the engine on our AA-1 Yankee had been nicely preheated and we were ready to start. By that time, the high clouds from an incoming system were turning the day duller in colour. A trace of *stratus fractus* was hanging around at 3 500 ft. The winds were almost calm; surface temperature was -10°C with a dewpoint of -17°C.

We took off and climbed up to 3 000 ft on our local flight, calling terminal in the climb. Levelling off, I set cruise power at 75%, but, within a few minutes, the RPM was bleeding off. I pulled on the carb heat and the RPM bled off even more—"splutter, splutter," and then the power came back quickly. Carb ice, on a day like this? Odd. A few minutes later, it was back so we decided to leave the heat on "hot," as this wasn't clearing up.

The rest of the trip was uneventful, except for the higher fuel burn due to the almost continuous use of carb heat to keep the ice at bay. Returning to home base, we were informed that a student pilot flying a Cessna 150 was stuck on the runway. The 150 wouldn't start after having "flamed out" on the ground during a touch-and-go. A stream of aircraft coming home decided to hold in the local practice area while the Cessna was pulled off the runway.

The culprit? Carb ice again—a long final approach at reduced power with the carb heat off, and the engine stopped on the runway. After the plane was cleared, the rest of us returned without incident for landing. While paying for fuel at the flying school, I talked to an instructor there. She had been up flying for much of the day in the school's 150s, and had also seen lots of carb ice—more than in a very long time. Other pilots reported carb ice too. Even some pilots flying ultralights with two-stroke engines that are normally pretty "carb-ice-resistant" (and are not carb-heat equipped) returned home with rising exhaust gas temperatures (EGT).

The carb ice didn't give up easily. After refuelling at the pumps, we started up to taxi back to the hangar line. The engine started fine, but balked on throttle increase. Some more carb heat cleared that up quickly and we got the Yankee back to the hangar without any further icing incidents.

What a strange day—carb icing was not suspected, based on the surface temperature and dewpoint, nor after consulting the carb ice chart found in section AIR 2.3 of the Transport Canada *Aeronautical Information Manual* (TC AIM), but it was found everywhere by almost everyone flying piston engines that day. Many of us haven't seen carb ice in decades—we were beginning to not believe in it anymore!

The lesson is clear—check for carb ice regularly, even when you don't expect it, and watch your RPM carefully (or manifold pressure in constant speed prop-equipped aircraft) for the telltale signs of power loss. Get the carb heat on first when you do! More information about COPA can be found at www.copanational.org. △

Electronic Flight Charts and Publications

Pilots who use *Canadian Aviation Regulation* (CAR) 602.60(1)(b) for bedtime reading know that under certain conditions, this regulation requires pilots of power-driven aircraft to take along aeronautical charts and publications. That's pretty logical and pretty easy. In the olden days, pilots understood the need for maps and stuff like the *Canada Flight Supplement* (CFS), the *Canada Air Pilot* (CAP), and anything else needed for the flight. The biggest questions were *"Do I have everything I need?" "Are my publications and charts current?"* and *"Can I carry this much weight on board?"*

Now, another question gets asked: "*Can I use electronic aeronautical publications and charts?*" The answer is, "of course." Pilots need safety information for their flights. If an electronic device contains the necessary information and can display it to the pilot, the requirement is met. After all, the root of the word "publication" is "public," not "printed."

However, there are some points you should think about before throwing away those paper publications in favour of electronic ones:

- The regulation (and common sense) calls for "current" charts and publications. That GPS unit with its database of aerodrome information was probably current when new, but it may be out of date now. Even electronic data have to be kept current.
- If the unit is battery-powered, think about spare batteries. Depending on the kind of batteries the unit uses, there may be a limit to how many you can carry before those spare batteries become dangerous goods.
- If the electronic device is handheld, things are pretty simple. If you bolt it onto the aircraft, it's called a "modification," and you need approval; if you connect it to some of the aircraft's systems, depending on the extent of the connection, you may also need approval. In either case, it would be a good idea to check first with someone who knows about airworthiness matters.
- Most of us think of portable electronic devices as CD players, computers and printers that passengers bring on board. CAR 602.08 deals with all portable electronic devices—even ones pilots take along to use during flight. The regulation puts the onus on aircraft operators to make sure that portable electronic devices don't impair the functioning of other aircraft systems or equipment.

"*Can I use electronic aeronautical charts and publications?*" Absolutely! Check that the electronic information is current. Make sure the device doesn't run out of power. Confirm that it doesn't interfere with the aircraft's other systems. If you plan to connect the device to the aircraft in any way, take care that the work is done properly. △

Carriage of Firearms and Ammunition On Board an Aircraft

In Canada, the *Canadian Aviation Security Regulations* (CASR) regulate the transportation of firearms, and the *Transportation of Dangerous Goods Regulations* (TDGR) regulate the handling, offering for transport, or transportation of ammunition to, from, and within Canada.

The CASR prohibit the transport of loaded firearms on board an aircraft.

The CASR state that peace officers, as defined in the CASR, are permitted to carry or have access to unloaded firearms on board an aircraft if they require access to the firearm immediately before, during or immediately after the flight (such as a prisoner escort). Certain conditions must be met, and are outlined in the CASR.

The CASR defines a peace officer as:

> *"(a) a member of the Correctional Service of Canada who is designated a peace officer under Part I of the* Corrections and Conditional Release Act *and any other officer or permanent employee of a prison other than a penitentiary as defined in Part I of the* Corrections and Conditional Release Act*;*
>
> *(b) a member of the Royal Canadian Mounted Police and a police officer, police constable or any person who is designated by the Solicitor General, the Commissioner of the Royal Canadian Mounted Police or a provincial minister as a peace officer for the purpose of the preservation and maintenance of the public peace at an aerodrome; and*
>
> *(c) an immigration officer who is enforcing any provision of the* Immigration and Refugee Protection Act *or any regulations, warrant, order or direction made under the* Immigration and Refugee Protection Act *respecting the arrest, detention or removal from Canada of any person."*

As ammunitions are considered to be dangerous goods, their transportation by air is regulated by the *International Civil Aviation Organization Technical Instructions* (ICAO TI), as referenced in the TDGR. Ammunitions are not allowed in carry-on baggage. Police officers or peace officers may carry ammunition in checked baggage in compliance with the ICAO TI's Part 8—*Provisions for Passengers and Crew*.

For the requirements governing the transport of ammunition as cargo on board an aircraft, refer to sections 12.1 and 12.4 of the TDGR.

To learn more about both the CASR and the TDGR, you may consult the Transport Canada Web site at www.tc.gc.ca. △

Aircraft Icing for General Aviation…And Others

by Paul A. Johnson, Civil Aviation Safety Inspector, Flight Crew Examinations, General Aviation, Civil Aviation, Transport Canada

Transport Canada wishes to maintain a high level of awareness within the civil aviation community on the hazards of flying with ice and snow adhering to the critical surfaces of an aircraft, and on flying into icing conditions. This article is primarily aimed at the general aviation pilot, but indeed applies to all pilots who fly in our tough climate, so please read on!

A very small amount of roughness, in thickness as low as 0.40 mm (1/64 in.), caused by ice, snow or frost, disrupts the airflow over the lift and control surfaces of an aircraft. The consequence of this roughness is severe loss of lift, increased drag and impaired manoeuvrability; particularly during the take-off and initial climb phases of flight. Ice can also interfere with the movement of control surfaces or add significantly to aircraft weight, as well as block critical aircraft sensors. **There is no such thing as an insignificant amount of ice.**

Aircraft operating from smaller regional airports are generally de-iced by company personnel, or in some cases directly by the pilot of the aircraft, using a pressure sprayer containing an approved de-icing fluid. Aircraft must be de-iced shortly prior to takeoff. When operating under icing conditions from remote sites, aircraft operators are responsible for carrying the appropriate anti-icing and de-icing equipment on board the aircraft or storing the equipment at the airport. If conditions are too severe, pilots are prohibited from attempting a takeoff.

In all aviation operations, the pilot-in-command (PIC) has the ultimate responsibility to determine if the aircraft is in a condition for safe flight.

Ground de-icing and anti-icing procedures vary greatly depending primarily on aircraft type, type of contamination accumulation on the aircraft and freezing point depressant (FPD) or de-/anti-icing fluid type. Pilots should become familiar with applicable *Canadian Aviation Regulations* (CARs) and Standards, the procedures recommended by the aircraft manufacturer in the pilot operating handbook (POH), aircraft flight manual (AFM), maintenance manual and, where appropriate, the aircraft service manual. As well, they should comply with all company operations manual provisions.

Qualified fluids—A list of qualified de-icing and anti-icing fluids is included on the Transport Canada Web site in their *Holdover Time (HOT) Guidelines*. If reliable holdover times are to be achieved, only qualified fluids that are stored, dispensed and applied in accordance with the manufacturers' instructions are acceptable. The qualified fluids have undergone laboratory testing to quantify their protection and to confirm aerodynamic acceptability.

Manual methods—Reducing the amount of de-icing fluid used can have a positive impact on both the cost and the environment. Manual methods of snow removal should be used whenever possible, as long as safety is not compromised. There are a wide variety of devices available to assist in the removal of frozen contaminants from aircraft. Factors such as temperature, amount of contamination, wind conditions, and contaminant location must be taken into account when choosing the method.

Pilot removing frost manually on small aircraft.
Photo: www.Cessna150-152.com.

Under extremely low temperatures, the use of glycol-based fluids is limited (refer to the fluid manufacturers' specifications for details). In these circumstances, manual methods may be the only option.

Note: Extreme care must be taken whenever manual methods are used, to protect the highly sensitive and often fragile sensors and navigation antennas. Also very vulnerable to damage are: pitot tubes, static ports, angle of attack sensors, and vortex generators. When sweeping or "pulling" contamination off an aircraft, care must be taken to use motions which pull contamination away from any openings, in order to avoid forcing the contamination into any openings on the wings or stabilizers.

Brooms—Probably the most commonly used and most readily available de-icing manual tool is the broom. Although a common household broom could be used, a larger, sturdier commercial variety is usually chosen. Care must be taken to ensure the bristles are sturdy enough to be effective, yet not so stiff as to do damage to the skin of the aircraft. The broom that is to be used to sweep snow from the aircraft should not be used to sweep floors, as this can introduce unwanted foreign contaminants and chemicals to the aircraft surfaces.

Brooms are very useful in cleaning windows and other sensitive areas (e.g. a radome) where the application of hot liquid is best avoided or prohibited.

Aircraft height requires that extra attention be paid to safety, especially when combined with the tendency to stretch the reach with a broom. If a ladder or other such device is used, personnel must be certain that it is well steadied. Slippery surfaces can make climbing somewhat dangerous.

Personnel have attempted to sweep snow from wing and tail surfaces while standing on these surfaces. This is an extremely unsafe practice with a very high risk of a slip and fall accident. As well, many surfaces are not stressed to support the weight of a person. The broom should be used in a pulling motion from leading edge to trailing edge

Scrapers—The most common type of scraper used is the commercial variety used to remove accumulation from building roofs. Because the handles of this type of scraper will often make contact with the wing, care must be taken to protect the wing. This can be accomplished by covering the handle with a foam wrap. Normally best with wet heavy snow, the scraper should be used in a pulling motion from leading edge to trailing edge (i.e. lay the scraper high on the aircraft surface and pull towards you).

Also available commercially, and of similar benefit to the scraper, is the squeegee. Squeegees are generally available in a variety of sizes and have foam or a similarly soft material on one side and a rubber blade on the other side.

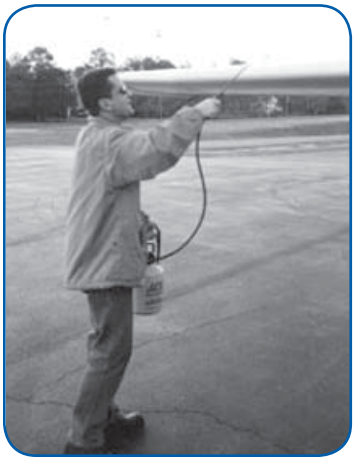
Ropes—Ropes are another method of removing contamination (usually light frost) from wings and horizontal tailplanes. The method requires two personnel and a seesaw motion back and forth across the surface to remove the contaminants. This method tends to polish thicker layers of frost, and under such conditions is not considered an acceptable method of preparing an aircraft for flight. This method would leave frost contamination on the critical surfaces prior to takeoff, which would not comply with CAR 602.11 or CARs Standard 622.11 [*General Operating Flight Rules* (GOFR)], and therefore, would not fulfill the "clean wing concept."

Portable forced air heaters—Heat from a portable forced air heater can effectively remove frost and ice from critical surfaces. These heaters are commonly found in remote and Northern Canadian locations, and are normally used to heat aircraft interiors and to pre-heat aircraft engines.

The operator directs the airflow from a flexible duct onto the contaminated surface and the combined effect of the heated air and low velocity airflow melts and evaporates contaminants.

This technique has the effect of briefly warming the wing surface and can cause snow or other contaminants to stick to the surface when precipitation is present. The operator must keep moving the duct to avoid overheating any spot, as these heaters generate enough heat to cause damage to de-ice boots and other equipment if directed at a single spot for too long. Any water tends to refreeze quickly, as no FPD fluids are used.

Hand sprayers—Extreme operational conditions often require specific solutions. Winter operations in the Canadian North pose their own problems due to the extremes in both weather and temperature. It has been noted that a number of air operators carry Type I fluids with them in the aircraft from station to station so that it is available. The containers in which the fluid is kept resemble the common garden insecticide sprayer. The fluid in this circumstance would appear to be kept at room temperature.



Small hand-sprayers can be used effectively.
Photo: www.Cessna150-152.com.

De-icing fluid is mixed with hot water to remove contamination from the aircraft. This is done from the top of the aircraft down and in a symmetrical fashion. Follow all guidance material listed in the flight manual for normal procedures. Don't forget the undercarriage and the assistance of other personnel.

CAUTION: Proper fluid coverage is absolutely essential for proper fluid performance. It is imperative

that the personnel applying the fluid are properly trained and that a consistent fluid application technique is utilized.

Most aircraft ground-icing-related accidents have occurred when the aircraft was not de-iced prior to takeoff. The de-icing process is intended to restore the aircraft to a clean configuration so neither degradation of aerodynamic characteristics nor mechanical interference from contaminants will occur.

Takeoff after holdover times have been exceeded

In accordance with the operator's program, takeoff may occur after the holdover time has been exceeded only if a pre-take-off contamination inspection is conducted and it is determined that critical surfaces are not contaminated.

Subparagraph 602.11(4)(a)(i) of the CARs states: "The aircraft has been inspected immediately prior to take-off to determine whether any frost, ice or snow is adhering to any of its critical surfaces."

Section 6.3 of CARs Standard 622.11 states, in part: "When holdover time tables are used as decision making criteria, take-off after holdover times have been exceeded can occur only if a pre-take-off contamination inspection is conducted, or the aircraft is de-iced/anti-iced again."

Transport Canada's interpretation of the phrase "inspected immediately prior to take-off," in the ground icing context, is that the inspection must be conducted within **five minutes prior to beginning of the take-off roll.**

This practice is not intended to be used continuously every five minutes, but as a one-time only condition after holdover times have been exceeded.

If, after conducting the contamination inspection, it is not possible to take off within five minutes, the aircraft must return for de-/anti-icing.

Failed fluid recognition

A fluid is considered failed when it is no longer able to absorb frozen precipitation. Under these circumstances, it must be assumed that the contamination is adhering to the critical surfaces.

Failed fluids can be difficult to recognize, in that a layer of clear ice may have formed under the fluid. This clear ice can usually only be detected by a tactile inspection. A failed fluid will usually lose all its glossiness and have a dulled crystalline appearance. While snow on a wing may be readily apparent, the clear ice that may have formed underneath is not. Snow that has accumulated on a wing on top of de-/anti-ice fluids means the fluid has failed and will not "blow off" on the take-off roll. Similarly, when used alone, Type I fluid can refreeze in a matter of a few minutes after the holdover time has expired under certain precipitation conditions (especially freezing drizzle and freezing rain). The appearance is of a dulled rough coating of frost. Upon recognition of a failed fluid, the aircraft must return for further de-/anti-icing or the takeoff must be delayed until the weather improves and the contamination melts.

Action view from the cherry-picker's position.

Here are some recommended media products available from Transport Canada:

— Our video classics *When in Doubt...Small and Large Aircraft, Aircraft Critical Surface Contamination Training* (TP 10643E) and *When in Doubt...Ground Crew—Aircraft Critical Surface—Contamination Training* (TP 10647E) are available in either CD-ROM or VHS format.

— The *Icing—Awareness and Training* CD-ROM (TP 14189E). This recently-released CD-ROM compilation contains the video *Plane Talk on Ice* and also includes the following material: aviation safety newsletters articles, a PowerPoint presentation on winter flying, all of which speak to various aspects of runway conditions or aircraft performance during winter operations. In the video *Plane Talk on Ice*, a group of concerned professionals—airline pilots, light airplane pilots, helicopter pilots, flight attendants and ground crew—has gathered in a hangar to talk about ice contamination and ways of dealing with it. The group discusses such things as poor crew communication, stress, inadequate ground

procedures, corporate pressure and the effects of contamination on aerodynamics. (Note that *Plane Talk on Ice* is also available individually as TP 13637E in VHS format only).

— *Icing for General Aviation Pilots* (TP 14041E) and *Tailplane Icing* (TP 13658E) were produced as a collaborative effort between the National Aeronautics and Space Administration (NASA) Glenn Research Center, the United States Federal Aviation Administration (FAA), and the Aircraft Owners and Pilot Association (AOPA) Air Safety Foundation. Both of these products were subsequently adapted in French by Transport Canada Civil Aviation. (To learn more about the Glenn Research Center's Icing Branch, visit http://icebox-esn.grc.nasa.gov/.)

  — *Icing for General Aviation Pilots* (TP 14041E) presents practical information to help pilots avoid and detect ice, minimize exposure, and safely exit icing conditions during each phase of flight. The effects of icing on aircraft performance and recovery procedures are also discussed. This video is available in CD-ROM, DVD or VHS format.

  — *Tailplane Icing* (TP 13658E) provides information about ice-contaminated horizontal stabilizers and is intended for pilots who may encounter in-flight icing. The video presents a physical description of the tailplane icing problem, symptoms of ice contamination, and suggests recovery procedures. This video is available in either CD-ROM or VHS format.

— *Supercooled Large Droplets (SLD) Icing* (TP 14342) is also a collaborative effort between NASA, the FAA, the Airline Pilot's Association (ALPA) and the National Center for Atmospheric Research (NCAR), with French language adaptation by Transport Canada. This video discusses the phenomenon of SLD icing for the professional pilot and other aviation professionals. Topics covered include how SLD icing conditions are different and exceed those required for aircraft certification; potential performance and handling hazards associated with SLD ice accretions; visual cues from the flight deck to aid early detection and escape; and finally where and how SLD form in the atmosphere to better anticipate this condition. This video is available in DVD format.

  — *System Safety Winter Briefing Kit* (TP 14181). This collection of 14 CD-ROMs contains various promotional products produced by System Safety headquarters and regional offices. This package was originally designed to provide the regional System Safety Specialists with a central bank of materials for the regional safety briefings. However, this collection could well serve industry in setting up their own safety briefings. This kit covers the following themes: 1. Runway surface and aircraft performance; 2. Icing awareness and training; 3. Meteorology and miscellaneous winter flying hazards; 4. Medical and human factors.

All of the products above can be purchased from the new Transport Canada Transact Web site at www.tc.gc.ca/transact, or by calling the Civil Aviation Communications Center at 1 800 305-2059.

Here are additional icing references from the Transport Canada Web site:

Commercial and Business Aviation Advisory Circular (CBAAC) 0130R—*Revised Airborne Icing Training Guidance Material*
www.tc.gc.ca/CivilAviation/commerce/circulars/AC0130r.htm

CBAAC 0225R—*'Ground icing operations update' and 'Holdover time guidelines'*
www.tc.gc.ca/CivilAviation/commerce/circulars/AC0225R.htm

Finally, the 7th edition of the *When in Doubt...Small and Large Aircraft Manual* (TP 10643E) dated December 2004 has been posted on the Web at:
www.tc.gc.ca/civilaviation/general/exams/guides/tp10643/menu.htm △

Don't have enough? Do you want to know more about winter operations?
For the zealous amongst you, consult section AIR 2.12
of the Transport Canada *Aeronautical Information Manual* (AIM)!

2005–2006 Ground Icing Operations Update

In July 2005, the Winter 2005–2006 Holdover Time (HOT) Guidelines *were published by Transport Canada. Check out the following Web site for all the details:* www.tc.gc.ca/CivilAviation/Commerce/HoldoverTime/menu.htm.

A summary of this year's changes to the HOT Guidelines *follows:*

One new Type II fluid was evaluated last winter to assess its holdover time performance. This fluid will not be commercialized this year. Two new Type IV fluids were evaluated last winter to assess their holdover time performance. One of those fluids, Octagon Maxflow, will be commercialized this year. A new manufacturer-specific holdover time guideline table has been generated for this fluid. Furthermore, the availability of this new fluid required two changes to the Society of Automotive Engineers (SAE) Type IV generic table in the snow column (for temperatures of -3°C and above, and below -3°C to -14°C at 75/25 concentration).

There were four additional changes to the SAE Type IV generic table resulting from the removal of obsolete data:

a) Freezing fog column, -3°C and above at 100% concentration;
b) Snow column, -3°C and above at 100% concentration;
c) Snow column, -3°C and above at 75/25 concentration; and
d) Snow column, below -3°C to -14°C at 75/25 concentration).

Several years ago, a need was identified for a de-/anti-icing fluid that had longer holdover times than a Type I fluid, but a lower viscosity than a Type II or IV fluid, for use on aircraft with lower rotation speeds. Clariant produced the Safewing MP III 2031 ECO fluid, which met all the applicable requirements and is qualified as a Type III fluid. A Type III generic fluid table was produced last year based on the holdover times of this fluid at 100% fluid concentration.

The holdover time performance of the Clariant Safewing MP III 2031 ECO fluid was further evaluated last winter for fluid concentrations of 75/25 and 50/50. As a result, HOT guidelines for these additional concentrations have been added to the Type III table this year. There were no HOT tests performed on any Type I fluids and therefore there are no changes to the Type I fluid guidelines.

If you are interested in understanding or learning more about fluid testing and qualification, refer to the following documents from the SAE: AMS 1424 and AMS 1428. These and other documents are available for purchase from the SAE at the following Web site: www.sae.org.

TP 14052, *Ground Icing Operations Update*, has undergone significant changes this year, including a new name. This reference document should continue to be used in conjunction with the *HOT Guidelines*.

In April 2005, TP 14052 was reissued as TP 14052 Edition 2: *Guidelines for Aircraft Ground Icing Operations*. The publication of this second edition was made possible thanks to the dedicated efforts of an Industry/Transport Canada working group. The group spent over two years contributing and refining material for the new edition. Industry members included: air operators, airport authorities, equipment manufacturers, fluid manufacturers, ground icing service providers and researchers. Transport Canada members included representatives from: Commercial and Business Aviation, General Aviation, Occupational Health and Safety, Aerodrome Safety and Environmental Systems.

The second edition covers the following ground icing areas in detail:

- Ground Icing Program Guidelines
- Roles and Responsibilities
- Quality Organization
- Training and Testing
- Personnel Safety
- Communications
- Fluids
- Equipment
- Preventative Measures and De/Anti-icing Procedures
- Holdover Time Guidelines and Associated Procedures
- Operational issues
- Environment
- Facilities
- Emergencies
- Due Diligence

The document also includes a glossary section where the most commonly used ground icing terminology is defined. A reference section to other ground icing documents is included for those seeking further detail and information. TP 14052 is available for download at the following Transport Canada Web site: www.tc.gc.ca/CivilAviation/Commerce/HoldoverTime/menu.htm. If you have any questions or comments regarding the above, please contact Doug Ingold at INGOLDD@tc.gc.ca. △

Feature

The "Other" Privilege of an Aircraft Maintenance Engineer (AME) Licence

by Traci K. Brittain, Superintendent, Aircraft Maintenance Engineer Licensing and Training, Operations, Aircraft Maintenance and Manufacturing, Civil Aviation, Transport Canada

"**Privilege**" *[priv·i·lege] … The* American Heritage Dictionary *identifies this as "a special advantage, permission, right, or benefit granted to or enjoyed by an individual."* Roget's New Millennium Thesaurus *defines a privilege as an "advantage, allowance, authority, authorization, benefit, entitlement, grant or license."*

Regardless of which definition you choose, its clear that being granted a "**privilege**," be it regulatory or otherwise, is serious business.

The scope of **privileges** associated with an AME licence allow for certification (i.e. maintenance certification) of work performed either by the licence holder or by another person under supervision of the licence holder (*primary privilege*). However, there are several other privileges and responsibilities attached to the AME licence; one of them being the responsibility of confirming an AME applicant's experience in the technician's personal logbook.

Where the primary privilege is self-explanatory and clearly understood by licence holders, past and current practices indicate there is confusion regarding the scope of the *secondary privileges*; their associated legal responsibilities and to whom they apply.

AMEs must be conscious of what they are signing for when it comes to tasks performed by another person; AME applicants must be careful to ensure that they record the tasks correctly and get the right people to sign for them.

It is surprising how often task records (e.g. AME logbooks or other such documents) are presented to Transport Canada (TC) for licensing assessment purposes, and during the review it's discovered that:

- The aircraft registration mark identified for the task being claimed does not, or did not, belong to that aircraft type at the time the task was completed (i.e. recorded as Bell 206, registered as Airbus 319);
- Due to non-applicability or non-existence of the system, the task being claimed is not one that could be performed on the aircraft type identified (i.e. changed floats on B737) … [*I kid you not*]; or
- The person who signed for completion of a task didn't hold the appropriate ratings, or in some cases even a licence, at the time the work was completed (i.e. task completed in 2001, signatory licensed in 2003).

"Technically," are such entries regarded as an offence under the *Aeronautics Act*? You bet'cha!

In these types of situations, both the inaccurate entries made by the apprentice and the certifications made by the AME could be viewed as false entries and subject to regulatory enforcement action. Why? Because both the person who wrote the entry and the person who signed for it are liable for the accuracy of the statements made or claimed.

By recording the entry, the applicant is certifying that they have in fact performed the task on that date, aircraft type and registration—and that the person they got to sign for the task supervised them completing the work claimed.

By appending their signature and AME licence [or approved maintenance organization (AMO)] number to a task performed by another, the signatory is certifying that they have personally observed the work to the extent necessary to ensure that it is performed in accordance with the requirements of any applicable standards of airworthiness—and that the individual who completed the work was competent to meet the requirements of *Canadian Aviation Regulations* (CARs) Standard 566.03(4)(e)(ii), which states:

> *Proof of having completed aircraft maintenance tasks shall take the form of a certification by the AME, or equivalent person who supervised the work […] and confirm that the applicant is able to:*
>
> *(A) identify the applicable standard for the task;*
> *(B) select the proper tools;*
> *(C) perform the work correctly without supervision; and*
> *(D) complete the necessary documentation.*

If the task was not completed under the current supervisor's realm, they cannot be asked to sign for it.

If the AME was not suitably licensed, or deemed to be an equivalent person (i.e. having the same level of knowledge and experience as that of a licensed AME) at the time

the task was performed, they are not qualified to sign for the task(s).

So when someone says, "*Hey boss, I need you to sign off some tasks in my logbook, you know, engine and starting systems stuff I did*," as the applicant you need to make sure that you've filled out all of the information required in the logbook pertaining to that work, that it's accurate and that you ask the right person to sign it off. As the AME, you need to check to see when that task was performed in order to ensure that it was in fact completed under your supervision, and that you are eligible to sign for it.

Remember—TC will check this information when submitted for review. Errors of this type will result in rejection of the task list or logbook; additional work and time for the apprentice to correct the entries; identification of the AME incorrectly signing for tasks; and the possibility of enforcement action.

The bottom line is, be conscious of what's being recorded and what's being signed. And remember, both the AME and the apprentice are legally responsible for the accuracy of the statements made or claimed. △

Industry Culture Shift Regarding Aircraft Wiring Badly Needed

by Wilfrid Côté, Civil Aviation Safety Inspector, Aircraft Evaluation, Operations, Aircraft Maintenance and Manufacturing, Civil Aviation, Transport Canada

Based on events (smoke and fires in aircraft) that happened in the last few years, it would be fair to say that wiring installed in aircraft, small and large, has not received the care it should. A sustained aviation personnel culture shift towards aircraft wiring must occur to reduce incidents and accidents caused by faulty wiring systems.

During cargo and baggage loading, and servicing and maintenance activities, wiring is subjected to a lot of abuse. It is stepped on, pulled on, stretched, contaminated with metal shavings, has various liquids spilled on it, and is sometimes used as a handhold. It may not be apparent at that particular time that the wiring suffered some degree of damage. The damage may appear as an intermittent fault or other mysterious performance of some systems. Cleanliness of wiring systems must also be addressed during the lifetime of the aircraft.

Awareness campaigns and continuous training directed at all personnel who are involved in aircraft manufacturing and maintenance would greatly improve the state of wiring systems in aircraft. Awareness campaigns and continuous training should be focused on cleanliness around wiring, the importance of following the standards related to installation practices, the appropriate size of wires for a particular application, adequate wire separation, clearance to structure, and routing. Replacement wires and wires used when installed under a supplemental type certificate (STC) must be compatible with those of the aircraft manufacturer and in compliance with the related installation standards.

The ageing aircraft wiring inspection mandated by the Ageing Transport System Rulemaking Advisory Committee (ATSRAC) found many discrepancies, such as, questionable wires (wires not qualified for airborne use) often utilized to perform a repair or a modification (STC installations), damage to wires, improper separation, inadequate clamping, damaged clamps, chafed wires, and inadequate support. The ATSRAC Web site is a very good source of information related to wiring issues; the Internet address is: www.mitrecaasd.org/atsrac/

Most of these discrepancies would have been found and corrected by maintenance personnel if the guidelines detailed in the aircraft manufacturers' wiring standards manuals had been followed.

The onus is on the original equipment manufacturer (OEM) to provide complete instructions for continued airworthiness (ICA) including wiring inspection and maintenance instructions. The Federal Aviation Administration (FAA) Advisory Circular (AC) 43-13-1B and -2A are appropriate standards that the OEM may use to help create their ICA. Maintenance personnel should also consult those FAA ACs for appropriate guidelines where shortcomings exist in the manufacturers' wiring standards manuals. Even though the subject AC is primarily for unpressurized aircraft, it is quite appropriate to follow its guidelines to supplement the gaps that exist in the aircraft manufacturers' wiring standards manual.

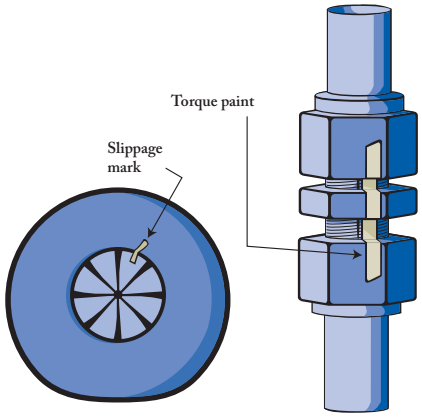
Wires were also found that were not marked in compliance with the requirements of the regulations. This condition leads to difficulty in performing required system maintenance, faultfinding and may also lead to maintenance errors.

To attain a true culture shift toward safe wiring practices, top management of the aviation industry, as well as everyone involved in the manufacturing of aircraft, air operators and maintenance organizations, must adopt a new attitude related to the handling of wiring systems on board aircraft, to ensure those systems receive the attention and care they deserve. This culture shift will ensure improved safety for the travelling public. △

Torque Paint (Slippage Marks)

by Marcel Payant, Civil Aviation Safety Inspector, Standards and Procedures, Aircraft Maintenance and Manufacturing, Civil Aviation, Transport Canada

The application of torque paint (slippage marks) to fuel, air and oil lines and fittings serves more than just one purpose. The most obvious reason is to provide a visual indication to confirm that the subject line and fitting are still at the required torque value (they have not come loose). Many engine manufacturers include the application of torque paint (slippage marks) to fuel, air and oil lines for that very specific reason. It provides for an easy visual confirmation that the subject fitting has not loosened or backed off.



The application of torque paint can also be very helpful to the aircraft maintenance engineer (AME) or technician who is installing or replacing many fuel, air and oil lines during scheduled and unscheduled maintenance. During the installation of multiple fuel, air and oil lines, the application of torque paint after each correct torque value application will provide an additional confirmation that this task has been completed. Some fuel, air and oil lines are installed in a specific sequence to facilitate the installation and/or to ensure correct alignment to prevent interference with other lines. After the installation of many lines, as in the case of an engine change, it becomes very easy to forget which lines have had the correct torque value applied, and which ones have just been hand tightened to facilitate installation and alignment. The application of torque paint (slippage marks) after the completion of the correct torque value to the fitting provides this additional safeguard.

Why do we still hear and receive reports of fuel, air and oil lines becoming loose and causing serious accidents or incidents in aviation? Engine manufacturers require that all fuel, air and oil lines, be visually inspected as part of either a pre- or post-flight inspection. Without this visual aid of torque paint, the AME or technician would need to physically check the torque value of every line and fitting to ensure that they are still at the correct torque value. Visual inspection of lines and fittings for any missing torque paint provides a confirmation that the fitting is still tight. Any missing torque paint would be suspect, and is intended to alert the AME or technician to physically check the subject line or fitting to confirm whether it is at the correct torque value or not.

Any fittings found to be loose should be re-torqued and have the torque paint re-applied.

Slippage marks are also commonly used in tire assembly and build-up to reduce the possibility of tire and tube failure due to slippage. The tire is marked and indexed with the wheel rim, which provides for an easy visual indication of any tire slippage.

Not only does the application of torque paint (slippage marks) make good sense, most manufacturers require it. Operators and maintainers should ensure that torque paint (slippage marks) is applied correctly and is inspected at the required intervals to help ensure that they provide the additional safety that was intended. △

REGULATIONS AND YOU

Regulatory Affairs: CARAC and So Much More!

by Nicole Girard, Chief, Regulatory Affairs, Regulatory Services, Civil Aviation, Transport Canada

Regulatory Affairs, a division of Regulatory Services, is best known by industry stakeholders as the Canadian Aviation Regulations Advisory Council (CARAC) Secretariat. However, our mandate is much broader than the management of CARAC activities. As a multi-disciplinary team, the Division also provides functional advice to regional and headquarters personnel, and advises stakeholders on the consultation and regulatory process. In addition, the team is responsible for the timely processing of exemptions to regulatory requirements, amendments to the *Canadian Aviation Regulations* (CARs) and the *Aeronautics Act*, the maintenance and amendment of the *Delegation of Authority* document, and the issuance of official credentials to delegated officers. Last but not least, Regulatory Affairs manages and publishes the aeronautical information publication (*A.I.P. Canada*), which became the Transport Canada *Aeronautical Information Manual* (TC AIM), in the fall of 2005.

CARAC was established in 1993, and is a joint undertaking of the government and the aviation community, with participation from a large number of organizations outside Transport Canada representing the overall viewpoint of the aviation community. The *CARAC Management Charter and Procedures* outlines the roles and responsibilities of the various CARAC groups, such as the Plenary, the Civil Aviation Regulatory Committee (CARC), the Technical Committees, the Working Groups, and the Secretariat. The CARAC Plenary meets approximately every 18 months, and is the custodian of the Charter, in addition to being responsible for establishing and amending, as required, CARAC's rules and procedures. CARAC recently celebrated its 10th anniversary. This council has become enshrined in the Canadian civil aviation rule-making process and is well respected by industry and government stakeholders.

For more information on Regulatory Affairs and the CARAC Secretariat, please visit our Web site at www.tc.gc.ca/CivilAviation/Regserv/Affairs/menu.htm. Make sure that you take the time to view our new Notice of Proposed Amendment (NPA) database, launched at the 2005 Plenary meeting. We are confident that you will be as excited as we are with this new service available to our stakeholders! △

The Aviation Enforcement Division: Who Are We?

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

As a contracting State of the International Civil Aviation Organization (ICAO), Canada has the obligation to promote compliance with aviation regulations, and efficient operation of all aviation activities for which it is responsible.

At Transport Canada, the Aviation Enforcement Division is the specialized unit that conducts regulatory investigations on all violations to the *Aeronautics Act* and the *Canadian Aviation Regulations* (CARs). In Canada, Canadian regulations apply to people, aeronautical products, and all other objects. Outside of Canada, they apply to holders of Canadian aviation documents, as well as Canadian aircraft and their passengers and crew.

Transport Canada's aviation enforcement policy recognizes the fact that "voluntary compliance" with the regulation is the most progressive and effective approach to achieving aviation safety. However, punitive action may prove to be necessary when there is a violation of the Canadian regulations. This punitive action is applied with fairness and firmness depending on public safety and economic consequences.

Each month, the Aviation Enforcement Division publishes a summary of all punitive action taken against companies or people who have contravened the Canadian regulations. You are invited to consult these documents at the following Web site:

www.tc.gc.ca/civilaviation/RegServ/Enforcement/Publications/menu.htm.

In our next article, we will provide an overview of compliance measures. △

When You Visit the Medical Examiner

This is the first article in the aviation medicine section of the new Aviation Safety Letter. It will describe what happens during an aviation medical examination, and why. In coming issues, we will write about various medical conditions and how they may affect the fitness of pilots to fly or air traffic controllers to perform air traffic control (ATC) duty. We welcome your questions and suggestions for topics to explore.

Most pilots and air traffic controllers will need to visit an appointed aviation examiner periodically to obtain or renew a medical certificate (MC). The few exceptions are those healthy enough to answer all questions on a medical declaration form in the negative, and who only desire a category 4 MC. However, if you have ever had any of the conditions listed on the form (for example, high blood pressure), then you must undergo a complete medical examination by an appointed examiner. The category 4 MC is restricted to use with gliders, ultralights, recreational pilot permits and student pilot permits (aeroplane).

All professional pilots (commercial and airline transport) require a category 1 MC, air traffic controllers and flight engineers require category 1 or 2 MC, and private pilots and balloon pilots require either category 1 or 3 MC to validate their licences. Examinations are required as frequently as every six months, for professional pilots who are at least 40 years of age, or as seldom as every five years, for private or balloon pilots who are under 40. The validity periods are printed in a table on the back of the MC. Appointed physicians are known as Civil Aviation Medical Examiners (CAME), and there are about 900 of them in Canada and overseas. A list on our Web site (www.tc.gc.ca/CivilAviation/Cam/menu.htm) can be searched by country, province or city.

When you arrive at the CAME's office, you will first complete Part A of the medical examination report (MER), where identification data is recorded. If this is your first visit to a particular CAME, you will probably be asked to show proof of identity in the form of photo ID. In addition to your identification, you should bring with you copies of any prescriptions (or the medications themselves), and a copy of your lens prescription if you require glasses or contacts. If you have had medical treatment since your last examination, then the name and phone number of your personal physician will facilitate getting copies of any records or reports that may be required.

When filling out the form, it is important to record your permit/licence number if you have previously applied for a MC, as well as the type of licence or permit desired and/or held, since this will determine which category is appropriate for your needs. The desired type should be consistent with your choice of *primary type of flying intended* (recreation, business or career), as confirmed later on the form.

Your daytime telephone number (and fax or e-mail if preferred), along with your current postal address in full, are required so that we can reach you promptly if we need to obtain further information. A tick-off box for address changes is provided so that Transport Canada records can be updated if you have moved since your last examination. You should write your complete legal names (rather than just initials and nicknames) as they appear on your passport or other identification. Your country of citizenship and birth date are requested for compliance with international agreements.

If you are a pilot, then the record of *pilot flight time* can be helpful if we need to apply flexibility, or when any medical limitation or restriction is considered. The identification of any aircraft accident is also important since this information is not routinely available from safety data and it may require special attention if it was associated with either a medical cause or resultant injury.

Similarly, a positive answer to questions regarding prior medical unfitness (being refused issue of an MC) or receiving a medical pension may lead to a request to document the condition before a certificate can be issued or renewed. Although a prior refusal to grant an MC may be considered as a red flag, you should be reassured that we will base our assessment only on your current condition and prognosis (expected outcome). We will apply up-to-date standards (which tend to be more liberal), using flexibility where possible. Many pilots and controllers who were previously found to be unfit would be acceptable by the current rules.

One of the most important, but often overlooked, questions in Part A is: "Have you consulted a physician since your last aviation medical examination? If yes, give reason." It is in your interest to ensure that the CAME is aware of any other examinations, tests, diagnoses or

treatments that you have undergone or received, both to prevent duplication and prevent embarrassment (if information is omitted here but revealed later in the assessment process).

Finally, you should indicate the dates of previous MERs, audiograms or electrocardiograms (ECGs) submitted for licensing purposes, and indicate the official language in which you prefer to receive correspondence.

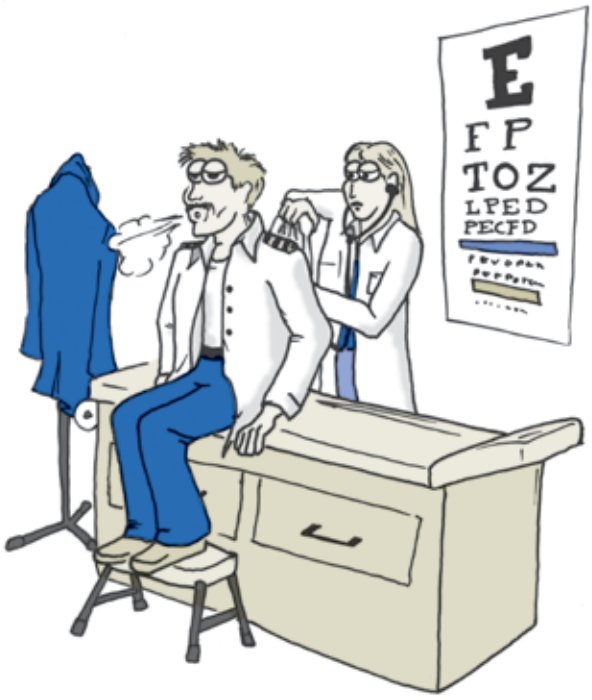
Part B of the MER consists of a medical history and review of systems. The examiner should complete this part, but it also requires your input. A section on *family history* is included to identify persons at higher risk for genetic or familial diseases. There is also a block to record cardiovascular risk factors. Further investigation may be advised if you appear to be at increased risk for any of these conditions.

A thorough functional inquiry (review of systems) is the basis for any good medical examination. If there is any significant history or symptom, the details must be elaborated either on the form or on an attached sheet. If you have had an injury or illness, but have recovered without any disability that would affect flight safety, then the requested documents will easily confirm your aviation status.

One of the most important questions in Part B refers to *current medications* [prescription or over the counter (OTC)]. Few medications are completely prohibited in aviation, but it is important for us to know what a pilot or air traffic controller may be using in order to advise them professionally. You may be told to avoid certain drugs for some time before duty, or to use alternatives with fewer adverse side effects. In other cases, the examiner may defer your renewal until the case has been referred to our office (we will discuss the use of medications further in an upcoming issue).

After completing the *review of systems* (or perhaps at the end of the examination), you will read, date and sign the *statement of applicant*. This is a legal declaration that must be witnessed. You are reminded that it is an offence under the *Aeronautics Act* to knowingly make a false declaration. The continued success of our medical assessment system relies on your honesty and candour as an applicant.

The next part of the process (Part C) is the physical examination done by the physician, although other office staff may perform some measurements such as height, weight and blood pressure. There is a place on the MER form to record surgical scars, tattoos or other marks, since these may occasionally be useful for identification following aircraft accidents. Special examination is made of the visual and auditory systems because of their importance in the safe operation or control of an aircraft. Another routine test is that of colour perception—usually tested with colour plates or with a vision-testing machine. If your distant or near vision is not fully corrected, your ocular muscle balance appears to exceed normal limits, or you fail the colour plate test, then you may be referred to an eye specialist for correction or further examination (the topic of visual standards will be covered fully in an upcoming issue). Normally, hearing may simply be tested using whispered voice or a screening audioscope, but if there is evidence of decreased hearing, you may need to be tested with an audiometer to obtain a pure tone audiogram. Professional aircrew are routinely required to submit an audiogram on initial examination, and again after age 55.



The rest of the physical examination, although comprehensive, will normally confirm what is known from your medical history and review of systems. Even applicants who have had an amputation of a limb, or have some other physical disability, may be considered fit (for certain types of permits or licences) through the application of flexibility. Before issue of an MC, a practical flight test may be required so that the applicant may demonstrate the ability to compensate for the physical deficiency and safely pilot or control an aircraft.

If you are a private pilot over 40 years of age, you will need to submit an ECG at least every five years (professional aircrew need to do so more frequently, and earlier). The only other requirement during the examination is for a urine test, which can be done in the examiner's office.

When the examination has been completed, the CAME will make a recommendation of fitness on the form and forward the documentation to the Regional Aviation Medical Officer (RAMO) for review. If the examiner considers you to be fit, and if you already hold an MC, then the CAME may renew your MC for the full validity period. This is done by stamping, signing and dating one of the renewal boxes on the back of the MC. However, CAMEs are not permitted to issue initial certificates, alter restrictions or upgrade categories.

If you are a new applicant, or if there is doubt whether you still meet the medical standards, then the CAME will defer issue or renewal. In that case, the RAMO will contact you to request further information (and perhaps other medical investigations) before completing your assessment.

In the unlikely event that the examiner considers you unfit to fly or control an aircraft because of a medical condition or treatment, they are obliged to inform Transport Canada (as all physicians and optometrists in Canada must do so in accordance with the *Aeronautics Act*). If you already held a certificate, you would be prohibited from exercising the privileges of your permit or licence in accordance with *Canadian Aviation Regulation* (CAR) 404.06.

If, for any reason, the CAME cannot renew your certificate, then your assessment will be completed by the RAMO. Once this is successful, you will be issued a new MC. Any restriction, such as "valid only when wearing required glasses," will be printed on the new certificate. Between 50 000 and 60 000 MERs are submitted annually, and the vast majority (over 98%) are assessed as either fit or fit with restrictions.

If you have any questions regarding your personal medical fitness, they should be directed to either your CAME or RAMO. Toll-free numbers for the Regional medical offices are printed on the tear-off bottom section of the MC, as well as published on our Web site (under Contacts). △

Zero Tolerance for Air Rage—Ensuring Safety in the Skies

Transport Canada has taken a leadership role in working to reduce incidents of air rage and increase safety in the skies. What is air rage? Any sort of disruptive behaviour or interference with crew members that jeopardizes the safety of the flight.

How prevalent is it? Evidence gathered to this point by airlines and the government suggests that air rage is not widespread, although recent attention to the issue is giving it more public prominence. Transport Canada is changing its regulations to make it mandatory for airlines to report incidents of air rage.

What causes air rage? The causes are many, and could include excessive alcohol consumption and psychological factors related to travel or stress.

Managing air rage

One of the first steps in dealing with unruly passenger behaviour that jeopardizes safety is to raise public awareness that interference with crew members is unacceptable and will not be tolerated. That's why Transport Canada and its partners in the air industry launched the world's first campaign to get the word out to the traveling public by providing material such as posters and ticket stuffers to air operators and travel agents across Canada.

On May 8, 2001, Transport Canada distributed a booklet entitled, *Unruly Passengers: The Police Response, an information guide for airline staff in Canada*, to air operators and airline employees. Originally produced by the Peel Regional Police and the Ottawa Police Service, the booklet outlines how the judicial process works and the role of law enforcement regarding air rage.

A special working group led by Transport Canada, that included representatives from industry, labour and law enforcement agencies, issued a report making recommendations on how to combat and limit future incidents of unruly behaviour.

Transport Canada is taking action to implement the report's recommendations in its areas of responsibility, including changes to the *Aeronautics Act* to make it a criminal offence to interfere with a crew member's duties, and to the *Canadian Aviation Regulations* (CARs) to require mandatory crew training on how to prevent and manage incidents. The government is also working with Canada's aviation industry to improve policies and procedures in this area.

Safety in the skies is a top priority for Transport Canada, and it will continue to monitor the situation and take action to improve safety. △

Airmanship: Dead or Alive?

by Michel Treskin, Civil Aviation Safety Inspector, System Safety, Ontario Region, Civil Aviation, Transport Canada

Last summer, I was at a weekend fly-in hosted by a local airport, with 60 to 70 airplanes and flying enthusiasts attending. On the last day, I went to see how so many aircraft might leave in an orderly fashion from a congested ramp and only one runway. I was shocked to notice that roughly 90% of the pilots did not perform a walk around of their aircraft before hopping into it, and similarly never called "clear prop" before engaging the engine's starter. I could not believe what I was witnessing! Even more shocking was how these pilots prepared to depart. I expected that each aircraft would be taxied to a point short of the runway where the usual magneto check, carburetor heat check and the other important checklist items would be completed. However, roughly 90% of these pilots did not perform those checks, and appeared to be in a rush to leave. This was not the first time I observed pilots not carrying out their pre-flight inspection and pre-flight checks. These checks are as important to complete as getting the weather before flight. It is the duty of a responsible individual in control of an aircraft to carry out these checks. This professional behaviour is known as airmanship.

When I went through training in the military, airmanship was treated equally as important as the regulations. We were taught how to become better aviators; how not to cut corners when important tasks were required to be done. We were deemed to be professionals. One dictionary defines a professional as "one skilled in a profession, craft or art." The flying industry definition is "someone who has received training in a professional training facility." Can a professional automatically be an expert in airmanship? Or is airmanship an acquired skill that someone achieves after years of experience? To answer these questions (of what airmanship is, and whether or not it exists within our personalized skills), we need to understand the fundamentals of airmanship.

Airmanship should be viewed overall. It includes discipline, skills, proficiency, knowledge of self, knowledge of your aircraft, knowledge of the environment and also the risks associated with flight. It also includes situational awareness and good judgment. The three fundamental principles of airmanship are: skill, proficiency and discipline. When all three are applied together, one becomes a safer and more efficient pilot. Skills come in four levels (Tony Kern): level one is safety (good enough to be safe); level two is effectiveness (being able to handle the local and cross-country environment that you wish to operate in on your own); level three is efficiency; and level four is precision and continuous improvement. The average general aviation pilot will usually reach level two in their lifetime. Only with additional training will they be able to move up to level three. Research (Wiegman & Shappell) has shown that over 80% of all general aviation accidents were attributed to lack of skills (skill-based error); the basic stick and rudder handling, or lack thereof. There is no substitute for flying skills.

Now, imagine what automation will do (degradation) to your basic flying skills. Proficiency is much easier to achieve. Basically, the more you fly on a regular basis, the more you will become skilled in doing so. "Poor proficiency is as high a risk factor as low experience" (Yacovine et al., 1992). You should not be reluctant to hire a qualified flight instructor after a long period of not flying. You can bet that one hour of refresher will go a long way and will definitely reduce the risk. Generally, most of us fly on a very casual basis, during hospitable weather conditions. Because personal proficiency is such an individualized subject, it is difficult to generalize, from either the regulatory requirements or research findings, in a way that is meaningful for everyone.

Flight discipline is the cornerstone of airmanship. There is no room in good airmanship for intentional deviations from accepted regulations, procedures or common sense. Violation of flight discipline is a major factor in many human factor accidents. Airmanship also involves maximizing situational awareness, in order to prepare ourselves to have the necessary attention to handle unexpected events. All we must do is build a solid and complete airmanship structure, and then good judgment will naturally flow from it. Good judgment leads to better decision-making, and that is what it's all about.

As professional pilots, we need to be ready for any complication or deviation from the normal flight envelope. Don't forget that flying is a risky business and we need to constantly reduce/manage the risk to a minimum acceptable level. The cure for the rash of human-error accidents and incidents lies at our fingertips: through self-improvement, we (as aviators) can affect a cultural change in aviation. Let's all think and act like professional pilots whenever we are preparing to go flying! △

Flight Crew Recency Requirements
Self-Paced Study Program

Refer to paragraph 421.05(2)(d) of the Canadian Aviation Regulations *(CARs).*

This questionnaire is for use from October 1, 2005, to October 31, 2006. Completion of this questionnaire satisfies the 24-month recurrent training program requirements of CAR 401.05(2)(a). It is to be retained by the pilot.

Note: The answers may be found in the Transport Canada Aeronautical Information Manual *(TC AIM). References are at the end of each question. Amendments to these publications may result in changes to answers and/or references.*

1. Aircraft accidents and reportable incidents are to be reported to the _____ office. (AIM-GEN 3.3.5)

2. When a section of a runway, or a helicopter take-off and landing area is closed, it will be marked with an __. (AGA 3.3 and 5.6)

3. Do turnaround bays (runway turn pads) give sufficient clearance from the runway edge to allow for holding while other aircraft use the runway? ___ (AGA 3.4)

4. Flags, cones, or wing bar lights may be installed to indicate the position of a _____ for a relatively short period of time. Further information will be given in a voice advisory or _____. (AGA 5.4.1)

5. A _____ sign is installed at all taxiway-to-runway intersections at certified aerodromes. [AGA 5.8.3(a)]

6. Runways greater than _____ ft in length will have a wind direction indicator for each end of the runway. (AGA 5.9)

7. A dry Transport Canada standard wind direction indicator will react to a wind speed of 10 kt by blowing at an angle of __ degrees below horizontal. (AGA 5.9)

8. When commencing their approach at an aerodrome with aircraft radio control of aerodrome lighting (ARCAL), pilots are advised to _____, even if the lighting is on, to ensure that the full 15-minute cycle is available. (AGA 7.19)

9. VHF direction finding system (VDF) equipment gives the VDF operator a means of providing _____, _____, or _____ information to pilots requesting the service. (COM 3.10)

10. What should pilots do if they suspect GPS interference or other problems with GPS? _____ _____. (COM 3.16.8)

11. What is the normal period of coverage of an aerodrome forecast (TAF)? _____ (MET 3.9.3)

12. What coded group is used, in an upper level wind and temperature forecast (FD), when the wind speed is less than 5 kt? _____ (MET 3.11)

13. In a METAR, is the wind direction is given in degrees true or magnetic? _____ (MET 3.15.3)

14. Automated weather observation system (AWOS) observations use the word _____ to indicate an automated weather observation. (MET 3.15.5)

15. METAR CYBC 211700Z 0912G20 5/8SM BLSN VV007 M03/M05 A2969 RMK SN8 VIS W2 SLP105

    In the weather report above, the prevailing visibility is _____ and the ceiling is _____. (MET 3.15.3)

16. What classes of airspace require the use of a functioning transponder? _____ _____ (RAC 1.9.2)

17. Low level airways are controlled low level airspace, extending upwards from _____ feet AGL, up to, but not including, 18 000 ft ASL. (RAC 2.7.1)

18. In uncontrolled airspace below 1 000 ft AGL, what is the minimum visibility for day VFR flight, and how far from clouds must you remain? _____ (RAC 2.7.3, CAR 602.115)

19. Except when operating within __ NM of the departure aerodrome, no pilot-in-command shall operate an aircraft in VFR flight unless a _____ has been filed. (RAC 3.6.1)

20. If radio-equipped, what two radio transmissions are mandatory when departing from an uncontrolled aerodrome within an aerodrome traffic frequency (ATF) area? _____ _____ (RAC 4.5.7)

21. Where possible, pilots are required to report at least ____ minutes prior to entering a MF or ATF area. (RAC 4.5.7)

22. What type of altimeter must a power-driven aircraft be equipped with for day VFR flight in controlled airspace? _____ (RAC ANNEX page 1-5, CAR 605.14)

23. To activate a dial-up remote communications outlet (DRCO), the pilot is required to key the microphone button __ times in a row, with no more than __ second(s) between each keying. (RAC 1.1.4)

24. The requirements for entry and departure of aircraft engaged in international flights, and the standard procedure for clearance of these aircraft at all international airports is contained in the _____ section of the AIM.

25. On flights from Canada to the U.S., at least _____ advance notice of your arrival must be provided to U.S. customs. (FAL 2.3.2)

26. Any testing of an emergency locator transmitter (ELT) must be conducted only during the first __ minutes of any ___ hour and for not more than __ seconds. (SAR 3.8)

27. The schedule outlining the requirements to carry an ELT for all aircraft is contained in section _____ of the AIM.

28. How often is the list of current aeronautical charts on the Web updated? _____ (MAP 2.2)

29. Aeronautical information circulars (AIC) provide advance notice of major changes to legislation, regulations, and procedures where the text is not a part of the _____. (MAP 6.3)

30. 051234 NOTAMJ CYND OTTAWA/GATINEAU
CYND RSC 09/27 100 PERCENT LOOSE SNOW 1 INS 0512051400
CYND CRFI 09/27 -7 .34 0512051415

In the above NOTAM, the Canadian runway friction index (CFRI) for Runway 09/27 is ___ and the temperature is __ measured in degrees _____. (MAP 5.6.4)

31. A CRFI reading will not be provided when there is loose snow on the runway surface exceeding _____ in depth. (AIR 1.6.4)

32. The altimeter subscale is set .50 in. Hg too high. The indicated altitude is 5 500 ft ASL, but the actual altitude of the aircraft will be _____ ft ASL. (AIR 1.5.3)

33. Refer to the *Cross Wind Limits for Canadian Runway Friction Index (CRFI)* chart in TC AIM, AIR 1.6.6, Table 3, or in the *Canada Flight Supplement* (CFS) General section.
The wind is 30 degrees off the runway at 20 kt. The minimum recommended CRFI is _____. (AIR 1.6.6 Table 3)

34. Cloudy or hazy aviation fuel is usually caused by _____, but can also occur because of _____. (AIR 1.3.2)

35. The use of small plastic fuel containers, which cannot be properly bonded or grounded, increases the chance of _____. (AIR 1.3.4)

36. Approximately ___% of all aircraft accidents involving light aircraft in Canada are attributed to pilot failure to compensate for crosswind conditions on landing. (AIR 2.2)

37. The presence of rain on the windscreen, in addition to causing poor visibility, introduces a _____. (AIR 2.5)

38. Three symptoms of carbon monoxide poisoning are _____, _____ and _____. (AIR 3.2.3)

39. The _____ is more sensitive to hypoxia that any other part of the body. (AIR 3.7)

40. Indiscriminately resetting popped circuit breakers should be _____. (AIR 4.11)

Answers to this quiz are found on page 20 of this ASL 3/2005.