Transport Canada Transports Canada

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AVIATION SAFETY LETTER

In this issue…

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

Canada

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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.

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GPS signals

The "Can GPS Get You Lost?" article in ASL 4/2012 makes some good points. Many pilots have become too dependent on portable GPS receivers and don't even unfold a map let alone follow their track on one. This can mean real trouble if GPS guidance is lost. Several examples in the article, however, leave the impression that GPS signal coverage is an issue, but loss of coverage is extremely rare. Loss of guidance is much more likely due to the limitations of portable units.

GPS signals are very weak when they reach a receiver, making antenna design and location critical. Antennas in portable GPS receivers perform well enough, but not as well as externally-mounted antennas. Airframe shielding can prevent a unit from receiving signals from all available satellites, sometimes resulting in loss of guidance. If this happens, putting the unit up on the glare shield could help, but a pilot's first priority should be to pinpoint position on a map.

Above all, flying the aircraft has to take precedence—too many pilots have been distracted trying to sort out technical problems, with disastrous results. Finding a technical solution can wait until you're back on the ground.

This could take the form of a plug-in remote antenna, or in the case of a computer tablet, an external GPS receiver that either uses Bluetooth or connects directly. Another thing to consider with a tablet is whether you can rely on it for maps. In the case of a dead battery or other total failure you will need either paper maps or another electronic map source.

Regardless of the technical solution, the operational solution is self-evident: fly VFR in weather that allows you to see the ground, follow your track on a map and use your portable GPS receiver as an aid to navigation.

Ross Bowie
Ottawa, ON

Ross Bowie managed the SatNav Program Office in Transport Canada and then in NAV CANADA for a total of 10 years. After retiring in 2009 he revised the GNSS Manual under contract with the International Civil Aviation Organization (ICAO). He holds an Airline Transport Pilot Licence (ATPL) and has flown for 46 years—the last 20 with GPS.

When the ELT Became the Hazard

A local flight training unit (FTU) requested that I conduct an examination for a private pilot licence on a student pilot in his own Cessna 172 C. I have completed pilot examinations in privately registered aircraft in the past. I insist that the aircraft be inspected by an approved maintenance organization (AMO) to the same standard as a commercially registered aircraft of the same type that may be flown by an FTU.

While observing Exercise 2D, the pre-flight inspection, I took a notion, for some unknown reason, to personally peer into the aft fuselage behind a panel to see if this aircraft was equipped with a 406 emergency locator transmitter (ELT) beacon or the old style 121.5/243 beacon. To my surprise, the beacon was not where it should have been (attached to the bracket on the side of the fuselage). Upon opening the panel a bit more, I saw the beacon in the belly on its back, still attached to its antenna but lying between the rudder cables and on top of the trim cables. The right rudder cable appeared to have been rubbing on the plastic case of the ELT battery.

I bring this to your attention because the aircraft manufacturer is not required to view this area of the structure during a pre-flight inspection. I think it might be a good idea for owners and operators to assess the safety of any items in such areas periodically. We will never know if my hunch prevented an accident, nor for how long the ELT was in this condition. The commercial and private flight tests do require stalls, sideslips, spirals and/or spins. Therefore, the use of the rudders to recover from these manoeuvres would obviously be of paramount importance.

The owner, in this case, immediately took the aircraft to his AMO, who reinstalled the beacon and also added air to the tires before we boarded the aircraft and conducted the test that day.

John M. Laing
Delta, B.C.

Pre-Flight

Survival on the Hudson: Inattention to Safety Briefings, Life Vests and Life Lines Increased Risks After US Airways Flight 1549 Touched Down

by Wayne Rosenkrans

This article was originally published in the July 2010 issue of AeroSafety World *magazine and is reprinted with the permission of the Flight Safety Foundation.*

The public's intuition that "fortuitous" circumstances contributed to all occupants surviving the January 2009 ditching of an Airbus A320 in the Hudson River has been seconded by the final accident report of the U.S. National Transportation Safety Board (NTSB) on US Airways Flight 1549.[1] Now-famous images of people without life vests or life lines standing on the wings, however, contain a less obvious message about shared responsibility for safety aboard aircraft. Rather than dwell on the unusually favourable circumstances, the NTSB took the opportunity to redirect the attention of government, the airline industry and the travelling public to the critical survival factors they do control.

For example, noting that "only about 10 passengers [of 150] retrieved life vests themselves after impact and evacuated with them" and that only 77 retrieved flotation-type seat cushions, the survival factors sections of the report essentially said that crew members and passengers disregard at their peril the life-saving knowledge and equipment provided. "The NTSB notes that, after exiting the airplane through the overwing exits, at least nine passengers unintentionally fell into the water from the wings," the report said.

Several explanations were offered by investigators. "Although the accident flight attendants did not command passengers to don their life vests before the water impact, two passengers realized that they would be landing in water and retrieved and donned their life vests before impact, and a third passenger attempted to retrieve his life vest but was unable to do so and, therefore, abandoned his attempt," the report said. "Many passengers reported that their immediate concern after the water impact was to evacuate as quickly as possible, that they forgot about or were unaware that a life vest was under their seat, or that they did not want to delay their egress to get one. Other passengers stated that they wanted to retrieve their life vest but could not remember where it was stowed." In all, 101 life vests were left stowed under passenger seats.

The accident analysis does not devalue the positive outcomes of the captain's judgment, the cabin crew's performance or the passengers' orderly behaviour, and the report notes, "The NTSB concludes that the captain's decision to ditch on the Hudson River[2] rather than attempting to land at an airport provided the highest probability that the accident would be survivable. . . . Contributing to the survivability of the accident was the decision making of the flight crew members and their crew resource management during the accident sequence; the fortuitous use of an airplane that was equipped for an extended-overwater [EOW][3] flight, including the availability of the forward slide/rafts, even though it was not required to be so equipped; the performance of the cabin crew members while expediting the evacuation of the airplane; and the proximity of the emergency responders to the accident site and their immediate and appropriate response to the accident," the report said.

The lessons learned reflected the importance of leaving as little to chance as possible in preparations to survive an aircraft accident. "The investigation revealed that the success of this ditching mostly resulted from a series of fortuitous circumstances, including that the ditching occurred in good visibility conditions on calm water and was executed by a very experienced flight crew. . . .

The investigation revealed several areas where safety improvements are needed," the report said.

The accident airplane was one of 20 EOW-equipped A320s among the airline's fleet of 75 A320s. Each of four slide/rafts was rated to carry 44 people and had an overload capacity of 55. Also aboard, but not counted toward EOW equipment, were two off-wing ramp/slides, one at each pair of overwing exits.

"The accident airplane had the statements, 'Life Vest Under Your Seat' and 'Bottom Cushion Usable for Flotation,' printed on the [overhead] passenger service units (next to the reading light switches) above each row of seats," the report said. The four life lines were designed to be retrieved after ditching from an overhead bin, attached to top corners of door frames on both sides of the airplane fuselage and anchored to a designated point on top of each wing.

The importance of these items becomes clear by considering that only two detachable slide/rafts were available for Flight 1549 occupants—at door 1L and door 1R—with a combined capacity to carry 110 of the 155 occupants if the airplane had sunk before they were rescued. The NTSB determined that about 64 occupants were rescued from these slide/rafts, while about 87 were rescued from the wings and off-wing ramp/slides.

Survival Scenario

Loss of thrust in both engines prompted the captain of Flight 1549 to commit to the ditching as the safest course of action despite it necessitating an evacuation in harsh winter temperatures. The flight crew later said that its top priority then was to touch down with a "survivable sink rate." Analysis of the digital flight data recorder showed that "the airplane touched down on the Hudson River at an airspeed of 125 kt calibrated airspeed with a pitch angle of 9.5°, [a descent rate of 12.5 ft per second (fps)] and a right roll angle of 0.4°," the report said.

The evacuation began within seconds of the airplane's rapid deceleration on the river's surface, after touchdown at about 15:27 local time. The captain opened the flight deck door and commanded an evacuation by speaking directly to the forward flight attendants and passengers. He observed then that the evacuation had already begun.

"The water in the back of the airplane rose quickly, which, in addition to improvised commands from flight attendant B to 'go over the seats,' resulted in numerous passengers climbing forward over the seatbacks to reach a usable exit," the report said. "However, some aft passengers remained in the aisle queue to the overwing exits. Many of these passengers noted that, when they arrived at the [overwing] exits, the wings were crowded and people were exiting slowly. They also reported that the aisle forward of the overwing exits was completely clear and that the flight attendants were calling for passengers to come forward to the slide/rafts."

The NTSB estimated the evacuation sequence and timing: The left overwing exits were opened by passengers at 15:30:58, contrary to the airline's ditching procedures, and the first passenger subsequently exited; flight attendant A opened door 1L to its locked-open position against the fuselage at 15:31:06, and no water entered, but this crew member had to operate the manual inflation handle to deploy the slide/raft because the automatic system appeared to have failed; flight attendant C opened door 1R at 15:31:11, automatically causing full deployment of the slide/raft at 15:31:16; one passenger jumped into the water from door 1L at 15:31:23 before its slide/raft began to inflate; the slide/raft at door 1L began to inflate at 15:31:26; the first vessel arrived on scene at 15:34:40; and the last vessel departed the scene after rescuing the last passengers from the left off-wing ramp/slide at 15:54:43.

Eight of the passengers exited the aircraft, re-entered the aircraft to obtain one or more life vests, then exited from a different door. Flight attendant B did not become aware of a serious injury to her left shin until aboard the door 1R slide/raft.

"A review of passenger exit usage indicated that, in general, passengers from the forward and mid parts of the cabin evacuated through the exit closest to their seats," the report said. "However, aft-seated passengers indicated that water immediately entered the aft area of the airplane after impact and that the water rose to the level of their seat pans within seconds; therefore, they were not able to exit from their closest exits because these exits were no longer usable." Several safety equipment irregularities occurred, affecting crew actions and passenger behaviour. "Flight attendant C… stated that door 1R started to close during the evacuation, intruding about 12 in. [30 cm] into the doorway and impinging on the slide/raft," the report said. "She stated that she was concerned that the slide/raft would get punctured, so she assigned an 'able-bodied' man to hold the door to keep it off of the slide/raft."

One female passenger with a lap-held child received assistance from a fellow passenger shortly before the touchdown. "When the captain [announced] 'Brace for impact,' the male passenger in [seat] 19F offered to brace her [nine-month-old] son for impact," the report said. "The lap-held child's mother [in seat 19E] stated that she thought the passenger in 19F 'knew what he was doing,' and she gave her son to him." None of these passengers was injured.

All three flight attendants described the evacuation process as relatively orderly and timely. The captain and first officer said that while assisting the cabin crew with the evacuation, they observed passengers without life vests outside the airplane. "[The captain and first officer] obtained some life vests from under the passenger seats in the cabin and passed them out to passengers outside of the airplane," the report said. The flight crew also conducted the final cabin inspection to ensure no passengers had been left, then exited onto the slide/raft at door 1L.

Emergency Response

Air traffic control tower personnel at LaGuardia Airport activated the area's emergency alert notification system via its crash telephone at 15:28:53. This immediately notified numerous agencies to respond with predetermined personnel and equipment according to the LaGuardia Airport emergency plan. The airport dispatched one rescue boat. Personnel from New York Waterway (NY WW) also responded to the accident although they were not part of the emergency plan.

"The airplane was ditched on the Hudson River near the NY WW Port Imperial Ferry Terminal in Weehawken, New Jersey," the report said. "Many NY WW ferries were operating over established routes in the local waterway, and the ferry captains either witnessed the accident or were notified about it by the director of ferry operations. Seven NY WW vessels responded to the accident and recovered occupants."

The first responders considered the winter weather conditions a serious risk to survival. "The post-crash environment, which included a 41°F [5°C] water temperature and a 2°F [minus 17°C] wind chill factor and a lack of sufficient slide/rafts (resulting from water entering the aft fuselage), posed an immediate threat to the occupants' lives," the report said. "Although the airplane continued to float for some time, many of the passengers who evacuated onto the wings were exposed to water up to their waists within two minutes."

The Port Imperial Ferry Terminal was designated as the central triage site; nevertheless, captains of vessels dropped off the Flight 1549 occupants at the closest locations in New York and New Jersey because the aircraft was drifting and some passengers were wet and at risk of cold-induced injury.

Among the 45 passengers and five crew members transported to hospitals, flight attendant B and two passengers had sustained serious injuries. One of those passengers was admitted to a hospital for treatment of hypothermia. The other was treated for a fractured xiphoid process, an "ossified extension" of the lower part of the sternum. "Two passengers not initially transported to a hospital later furnished medical records to the NTSB showing that one had suffered a fractured left shoulder and the other a fractured right shoulder," the report said. "Flight attendant B sustained a V-shaped, 12-cm-long 5-cm-deep [5-in. by 2-in.] laceration to her lower left leg that required surgery to close." The cause of flight attendant B's laceration was a vertical beam that punctured the cabin floor in front of her jump seat about 11 in. (28 cm) forward of the seat pan.

Life Vest Awareness

Passenger interviews indicated that about 70 percent of the passengers did not watch any of the preflight safety briefing. "The most frequently cited reason for [inattention] was that the passengers flew frequently and were familiar with the equipment on the airplane, making them complacent," the report said.

Flight 1549 passengers could learn about the availability of life vests only from the safety information cards in seatback pockets or the overhead statements, although some assumed that all commercial passenger jets carry life vests. "US Airways' FAA-accepted In-Flight Emergency Manual followed [FAA] advisory circular guidance and specified that, if the airplane is equipped with both flotation seat cushions and life vests, flight attendants should brief passengers on both types of equipment, including the location and use of life vests," the report said. "The cockpit voice recorder recorded flight attendant B orally brief the location and use of the flotation seat cushions; however, it did not record her brief the location of or the donning procedures for life vests. . . . A life vest demonstration was not required because the flight was not an EOW operation."

Braced But Injured

The safety information cards also provided instructions on the operation of the emergency exits and depicted passenger brace positions that were similar to FAA guidance on brace positions. Three of four seriously injured passengers were hurt during the airplane's impact with the water.

"The two female passengers who sustained very similar shoulder fractures both described assuming similar brace positions, putting their arms on the seat in front of them and leaning over," the report said. "They also stated that they felt that their injuries were caused during the impact when their arms were driven back into their shoulders as they were thrown forward into the seats in front of them. The brace positions they described were similar to the one depicted on the US Airways safety information card."

The passenger seats on the accident airplane were 16-g compatible seats. The NTSB noted that new seats have a non-breakover seatback design, which minimizes head movement and body acceleration before striking the seatback from behind, resulting in less serious head injuries.

"Guidance in [FAA Advisory Circular 121-24C] did not take into consideration the effects of striking seats that do not have the breakover feature because research on this issue has not been conducted," the report said. "The

NTSB concludes that . . . in this accident, the FAA-recommended brace position might have contributed to the shoulder fractures of two passengers."

Unused Life Vests

Overall, 19 passengers attempted to obtain a life vest from under a seat, and 10 of them reported difficulties retrieving it. "Of those 10 passengers, only three were persistent enough to eventually obtain the life vest; the other seven either retrieved a flotation seat cushion or abandoned the idea of retrieving flotation equipment altogether," the report said.

Most passengers who attempted to don or donned life vests were already seated in a slide/raft or ramp/slide or were standing on a wing. "Of the estimated 33 passengers who reported eventually having a life vest, only four confirmed that they were able to complete the donning process by securing the waist strap themselves," the report said. "Most of the passengers who had life vests either struggled with the strap or chose not to secure it at all for a variety of reasons."

Airline industry safety standards for overwater flight have not anticipated scenarios in which passengers exit onto the wings after a ditching, the report said. "Each overwing exit pair [in this case] was equipped with an automatically inflating, off-wing Type IV exit ramp/slide," the report said. "The off-wing ramp/slides did not have quick-release handles [for detachment]."

Despite a regulation requiring life lines at overwing exits—which are intended to be opened by passengers, not flight attendants—circumstances in which they could be used effectively after ditching have been unclear, the report said. The passenger safety information card lacked information about the location of the life lines and how to use them. "Further, no information is provided to passengers about life lines during the preflight safety demonstration or individual exit row briefings," the report said, and placards above the overwing exit signs only depicted deployed life lines from a pair of overwing exits. The NTSB concluded that life lines could have been used to assist Flight 1549 passengers on both wings, "possibly preventing them from falling into the water."

The off-wing ramp/slides on the accident airplane, as is typical in the industry, had no quick-release girts to enable occupants to free the ramp/slides from the sinking airplane for flotation out of the water or for use as handholds.

"Some passengers immediately recognized their usefulness and boarded the ramp/slides to get out of the water," the report said. "Eventually, about eight passengers succeeded in boarding the left off-wing slide and about 21 passengers, including the lap-held child, succeeded in boarding the right off-wing ramp/slide."

Summary statements in the report encouraged the government and airline industry to reconsider past NTSB recommendations validated by the facts of this event. "The circumstances of this accident demonstrate that even a non-EOW flight can be ditched, resulting in significant fuselage breaching," the report said. "Therefore, all passengers, regardless of whether or not their flight is an EOW operation, need to be provided with adequate safety equipment to ensure their greatest opportunity for survival if a ditching or other water-related event occurs." △

Notes

1. NTSB. "Aircraft Accident Report: Loss of Thrust in Both Engines After Encountering a Flock of Birds and Subsequent Ditching on the Hudson River, US Airways Flight 1549, Airbus A320-214, N106US, Weehawken, New Jersey, January 15, 2009." Accident Report NTSB/AAR-10/03, PB2010-910403, Notation 8082A, May 4, 2010. The report contains safety recommendations, including references to NTSB safety recommendations dating from the 1980s that remain relevant to survival factors. It is available at http://www.ntsb.gov/doclib/reports/2010/AAR1003.pdf.

2. About two min after takeoff, at an altitude of 2 800 ft, the aircraft experienced an almost complete loss of thrust in both engines after encountering a flock of birds and subsequently was ditched about 8.5 mi. (14 km) from LaGuardia Airport, New York City, New York, USA. The accident occurred on January 15, 2009.

3. EOW operations, with respect to aircraft other than helicopters, are operations over water at a horizontal distance of more than 50 NM (93 km) from the nearest shoreline.

Aviation Weather—What You Need to Know

by Louis Sauvé, Civil Aviation Safety Inspector, Flight Information Services & Weather, ANS Operations Oversight, National Operations Branch, Civil Aviation, Transport Canada

Weather information is crucial in preparing for a flight. Current conditions and forecasts based on aviation weather reports are key elements in all phases (preparation, en route and arrival) of a flight.

Transport Canada Civil Aviation regulates the provision of aviation weather under *Canadian Aviation Regulation* (CAR) 804 and a number of exemptions to this regulation.

There are two main categories of aviation weather service providers:

1. Providers of METAR/SPECI weather information that operate in accordance to CAR 804.
2. Providers of weather information under an exemption that does not lead to the production of a METAR.

NAV CANADA is the principal provider of METAR/SPECI in Canada. According to the March 2013 issue of the *Canada Flight Supplement* (CFS), there are 250 METAR sites across the country comprised of the following:

- 66 weather stations (CWO) under contract with NAV CANADA
- 62 community aerodrome radio stations (CARS)
- 58 flight service stations (FSS)
- 51 automatic stations (AWOS)
- 13 sites operated by the Department of Defence

All of these stations—except for automatic stations—must comply with CAR 804 and provide weather information in accordance with the standards described in the following documents:

(a) Annex 3 to the Convention;
(b) the *Manual of Standards and Procedures for Aviation Weather Forecasts* (MANAIR);
(c) the *Manual of Surface Weather Observations* (MANOBS).

There are also a significant number of aerodromes offering weather information other than METAR/SPECI in Canada. This information is provided by UNICOMs, approach UNICOMs (AU) or private automated systems such as automated weather observation systems (AWOS) or limited weather information systems (LWIS).

According to that same issue of the CFS, there are approximately:

- 200 UNICOM sites where there is a published instrument approach procedure
- 80 AUs
- 40 private AUTO sites

All of these services are provided in accordance with at least one of the following exemptions:

- Exemption allowing for the provision of an altimeter setting measured by a dual aircraft altimeter system for use in instrument procedures.
- Exemption allowing for the provision of wind direction and speed estimation for the purpose of supporting a straight-in landing from an instrument approach.
- Exemption allowing for the provision of aviation weather services consisting of automated observation and reporting of any or all of the following: wind direction, speed and character; visibility; present weather; sky condition; temperature; dew point temperature or atmospheric pressure.

The exemption which permits the provision of weather information using automated systems was created based on recommendations submitted by a Canadian Aviation Regulation Advisory Council (CARAC) working group. This working group had been mandated to establish standards for the inclusion of automated systems into CAR 804. These recommendations were accepted and resulted in a Notice of Proposed Amendment (NPA) to CAR 804.

Meanwhile, in order to allow for the operation of such systems, an exemption to CAR 804 was created based on the working group's recommendations.

Any person who wishes to provide a service described in one of these exemptions must inform the Minister by contacting one of Transport Canada's regional offices.

The exemption is permissive. In most cases, if the service provider forwards basic information (such as address, type of service provided, etc.) in good order and accepts full responsibility for the service, the Minister will accept its operation.

The exemption applies exclusively to automated weather equipment used in support of an instrument procedure.

If you wish to provide a service under any of these exemptions, you may contact your Transport Canada regional office (www.tc.gc.ca/eng/regions-air.htm). △

Sharing of Safety Information Key to Effective Industry-Wide Safety Management

by James Carr, Manager, Human Performance, NAV CANADA

We all know that sharing safety information within our organization is crucial to a robust safety culture and an effective safety management system.

Similarly, it stands to reason that improving safety performance industry-wide requires the sharing of safety information and data across all players within the industry.

NAV CANADA has always exchanged information with operators following occurrences to aid parties in better understanding what happened. More recently, the company has signed specific memoranda of agreement (MOA) with over 65 operators and other industry players, such as airport authorities, for the sharing of audio and surveillance data and other safety information related to specific occurrences.

Normally, operators submit requests for audio and/or surveillance data related to an incident, accident or other event they wish to examine more closely for potential safety lessons to NAV CANADA via an e-mail to operationalsafety@navcanada.ca. They should include a description of the event or a CADORS number, if applicable. If the operator does not yet have a MOA, one will be established to govern the use of the data provided.

When a request is received, Operational Safety will take steps to secure the relevant information, review it to ensure it accurately covers the event in question and make arrangements to transfer the information to the operator. The information usually includes audio files of radio communications and screen shots or short video files of radar playbacks.

Having this information allows operators to conduct more effective investigations following occurrences by providing clear information on what took place; or alternatively, to examine events that may not have been reportable occurrences but still warrant a closer examination. In the past two years, NAV CANADA has shared information related to over 100 events under this information-sharing program. From discussions with participants in the program, it is clear that a number of safety improvements have occurred as a result.

While many larger operators and airports have taken the opportunity to access this type of information to aid their assessments, smaller operators and flying school operations can also benefit.

If you are interested in accessing NAV CANADA audio and/or surveillance data to aid in investigating your own occurrences, contact operational safety at operationalsafety@navcanada.ca for more details or to arrange a MOA. △

Nominate a Person or Organization for the 2014 Aviation Safety Award!

Transport Canada is now accepting nominations for the 2014 Aviation Safety Award!

The Aviation Safety Award acknowledges sustained commitment to Canadian aviation safety for an extended period of time.

Nominations must demonstrate that the contribution to aviation safety meets at least one of the following categories:

- A demonstrated commitment and an exceptional dedication to Canadian aviation safety over an extended period of time (three years or longer);
- The successful completion of a program or research project that has had a significant impact on aviation safety in Canada;
- An outstanding act, effort, contribution or service to aviation safety.

An award certificate signed by the Minister of Transport is normally presented to the recipient during the week of National Aviation Day (February 23).

The award recipient will be notified by January 15, 2014. For more information, please visit the Aviation Safety Award Web page.

How do I submit a nomination?

Nominators and nominees must sign the Nomination Form acknowledging that they agree to abide by the Award Rules as defined in the Nomination Guide.

In addition to the Nomination Form, supporting documentation is required to successfully nominate a candidate, including the category for which the candidate is to be considered and a narrative describing the contribution and its significance to aviation safety.

Nominations are to be forwarded via mail, fax or e-mail to*:

Civil Aviation Communications Centre
TC Aviation Safety Award
Transport Canada
Civil Aviation Secretariat (AARCB)
Place de Ville, Tower C, 5th floor
330 Sparks St.
Ottawa ON K1A 0N5

Fax: (613) 993-7038
E-mail: Services@tc.gc.ca
*If sending a nomination via e-mail please ensure to include a scanned copy of the nomination form.

The nomination period closes on December 7th, 2013. For complete information on submitting a nomination, please visit the Aviation Safety Award Nomination Web page.

Past award winners

In the last three years, the award recipients have reflected the diverse contributions made every day to the enhancement of aviation safety in Canada: From the CHC Safety & Quality Summit, for creating a world-leading forum to share best practices amongst delegates around the world, to St. Clair McColl, who was the first to have emergency push-out windows installed on his entire fleet of de Havilland Beaver floatplanes, to Vitorio Stana, who played a vital role in setting and maintaining high manufacturing safety standards for his company's products.

Please visit the Past Recipients Web page to learn more about the recipients of the Aviation Safety Award.

Background

Transport Canada has had a long tradition of recognizing excellence in aviation safety. The first Aviation Safety Award was given in 1988 to Bob Carnie, vice-president of aviation safety at Reed Stenhouse Limited, for his outstanding contribution to the promotion of safety for both fixed- and rotary-wing aircraft operations.

Any individual, group, company, organization, agency or department may be nominated for this award. A nominee must be a Canadian-owned organization or a resident of Canada. △

Is Your Aviation Document Booklet Expiring?

by the Transport Canada Civil Aviation Personnel Licensing Division

Transport Canada Civil Aviation (TCCA) introduced the Aviation Document Booklet (ADB) in 2008 to enhance the security of the licensing document and to provide a more lasting product for pilots, flight engineers and air traffic controllers. The ADB provides evidence that holders have qualified for certain aviation-related permits, licences, medical certificates and ratings.[1]

Your ADB must be renewed within five years to ensure that the photograph is current. Some ADB holders may require earlier renewal for other reasons (for example, if a pilot holds a level 4 language proficiency).

How to renew your ADB

To renew an expiring ADB, applicants are required to submit a completed Application for an Aviation Document Booklet form (TP 26-0726) and a passport-style photograph to the TCCA regional office that holds their licensing file. TCCA requires four to six weeks to process a completed application.

1 A Student Pilot Permit (SPP) is a standalone document. Students should not apply for an ADB if they only hold a SPP.

Your ADB must be renewed every five years. Please make a note of the expiry date as indicated in the example above.

Applicants should submit their application form at least 90 days prior to their expiry date. There is no fee for the renewal of the ADB except for the cost of the photo and postage, which remain the responsibility of the applicant.

For more information, visit the ADB Web site at www.tc.gc.ca/ADB. △

Flight Operations

Flight Test—Ultra-light Aeroplane

by Martin Buissonneau, Recreational Aviation Inspector, Flight Training Standards, Quebec Region, Civil Aviation, Transport Canada

History

In December 2005, three new sections were added to the *Canadian Aviation Regulations* (CARs): **401.55**, **401.56** and **421.55.** These sections set out the new passenger carrying rating for advanced ultra-light aeroplanes, as well as the rating's privileges and requirements, including the successful completion of a flight test.

Also in December 2005, sections **401.88** and **421.88** of the CARs, pertaining to the ultra-light aeroplane flight instructor rating, were amended to include a successful flight test.

One flight test, two uses

To obtain an ultra-light aeroplane passenger carrying or flight instructor rating, the holder of an ultra-light aeroplane permit must successfully complete the same flight test. The flight test, known as "Flight Test—Ultra-light Aeroplane," is described in Transport Canada's *Flight Test Guide—Ultra-light Aeroplane* (TP13984). The guide is valid for both ratings and is found at the following Web address: http://www.tc.gc.ca/eng/civilaviation/publications/tp13984-menu-1812.htm.

All the requirements relating to medical standards, experience and skills for passenger carrying and flight instructor ratings are listed in sections **421.55** and **421.88** of the CARs.

In contrast to flight tests for flight instructors of other aircraft categories, the flight test required for an ultra-light aeroplane flight instructor rating does not include the demonstration of ground or flight teaching techniques.

The ultra-light aeroplane flight test, for either the passenger carrying or flight instructor rating, includes the following items in both cases: a) on the ground: aircraft familiarization and preparation for flight; b) in flight: ancillary controls, taxiing, takeoff, stall, pilot navigation, precautionary landing, forced landing, overshoot, emergency procedures, runway circuit, approach and landing, and slipping.

Depending on the type of ultra-light aeroplane used during the flight test, certain exercises have been removed, either for safety reasons or because the aircraft type cannot perform the manoeuvre. In Transport Canada's aircraft classification by category, the ultra-light aeroplane category includes four relatively different aircraft types:

Basic ultra-light in flight (Photo: Martin Buissonneau)

- three-axis ultra-light aeroplane;
- powered hang-glider (also known as a trike);
- under the term "powered parachute", the powered para-glider; and
- powered parachute with trike.

The exercises not to be conducted as well as the exempt aircraft types are mentioned after the title of each exercise in the *Flight Test Guide—Ultra-light Aeroplane*. In 2010, Transport Canada published a new flight test guide specifically for powered para-gliders, the *Flight Test Guide—Power Para-Glider* (TP 15031) is available at the following Web page: www.tc.gc.ca/eng/civilaviation/publications/tp15031-menu-3046.htm. Given that para-gliders are typically single-seat aircraft that cannot accommodate an on-board pilot examiner during a flight test, it was imperative to develop a flight test where the pilot examiner could observe and evaluate the candidate's on-board flight exercises while remaining on the ground.

Types of aircraft that can be used for a flight test—ultra-light aeroplane

As mentioned above, the ultra-light aircraft category can be subdivided into four aircraft types. One subdivision can also be made based upon whether a passenger may legally be carried.

This leads to the possibility of two types of ultra-light aeroplanes:

- basic ultra-light aeroplanes that are prohibited from carrying a passenger
- advanced ultra-light aeroplanes that may carry a passenger

Before going any further, here are the definitions of these two aircraft types as found in section **101.01** of the CARs:

Basic ultra-light aeroplane: An aeroplane having no more than two seats, designed and manufactured to have:

(a) a maximum take-off weight not exceeding 544 kg (1 200 lb), and

(b) a stall speed in the landing configuration (V_{so}) of 39 kt (45 mph) indicated airspeed, or less, at the maximum takeoff weight.

Advanced ultra-light aeroplane: An aeroplane that has a type design that is in compliance with the standards specified in the manual entitled *Design Standards for Advanced Ultra-light Aeroplanes*.

For the moment, only ultra-light aeroplanes with conventional aircraft controls are considered advanced ultra-light aeroplanes because the standard for these aircraft, set at the end of the 1980s, was developed around this type of ultra-light aeroplane. Thus, a three-axis ultra-light aeroplane may be considered basic or advanced depending on whether the manufacturer decided to follow the *Design Standards for Advanced Ultra-light Aeroplanes* during the aircraft model design planning stage.

Basic ultra-light aeroplanes, which include powered hang-gliders, powered parachutes, powered parachutes with trikes as well as three-axis ultra-light aeroplanes that are not advanced, *cannot* carry passengers. Section **401.21a)** of the CARs clearly states that a holder of a pilot permit—ultra-light aeroplane must have no other person on board. However, section **602.29** of the CARs, which prohibits having two persons on board a *basic* ultra-light aeroplane, allows for two exceptions:

1. When the flight is conducted for the purpose of providing dual flight instruction (a flight instructor and a student).
2. When the other person is a holder of a pilot licence or permit, other than a student pilot permit, that allows them to act as pilot-in-command of an ultra-light aeroplane. For example, two ultra-light aeroplane pilots, two conventional airplane pilots or one ultra-light aeroplane pilot and one conventional airplane pilot.

Even though only an advanced ultra-light aeroplane may carry a passenger, the flight test can be conducted on either a basic or an advanced ultra-light aeroplane. Details about aircraft and equipment requirements for flight tests can be found on page 2 of both the *Flight Test Guide—Ultra-light Aeroplane* and the *Flight Test Guide—Powered Para-Glider*.

In addition, the flight test may be conducted in a conventional aircraft that corresponds to the definition of a basic ultra-light aeroplane as listed above and as found in section **101.01** of the CARs.

The reason why a flight test may be conducted in a conventional aircraft that corresponds to the basic ultra-light aeroplane definition is that, since the publication of Transport Canada General Aviation Policy Letter No. 576 in 1996, the holder of an ultra-light aeroplane pilot permit is authorized to be pilot-in-command on board such an aircraft.

Even though advanced ultra-light aeroplanes may have a maximum permissible takeoff weight of 1 232 lb, if a conventional aircraft is used for the flight test, it must respect the definition of a *basic* ultra-light aeroplane which allows for a maximum permissible takeoff weight *not exceeding* 1 200 lb.

The pilot examiner and evaluation during a flight test

Pilot examiners conduct flight tests for ultra-light aeroplanes. They hold accreditation giving them official authorization to conduct flight tests on behalf of the Minister, in accordance with Part 1, subsection 4.3(1) of the *Aeronautics Act*. Transport Canada inspectors may also conduct these flight tests.

In the ultra-light aeroplane category, the pilot examiner must hold a flight instructor rating for ultra-light aeroplanes or a flight instructor rating for aeroplanes. The pilot examiner must also possess sufficient flight experience on the type or types of ultra-light aeroplanes on which they conduct flight tests.

The minimum pass mark for the ultra-light flight test is 50% and the failure of any flight test item constitutes failure of the flight test. This is true for the four types of ultra-light aeroplanes used during flight tests.

The flight test is divided into three parts:

- The first part (1:15) takes place on the ground, usually in a private area. This part includes meeting the candidate, verifying the candidate's admissibility, briefing the candidate about the test and evaluating the candidate's knowledge;
- The second part (1:15) takes place in flight and includes a pre-flight briefing and an in-flight evaluation;
- The third part (30 min) is a post-test debriefing conducted by the pilot examiner regarding the test results: pass or fail, strong and weak points, etc.

The times listed here are approximate and may vary depending on the candidate, the type of ultra-light aeroplane used for the test and other test factors.

In the event of a flight test failure, a retest is possible after the candidate has received further training on the failed test item(s). It is possible to take a "partial flight test" if the candidate failed one or two items whereas a complete retest is required if the candidate failed more than two flight test items.

For more details about this subject or subjects related to flight tests and pilot examiners, please refer to the Transport Canada *Pilot Examiner Manual* (TP 14277) which can be found at: www.tc.gc.ca/publications/EN/TP14277/PDF/HR/TP14277E.PDF

The aforementioned publication describes the evaluation and marking criteria for each flight test item.

Flight instructor rating and passenger carrying rating

An ultra-light aeroplane flight instructor *does not have to* hold a passenger-carrying rating on their pilot permit because the instructor is flying with a student and not a passenger during flight training. As such, the instructor exercises privileges under section **401.88** of the CARs and not those listed under section **401.56**.

If, however, an ultra-light aeroplane instructor wishes to carry a passenger in an advanced ultra-light aeroplane, then the instructor must hold a passenger-carrying rating and meet the requirements set out in section **421.55** of the CARs for this rating.

At the candidate's request, it is possible that the same flight test be used to obtain ratings for flight instruction and passenger carriage, as long as the requirements for the two ratings, as listed in sections **421.88** and **421.55** of the CARs, are respected.

For more information on the subjects discussed in this article as well as on Canadian aviation regulations regarding ultra-light aeroplanes, visit the following Transport Canada Web page: www.tc.gc.ca/eng/civilaviation/standards/general-recavi-ultra-light-menu-2457.htm. You may also contact your Transport Canada regional or district office.

Please note that the latest revision or amendment to the Canadian Aviation Regulations *and their related standards make up the official document. You must always refer to the official document. In addition, the official document ALWAYS has precedence over the information presented in this article.* △

Helicopter Rules of Thumb

by Serge Côté, Civil Aviation Safety Inspector, Aviation Licensing, Standards, Civil Aviation, Transport Canada

Based on some pilot experiences, some manoeuvres in helicopters should be avoided as the result has proven to be undesirable in many cases. An autorotation downwind flare is one of those manoeuvres. Most helicopter flight training manuals, if not all, fail to describe an autorotation downwind flare; however they all describe, following an entry in autorotation, a turn into wind before the flare.

The reason to avoid an autorotation downwind flare manoeuvre is that some of the benefits gained in a flare into wind or in a no-wind condition are diminished considerably in a downwind flare. In a flare, the airspeed is traded for lift in order to decrease the rate of descent and consequently the rotor rpm rises to a certain rate. After levelling the aircraft at the end of the flare, the high rate of the main rotor rpm is now used to cushion the landing with the collective. A downwind flare will have a similar effect but only until the forward airspeed, relative to the surrounding air, reaches zero. As the forward speed relative to the surrounding air reaches zero, the high rate of rotor rpm will start to decrease back to a pre-flare number, due to the decrease of inflow to the main rotor, as the pilot will attempt to achieve a zero or near zero ground speed.

The inflow decrease will prevent the pilot from reaching a zero or near zero ground speed and as the aircraft is levelled for the landing, the downwind effect will increase the forward velocity. Because of the decay of the main rotor rpm before the end of the flare, the efficiency in cushioning the landing will be reduced. This will result in a fairly fast-running touchdown, with a proportionally lower main rotor rpm to cushion the contact with the ground. Any fast-running touchdown requires a firm, well-prepared surface. According to reports of helicopters having to autorotate following a failure, the terrain available in the majority of the occurrences did not permit a fast-running touchdown. A turn into wind before the flare is preferable in order to take full advantage of the increase in main rotor rpm and the stop or near stop of the forward movement before the touchdown.

The major problem with a 180° turn is that it takes time, and time is precious when the rate of descent is 1 500 ft per minute or more. The lower the height, the less time the pilot has for such a turn.

Other factors also have an effect on the time required to make a 180° turn in autorotation. Simulated failures that require autorotations are expected on training flights with an instructor or a training pilot. The pilot that is being trained is mentally prepared even for a surprise autorotation, and consequently should react quickly and automatically to the announcement "Simulated engine failure!".

In a real emergency situation that requires an autorotation, our first thought is usually "What's wrong?" It is only after a quick scan and analysis that we realise that you must lower the collective to enter the autorotation. After the collective is down, the rotor rpm is usually lower than we are accustomed to seeing during a training flight autorotation and this is due to the split second delay caused by analyzing the problem and then deciding to lower the collective. Psychologically, there is often a short period of denial, where the pilot cannot believe that an engine failure has occurred. This too can cause a delay in reaction time, causing the further loss of critical main rotor rpm.

On an entry into autorotation, a lower main rotor rpm means a higher rate of descent until the rotor rpm recovers. Such delayed initial reaction easily results in greater loss of height in comparison to the reaction during a training flight. Following the entry, the pilot focuses then on making sure that the rotor rpm is recovering, and if the rpm is very low, a rotor rpm recovery method should be used. This is followed by a quick look around for a suitable landing area.

Some other situations could further interfere with the reaction of a pilot. For example, if the pilot flying is a student that is learning how to fly, the loss of rotor rpm on the entry into autorotation could be fairly high if the student reaction time is slower than expected or nonexistent. The loss of rotor rpm will be greater with a high power setting such as during a climb and this is due to the higher pitch angle resulting in additional drag on the main and tail rotors. It is not surprising to hear from pilots that have experienced a real failure followed by an autorotation that time during the descent seemed shorter than when training for autorotations.

Obviously, good practice dictates that, as much as possible, we should maintain a height that will increase the likelihood of a successful autorotation. Downwind flight at low altitude, when not necessary, increases the chances of an unfortunate consequence. We usually link the necessity of entering into autorotation to a partial or complete loss of engine power or an engine fire, but autorotations could also be the result of various failures of the drive system, including the tail rotor system. Twin-engine helicopters are vulnerable to those various failures of the drive system as much as single-engine helicopters. A greater height, in addition to giving us time, also gives us a greater choice of landing areas.

Too often, helicopter pilots will turn out of wind on departure at low altitude towards their destination ignoring the fact that an early low turn may position them over significant obstacles. This simple but common mistake adds greatly to the difficulty of conducting a successful autorotation should that action become necessary. In the mistaken belief of being more operationally efficient, it instead results in a self-made trap that could have a tragic outcome. Such situations have happened too many times and are avoidable.

Helicopter type-related rules of thumb have been around for decades. Those rules of thumb are sometimes written or passed on verbally. According to a few dictionaries, the definition of "rule of thumb" is: "*a method of procedure based on experience and common sense*" and "*a rule for general guidance, based on experience or practice rather than theory*". This quite accurately defines the rules of thumb that we find in the helicopter industry, as a result of pilot and helicopter maintenance engineer experiences with certain types of helicopters.

Here is a new rule of thumb that applies to all types of helicopters: The next time you depart from an airport, a pad or a confined area, before you turn out of wind, think of how much time you had to spare the last time the instructor or the training pilot gave you a surprise autorotation at 500 ft downwind. And remember, that was likely over a long runway, with the certainty that the instructor or a training pilot was going to take over if you made a mistake. You may even decide to make this a habit! Have a good flight, have a safe flight. △

Watch That Hand Over the Governor Beep Switch!

The following story was submitted by an operator for the benefit of the helicopter industry.

Last season we had a helicopter accident that really should not have happened, and the outcome of the investigation really took us by surprise. We found that the root cause was that the pilot would sometimes fly with his hand wrapped around the top end of the collective. In this case, on approach to the intended landing site, the pilot lowered the collective with his hand on top of it. At the same time, he unknowingly pressed the governor beep switch to the lower end of its range. The low rotor/engine out warning system was activated at 250 ft AGL. The pilot made an autorotation and landed in an estuary. The main rotors struck the tail boom but the aircraft stayed upright. Thankfully, none of the occupants were hurt.

After talking to friends and colleagues in the helicopter community, I found two other pilots who had done something similar. One pilot, in New Zealand, was flying a Hughes 500D when he lost rotor rpm. The pilot had enough altitude to figure things out and recovered in flight. He later realized that his watchband had pressed on the governor switch when his hand was on top of the collective.

The second event happened in Alaska, where the pilot, with his hand in the same position, was hovering a Bell 205 and long lining. He pressed on the governor switch without knowing and landed safely with low rotor speed. After landing and with the helicopter still running, he came to the conclusion that he had inadvertently "beeped" the governor down.

The following photos illustrate the issue quite clearly, showing both the incorrect and correct ways to hold the collective grip.

Wrong position (on top of the governor beep switch)

Right position

As a result, our operator issued a bulletin making it company policy that pilots should never fly with their hand over the end of the collective. Our operator also announced additional training sequences on reduced power setting flight, low rotor rpm recognition and recovery, and the use of the governor range in order to show that the aircraft will still fly at the low end of the range.

Thank you for sharing. Most helicopters have the beep switch installed where the pilot can access it without difficulty. As a result, this is also where the governor can be beeped down inadvertently. Keep in mind that, normally, the minimum beep position should not allow the engine to be operated with rotor rpm outside the normal range.

Nevertheless, inadvertent beep down can be an insidious trap. Pilots may not notice the beep down until they try to increase power. This often occurs late in the approach when they are committed, there is little time to figure out the problem, and few options remain as they get closer to the ground.

Your advice applies not only to inadvertent operation of the beep switch, but also to any other critical on/off device in the cockpit. Consequently, pilots need to pay attention not only to the location of their hands but also to the position of their jacket sleeves, glove cuffs, wristwatches, pens, zippers, straps, etc. Such "pilot paraphernalia" could engage devices inadvertently. —Ed. △

Worth-a-Click: Analysis of Runway Incursion and Excursion Statistics

Take a few minutes to read Rick Darby's analysis of runway incursion and excursion statistics for 2012 in Canada. M. Darby is associate editor at the Flight Safety Foundation (FSF) and his article was published in the May 2013 issue of the FSF's *AeroSafety World* magazine. It's Worth-a-Click!

Approved Aircraft Maintenance Type Training

by Martin Truman, Civil Aviation Safety Inspector, Operational Airworthiness Division, Standards Branch, Civil Aviation, Transport Canada

Approved aircraft maintenance type training courses are intended to provide aircraft maintenance engineers (AME) with the necessary level of aircraft systems knowledge to sign maintenance releases. The knowledge gained from a type course ensures that aircraft are maintained and certified correctly. As a result, the safety of the passengers and crew for the applicable aircraft make and model is maintained.

The requirements for signing an aircraft maintenance release may be found in the *Canadian Aviation Regulations* (CARs). The regulation says that before signing a maintenance release for a transport category airplane or turbine powered helicopter, an AME must complete an approved type training course on the applicable make and model of aircraft from an approved training organization (ATO). The AME signing the maintenance release must also be rated either M1 or M2 for turbine powered helicopters. For transport category airplanes, an M2-rated AME license is required. If the aircraft are being maintained and released within an approved maintenance organization (AMO), the AME will also need an aircraft certification authority (ACA) on the aircraft make and model.

Aircraft maintenance type training courses come from two sources. The main source is an ATO, whose courses are all individually approved by Transport Canada (TC). Training may be also be provided by an AMO. AMO courses are approved through the AMO maintenance policy manual (MPM) and are not publicly available. All ATOs and AMOs have to meet regulatory requirements to have their courses approved by TC. The main difference between the two sources of training mentioned is that an AMO is only approved to conduct type training for its own employees and may not provide training to employees from other operators.

All approved type courses offered by an ATO may be found on the "Current type course approvals" Web page. The courses identified on this page are all individually approved and have all been issued a unique TC approval number. This same approval number will be included on your course graduation certificate.

Once you have found the training course that you want to take on the TC current course approvals Web page, contact the ATO listed for further details. If the course you need to take is not shown on the TC Web site, then it has probably not yet been approved. Occasionally, a course is so new that it has not yet been posted on the Web site. Contact your local TC office to confirm if there is an approved course for the aircraft type that you need training on.

I encourage you to take the time and do the research by first checking the TC current type course approvals Web page to see whether the course you need is listed. Being proactive will save you time, money and aircraft down time in the long run. △

TC AIM Snapshot: Airworthiness Directives (ADs)

Compliance with ADs is essential to airworthiness. Pursuant to CAR 605.84, aircraft owners are responsible for ensuring that their aircraft are not flown with any ADs outstanding against that aircraft, its engines, propellers or other items of equipment. Refer to CAR Standard 625, Appendix H, for further details.

When compliance with an AD is not met, the flight authority is not in effect and the aircraft is not considered to be airworthy.

Exemptions to compliance with the requirements of an AD or the authorization of an alternative means of compliance (AMOC) may be requested by an owner as provided for by CAR 605.84(4). Applications should be made to the nearest TC regional office or TCC in accordance with the procedure detailed in CAR Standard 625, Appendix H, subsection 4. General information about exemptions and AMOC is given in subsection 3 of that appendix.

(Ref: Transport Canada Aeronautical Information Manual (TC AIM), Section LRA 5.7)

Winter Confrontations

The following article was originally published in Issue 4/1989 of Aviation Safety Maintainer.

As the harsh Canadian winter approaches, it is time to review the special aircraft operating problems this creates and think about how to counteract situations before an accident occurs. Fuel filters and low drain points in the fuel system of all aircraft require extra winter attention or water collected over a period of time may freeze during flight and result in fuel starvation. For piston-engine aircraft, carburetor or induction heat systems need inspection to ensure correct operation and provision of sufficient heat. For jet-engine aircraft, this applies to lip boots and anti-ice vanes. Inspect all other aircraft ice protection systems and ensure that they deliver the specified amount of fluid or heat required for safety during flight in icing conditions.

Aircraft fluids and lubricants may require changing to winter specifications. Most aircraft require installation of winter kits on the engine or where indicated by the aircraft maintenance manual. Other aircraft ground protective covers, including those used for helicopter rotorheads and tail rotors, must be clearly marked to indicate removal prior to flight.

Batteries are less efficient in cold temperatures. Preheating the engine compensates for this and ensures better start-up lubrication and less engine wear.

Cold dry air is prone to static-electricity generation. Wear approved clothing or clothing of known low-static properties, particularly when you are refuelling aircraft.

Snow ploughs or other bulky equipment parked near areas where aircraft taxi can result in bent wing tips. Keep the ramp clear of all such hazards. Move or tow aircraft with great care on icy ramps.

Maintenance personnel, aware of the hazards of ice and hoarfrost on wings and tail surfaces, can indicate the corrective measures available to pilots prior to takeoff when these conditions are present. Recommending the type of pre-takeoff de-icing fluid is a judgment call; therefore, a thorough knowledge of the type of fluid mix required for the weather conditions is essential. This is where well maintained and readily available preheating and de-icing equipment pays off for the pilot and the maintenance organization.

SOMEONE LIVING WITH AN ICING PROBLEM MAY END UP NOT LIVING. △

2013-2014 Ground Icing Operations Update

In August 2013, the Winter 2013–2014 *Holdover Time (HOT) Guidelines* were published by Transport Canada. As per previous years, TP 14052, *Guidelines for Aircraft Ground Icing Operations*, should be used in conjunction with the *HOT Guidelines*. Both documents are available for download at the following Transport Canada Web site: www.tc.gc.ca/eng/civilaviation/standards/commerce-holdovertime-menu-1877.htm.

To receive e-mail notifications of *HOT Guidelines* updates, subscribe to or update your "e-news" subscription select "*Holdover Time (HOT) Guidelines*" under Publications / Air Transportation / Aviation Safety / Safety Information.

If you have any questions or comments regarding the above, please contact Doug Ingold at douglas.ingold@tc.gc.ca.

Update to SAR Posture Times Stated in ASL 2/2013

The author of the National Search and Rescue (SAR) article on page 6 of Issue 2/2013 of the *Aviation Safety Letter* (ASL) asked us to mention important changes in the SAR response posture times. In paragraph 7, the 2-hour SAR response posture times have been changed to what are considered historically quiet times, i.e. mid-week, early morning and late at night. The heightened 30-minute full alert posture times, discussed in paragraph 8 of the article, are now Friday to Monday inclusive, from approximately 10 a.m. to 8 p.m.

The following summaries are extracted from final reports issued by the Transportation Safety Board of Canada (TSB). They have been de-identified and include the TSB's synopsis and selected findings. Some excerpts from the analysis section may be included, where needed, to better understand the findings. For the benefit of our readers, all the occurrence titles below are now hyperlinked to the full TSB report on the TSB Web site. —Ed.

TSB Final Report A10W0040—Runway Incursion

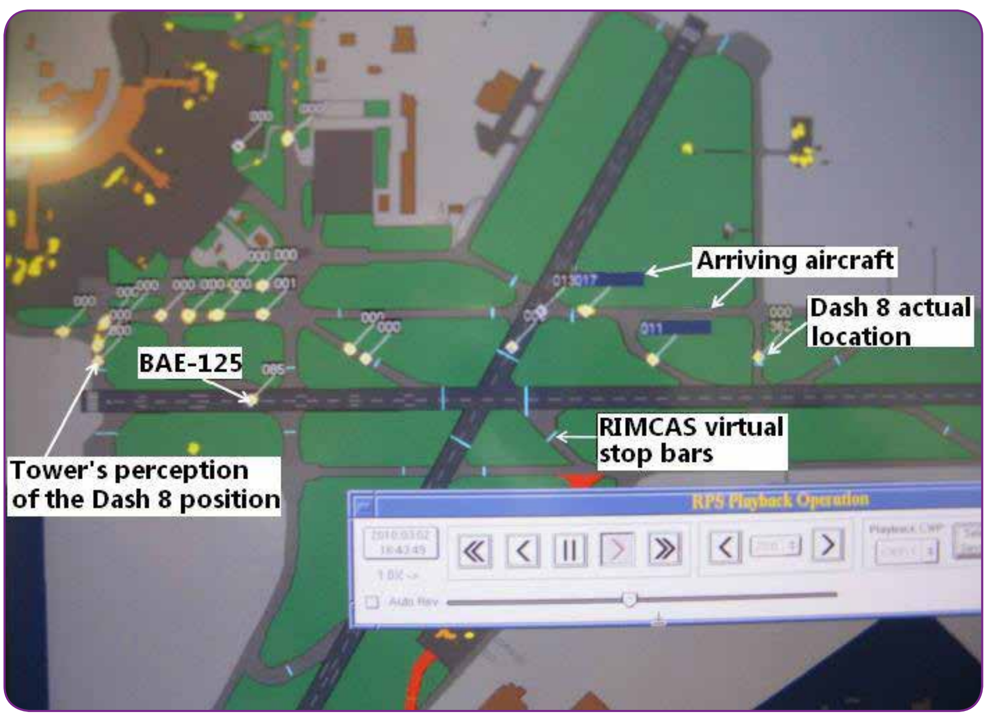
On March 2, 2010, Calgary International Airport was operating under its reduced visibility operations plan (RVOP) with Runway 16 as the only active runway. The runway visual range (RVR) for Runway 16 was variable, from 1 400 to 4 000 ft, for most of the morning. There were 12 aircraft lined up for departure from the threshold, two from Taxiway C4 and one from Taxiway U at mid field. After a BAE 125-800A commenced its takeoff roll from the threshold, a de Havilland Dash 8 was instructed to line up and wait at the threshold of Runway 16. The Dash 8 was the aircraft at Taxiway U. At 09:45 MST, after the Dash 8 crew queried the instruction, the airport controller confirmed it and advised the Dash 8 crew to be ready for an immediate takeoff. The Dash 8 crossed the hold line at Taxiway U as the BAE-125 passed overhead, climbing to 400 ft AGL. *The TSB authorized the release of this report on October 21, 2010.*

Analysis

Pilot and Controller Communication

As a result of the long delay between arrival at Taxiway U and issuance of the takeoff clearance, the airport controller lost track of the location of the Dash 8 and did not use the Extended Computer Display System (EXCDS)[1] to support or contradict the airport controller's mental model.

1 **EXCDS** is an advanced tower, terminal, airport and en route coordination system that permits controllers to manage electronic flight data online, using touch sensitive display screens. EXCDS automates flight data transactions thereby eliminating the need for paper handling, reducing voice communications and minimizing head down time. EXCDS will also display current airport conditions (such as wind, altimeter, RVR, runway light brightness and active runways). Use of EXCDS at Calgary has resulted in a nearly paper-free environment, where paper strips are used as a backup only and most coordination tasks are automated. The EXCDS also gathers data for billing and statistical purposes. An EXCDS flight strip can track more than 110 different data items (such as time of departure, aircraft type, destination, and parking gate).



Airport Surface Detection Equipment (ASDE) display at 0943:49

The controller believed the Dash 8 to be at the threshold of Runway 16 (Taxiway C8), and the flight crew believed the controller knew they were at Taxiway U. It is likely that, as a result of the unexpected clearance of two flights between arriving flights, the flight crew of the Dash 8 felt rushed to get into position and simultaneously unsettled by their takeoff clearance that appeared to be sequenced much more quickly than previous departures. The assimilation of the departure heading instruction, the completion of the before takeoff check list, and the concern about a possible aircraft departing from the threshold all contributed to a high workload for the flight crew of the Dash 8. This would have resulted in little reserve to figure out that ATC believed them to be at Taxiway C8, as opposed to Taxiway U.

Similarly, the airport controller did not have enough verbal information from the flight crew's query to alter his assumption of the Dash 8's position before reiterating the instruction to line up.

The *Canadian Aviation Regulations* (CARs) do not require flight crews to read back the location for line up or takeoff instructions. During times of restricted visibility, when an aircraft cannot be positively identified visually, the primary tool for a controller to identify it and its location is through pilot and controller communications. To ensure that the information is received by the pilot and understood, a read back and hear back must be done.

Calgary Tower Staffing Levels

During the day, the normal complement in the tower was six controllers plus a supervisor. Due to the absence of two controllers, there was insufficient staff to cover all five controlling positions and allow for breaks. As a result, the supervisor took a controlling position, while the tower coordinator position was left vacant. Due to the complexity of the situation and the volume of traffic waiting for departure, this was done in favour of opening the second ground position.

Seeing as the tower coordinator position was vacant, there was one less opportunity to correct the airport controller's misconception regarding the position of the Dash 8.

ASDE and RIMCAS

The airport surface detection equipment (ASDE) installed at Calgary International Airport worked as designed. Due to reduced visibility on the day of the occurrence, the ASDE display was the primary source of information for controlling aircraft that were on the manoeuvring areas. However, the Calgary ASDE does not have aircraft identification tags to differentiate one target from another. Consequently, the controller's ability to acquire and maintain an accurate picture of the departure situation was impeded.

The controller formulated a mental picture as to the position of the next five departing aircraft, based on incomplete information provided on the ASDE display and the flight data entries on the EXCDS display. Although the Dash 8 was identified at Taxiway U on the EXCDS display, the information presented was not used by the controller to either support or contradict the controller's mental model. At the time of the occurrence, the controller's attention was directed towards the ASDE display while waiting for movement of the targeted flight to confirm that the flight was making appropriate and timely movement towards its takeoff position. The ASDE target's lack of movement at the threshold of Runway 16 ultimately triggered the controller to identify the true location of the aircraft at Taxiway U.

The runway incursion monitoring and collision avoidance system (RIMCAS) was disabled due to nuisance alarms associated with the configuration of multiple intersecting runways at Calgary International Airport. However, when the reduced visibility operations plan (RVOP) was active, only one runway was allowed for arrivals and departures. There was a missed opportunity for RIMCAS to be configured for single runway operations in order to provide another layer of defence against collisions in low visibility conditions.

RVOP

Intersection takeoffs were being allowed to facilitate the movement of aircraft from the apron to Runway 16, given its close proximity to the threshold of Runway 16. The Calgary International Airport RVOP allowed for such operations when the ASDE was working. However, ASDE provides limited protection against incursions and, with RIMCAS disabled, there was limited protection against collisions.

Runway Incursion Prevention Initiatives

Given the risk posed to Canadians by runway incursions, as emphasized by the Transportation Safety Board in its 2010 Watchlist, this report again highlights the pressing need for improvement while acknowledging the progress that has been made to date.

Findings as to causes and contributing factors

1. As a result of the long delay between arrival at Taxiway U and the issuance of the takeoff clearance, the airport controller lost track of the location of the Dash 8 and did not use the information presented on the EXCDS to either support or contradict the airport controller's mental model.
2. In its communications with the tower, the Dash 8 flight crew did not hear the controller's instruction to line up at the threshold and did not include their location information, resulting in the airport controller maintaining the perception that the Dash 8 was at the threshold.
3. The tower was operating at reduced staffing levels, with the tower coordinator position vacant, resulting in one less opportunity to correct the controller's perception of where the Dash 8 was on the field.
4. The ASDE display does not show the identification tags of departing aircraft, allowing the controller to continue with the mistaken belief that the Dash 8 was at the threshold rather than at Taxiway U.
5. The RIMCAS feature was not enabled, thus removing an opportunity for the controller to be alerted to the Dash 8 crossing the hold line while the BAE-125 was becoming airborne.

6. The RVOP allowed for multiple intersection takeoffs with ASDE, a less than adequate defence, to mitigate the risk of runway incursions.

Finding as to risk

1. Seeing that the CARs do not require flight crews to read back their location when acknowledging instructions to enter an active runway, there is a risk of runway incursions, as controllers are unable to confirm aircraft position and flight crew understanding of the instruction.

Safety Action Taken

NAV CANADA

On March 3, 2010, Operations Letter 10-004 was issued by the NAV CANADA site manager for the Calgary tower. The letter stated, in part, that the following procedures would be implemented immediately:

"While RVOP is in effect, no aircraft shall depart from any intersection along a runway unless the tower coordinator position is opened and manned."

In addition, the tower operations committee has been tasked with reviewing the use of intersection departures during RVOP.

On October 9, 2010, Operations Letter 10-015 was issued by the NAV CANADA site manager for the Calgary tower to replace Operations Letter 10-004. The letter advised that the operations committee had reviewed the use of intersection departures during RVOP and had agreed to discontinue the practice unless the tower coordinator position was manned. This directive is now permanent.

The virtual stop bar feature in the ASDE system at the Calgary control tower is being put into use for reduced visibility operations. Software updates, system testing and controller training are to be completed by mid-November 2010.

Furthermore, NAV CANADA coordinates the Runway Safety and Incursion Prevention Panel (RSIPP), a national interdisciplinary forum which monitors and addresses runway safety issues. The mandate of the panel is to promote runway safety and reduce safety risks, particularly runway incursion risks. (For more, visit www.navcanada.ca and click on RUNWAY SAFETY.)

Dash 8 Operator

The operator of the Dash 8 issued a flight operations bulletin for its operations conducted under subparts 703, 704 and 705 of the CARs stating that effective immediately, they would apply full length departures from all runways when the low visibility operations plan (LVOP) or RVOP are in effect. Additionally, the following was incorporated into their operations manual:

"Communicating with Tower/Radio: When holding short, regardless of frequency congestion or position, crew will state their position on the field (for example, "[call sign] holding short Runway 16 on Uniform"). This includes hand over to Tower from ground frequency. This ensures flight crew and ATC are working together to keep situational awareness."

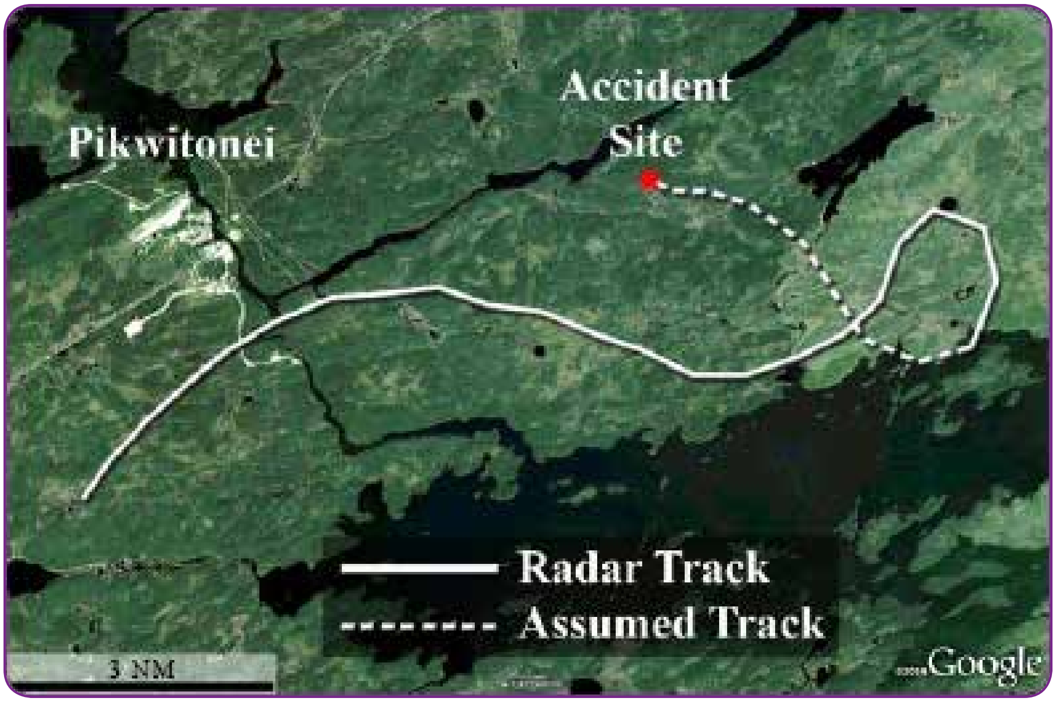
TSB Final Report A10C0060—Fuel Starvation and Forced Landing

On May 13, 2010, a Beech 95-55 departed Thicket Portage for a day VFR flight to Thompson, Man., about 29 NM north. Shortly after takeoff, the pilot used his cell phone to contact the Winnipeg flight information centre (FIC). The pilot indicated that the aircraft was experiencing an electrical problem and that the flight would arrive at Thompson in 12 min, without radios or transponder. There were no further communications with the aircraft. About 30 min after the telephone call was received, a series of emergency signals from a tracking system carried by the pilot were received. A helicopter was dispatched to the location indicated by the tracking system. The aircraft was located about 3 NM east of Pikwitonei, about 25 NM northeast of Thicket Portage and 27 NM southeast of Thompson. The pilot, the sole occupant, sustained minor injuries. The aircraft was destroyed on impact with trees and terrain, but the emergency locator transmitter (ELT) did not activate. There was no post-crash fire. The accident occurred during daylight hours at about 09:50 CDT. *The TSB authorized the release of this report on February 16, 2011.*

Analysis

The first indication of a loss of electrical power occurred immediately after takeoff, when the electrically-operated landing gear did not fully retract and all avionics power was lost. The transponder also stopped transmitting and the aircraft was no longer being tracked by radar.

The simultaneous occurrence of these electrical malfunctions indicates that they are likely related to low electrical bus voltage caused by a loss of both generators, combined with low battery voltage.



The pilot's response to the electrical malfunction after take off was to communicate rather than aviate first and assess the malfunction and then navigate. The cell phone call to the FIC distracted the pilot from assessing the extent of the electrical problem and taking corrective action in a systematic way. Because the air-driven directional gyro (DG) had not been set and a ground feature had not been selected prior to take off to confirm the departure track, the pilot's VFR navigation technique relied solely on the heading reference provided by the electrically-powered horizontal situation indicator (HSI). The HSI malfunction due to the electrical problem was not immediately recognized and consequently, the pilot became lost. When smoke or fumes were detected in the cockpit the pilot had lost situational awareness. This loss of situational awareness eliminated the pilot's best option, which was an immediate return to Thicket Portage, while completing the aircraft checklist for electrical smoke or fire.

The pilot was uncertain of his exact position, he was dealing with an electrical power failure and a landing gear malfunction as well as the possibility of a fire. The pilot actions indicate that task saturation had occurred. With the exception of using the standby magnetic compass to confirm the orientation of the railroad tracks, the pilot did not prioritize the critical actions required. Fuel management was not addressed and the auxiliary tanks were not selected in cruise. The pilot's attention became focused on the landing gear malfunction which was dealt with prior to completing the items listed in the electrical fire or smoke emergency checklist. These items were not completed for some 15 minutes as indicated by the appearance of the aircraft's transponder target on radar in the vicinity of Pikwitonei. The landing gear remained a priority and the pilot extended the approach path and rocked the aircraft to ensure the gear was locked down. The pilot concentrated on this activity and did not address the fuel state of the aircraft.

The engines stopped shortly after the aircraft was rocked to lock the landing gear. The loss of fuel supply and the stoppage of the right engine were likely due to fuel exhaustion as the fuel in the right main tank became depleted. The left engine stopped almost immediately after the right engine had stopped. The stoppage of the left engine may also have resulted from fuel exhaustion if the engines had burned an equal amount of fuel since the aircraft had last been fueled. It is more likely, however, that the engine stopped as a result of fuel starvation as the low level of fuel in the tank allowed the port to become uncovered when the aircraft experienced yaw from asymmetric thrust. The decision not to feather the propeller on the right engine would have resulted in increased drag and greater yaw forces, causing the fuel to move away from the fuel port at the inboard edge of the left tank. With the gear already down, the pilot's decision not to feather either propeller increased the rate of descent and reduced the pilot's ability to control the forced landing.

Findings as to causes and contributing factors

1. The electrical system likely failed due to low electrical bus voltage caused by the failure of the right voltage regulator and low voltage output of the left regulator.
2. The pilot became distracted while communicating with the FIC by cell phone and did not prioritize the handling of the electrical failure and navigation. Consequently, the pilot became lost.
3. Task saturation, due to the pilot's low experience and currency level, limited the pilot's ability to respond effectively to the multi-faceted emergency. Consequently, the fuel situation was not addressed and the engines stopped because of fuel starvation and fuel porting.

Findings as to risk

1. The pilot did not activate the SPOT Track Progress mode and the ELT did not activate during the crash despite the severity of the impact with the terrain. As a result, the pilot's rescue could have been delayed.

2. The fuel quantity indicator gauges were not marked with a yellow band as required by regulation. The absence of the yellow band increased the risk of takeoff in this prohibited range by removing a visual warning of low fuel condition.

3. The aircraft's single-axis G-switch ELT, though approved and serviceable, did not activate during the crash despite the severity of the impact with the terrain. As a result, the pilot's rescue could have been delayed.

Other finding

1. Serious injuries were prevented by the use of a lap belt with shoulder harness.

TSB Final Report A10Q0098—Engine Problem—Collision with Terrain

Note: *The TSB investigation into this occurrence resulted in a major report, with extensive discussion and analysis on many issues such as normal, abnormal and emergency procedures, pilot training, company management, oversight, surveillance and more. Therefore we could only publish the summary, findings and safety action in the ASL. Readers are invited to read the full report, hyperlinked in the title above. —Ed.*

On June 23, 2010, a Beechcraft A100 King Air was making an IFR flight from Québec to Sept-Îles, Que. At 05:57 EDT, the crew started its takeoff run on Runway 30 at Québec/Jean Lesage International Airport. Just over a minute later (68 s), the co-pilot informed the airport controller that there was a problem with the right engine and that they would be returning to land on Runway 30. Shortly thereafter, the co-pilot requested aircraft rescue and fire fighting (ARFF) services and informed the tower that the aircraft could no longer climb. A few seconds later, the aircraft struck the ground 1.5 NM from the end of Runway 30. The aircraft continued its travel for 115 ft before striking a berm. The aircraft broke up and caught fire, coming to rest on its back 58 ft further on. Two crew members and five passengers died in the accident. No signal was received from the emergency locator transmitter (ELT). *The TSB authorized the release of this report on July 4, 2012.*

The aircraft struck the ground approximately 1.5 NM past the end of Runway 30, 900 ft to the right of the extended centreline. Initial impact was made in a direction of approximately 320° magnetic, banking right. The right wingtip left a 5-ft long furrow in the ground 173 ft before the wreckage. The marks made by the left wing in a tree (BΔ) show that the aircraft was banking right at approximately 23°.

About 92 ft further, there were marks made by the left propeller (C). The space between the first three marks made by the propeller is 0.8 ft. Analysis of these marks revealed that the aircraft was travelling at 69.7 kt, based on the assumption that the engine rpm was 2 200 at that specific time. Approximately 23 ft further on, the left wing hit a berm (D), causing the fuselage to roll to the right. The right wing broke on the ground, the right engine (G) separated from the wing and the fuel tank was crushed. After point (C), where the left propeller struck the ground, the aircraft travelled just over 82 ft before coming to rest on its back (F). Much of the aircraft was destroyed by fire. The fire may have been caused by electrical arcing resulting from damaged electrical harnesses, the heat of the engines and possibly by friction from the sheet metal coming into contact with the fuel.

Illustration of impact sequence

Findings as to causes and contributing factors

1. After takeoff at reduced power, the aircraft performance during the initial climb was lower than that established at certification.

2. The right engine experienced a problem in flight that led to a substantial loss of thrust.

3. The right propeller was not feathered; therefore, the rate of climb was compromised by excessive drag.

4. The absence of written directives specifying which pilot was to perform which tasks may have led to errors in execution, omissions and confusion in the cockpit.

5. Although the crew had the training required by regulation, they were not prepared to manage the emergency in a coordinated, effective manner.

6. The priority given to ATC communications indicates that the crew did not fully understand the situation and were not coordinating their tasks effectively.

7. The impact with the berm caused worse damage to the aircraft.

8. The aircraft's upside-down position and the damage it sustained prevented the occupants from evacuating, causing them to succumb to the smoke and the rapid, intense fire.

9. The poor safety culture at the operator contributed to the acceptance of unsafe practices.

10. The significant measures taken by TC did not have the expected result of ensuring compliance with the regulations and consequently, unsafe practices persisted.

Findings as to risk

1. Deactivating the flight low pitch stop system warning light or any other warning system contravenes the regulations and poses significant risks to flight safety.

2. The maintenance procedures and operating practices did not permit the determination of whether the engines could produce the maximum power of 1 628 ft-lb required at takeoff and during emergency procedures, thereby posing major risks to flight safety.

3. Besides being a breach of regulations, a lack of rigour in documenting maintenance work makes it impossible to determine the exact condition of the aircraft and poses major risks to flight safety.

4. The non-compliant practice of not recording all defects in the aircraft journey log poses a safety risk because crews are unable to determine the actual condition of the aircraft at all times and, as a result, could be deprived of information that may be critical in an emergency.

5. The lack of an in-depth review by TC of standard operating procedures (SOPs) and checklists of 703 operators poses a safety risk because deviations from aircraft manuals are not detected.

6. Conditions of employment, such as flight hr-based remuneration, can influence pilots' decisions and create a safety risk.

7. The absence of an effective, non-punitive and confidential voluntary reporting system means that hazards in the transportation system may not be identified.

8. The lack of recorded information significantly impedes the TSB's ability to investigate accidents in a timely manner, which may prevent or delay the identification and communication of safety deficiencies intended to advance transportation safety.

Safety action taken

Transport Canada

Transport Canada has made significant changes to its surveillance program. These changes include updates to the methods used for surveillance planning and the introduction of tools that provide an improved capacity for the monitoring and analysis of risk indicators within the aviation system.

TSB Final Report A10O0145—Collision with Tower

On July 23, 2010, at 12:26 EDT, a commercially registered Bell 206B departed North Bay for a VFR flight to Kapuskasing, Ont. The pilot was repositioning the helicopter for sightseeing flights planned at a local festival the next day. Another company pilot was a passenger. During the flight, poor weather conditions were encountered and approximately 1 hr and 12 min after departure, in the vicinity of Elk Lake, the helicopter collided with a tower approximately 79 ft in height. The helicopter then struck the ground approximately 430 ft beyond the tower and was destroyed. Both occupants were fatally injured; there was no post-impact fire. The emergency locator transmitter (ELT) functioned, but its range was reduced significantly as its antenna was sheared on impact. *The TSB authorized the release of this report on November 16, 2011.*

Analysis

The pilot called the London flight information centre (FIC) and obtained the weather conditions for North Bay, Timmins and Kapuskasing, all of which reported VFR weather conditions. However, the pilot did not obtain any weather reports or forecast from other stations located near the flight path, such as Sudbury and Earlton, which reported worse weather. Nor did he request a graphic area forecast (GFA) or a pilot weather briefing, both of which would have given the pilot more detailed information about the weather conditions along the flight route. Therefore, he was not fully aware of the weather conditions and consequently briefed senior company personnel that the weather was suitable for the flight.

The flight service specialist did not offer a pilot briefing, which is required by the Flight Services Manual of Operations (FS MANOPS). Had the pilot received all of the available weather information, it might have affected his decision to depart.

All of the METARs were reporting conditions above the minimum required for VFR flight in uncontrolled airspace. However, the elevation at the occurrence site is higher than all of the stations reporting the METARs. Consequently, if the cloud base at the occurrence location was at a similar height to that of the reporting stations, the cloud base above ground would have been reduced. This was confirmed by the actual weather conditions at the occurrence site at the time. There was no data to indicate that this was considered a factor during the flight planning stage.

The helicopter was travelling at a normal cruise speed (104 kt) about 1 000 ft from the tower, and the damage sustained by both the helicopter and tower were indicative

Side-by-side photos of the tower pre-and post-impact

of a frontal impact with significant velocity. The global positioning system (GPS) data did not indicate any sudden manoeuvring. The velocity and course appeared constant, implying the pilot did not see the tower with enough time to react prior to impact, likely because the tower was obscured by the weather or blended into the overcast conditions.

About 17 NM prior to the occurrence location, the pilot had deviated from the intended flight path and reduced the helicopter's speed, likely due to higher terrain and weather conditions. However, shortly afterwards, cruise speed was reattained, which decreased the time the pilot had to react prior to tower impact.

The pilot was likely navigating using the VFR navigation chart (VNC) or GPS. However, because the tower was not depicted on the VNC or GPS, the pilot was likely unaware that it existed. The visibility was reduced. The tower was grey coloured, not marked or lit, and may have blended into the overcast conditions, making it difficult to notice. Had the tower been marked on the VNC, the pilot might have noticed the tower depiction in time to deviate or take other corrective action.

The GPS database was not updated. As a result, there was a risk that known depicted obstructions would not have been displayed.

The VNC does not depict small obstacles such as the occurrence tower. The tower did not meet the height requirements to be lighted and marked, or meet the 300 ft mark to be deemed a significant hazard. VNC depict the maximum elevation figure (MEF) to provide information to pilots so that they can avoid terrain and obstacles. Pilots who fly below the MEF and close to the ground are at risk of encountering uncharted obstacles.

Findings as to causes and contributing factors

1. The pilot did not adequately review the weather for the intended route prior to departure from North Bay. In addition, the flight service specialist did not offer a weather briefing as per the MANOPS. As a result, the pilot was not aware that poor or deteriorating weather conditions existed.
2. Due to the deteriorating weather conditions, the pilot flew the helicopter at a low altitude. Reduced visibility likely obscured the tower and reduced the available reaction time the pilot had to avoid the tower.
3. Because the tower was not depicted on the VNC or GPS, the pilot was likely unaware that it existed.

Findings as to risk

1. The GPS database was not updated. As a result, there was a risk that known depicted obstructions would not have been displayed.
2. Pilots who fly below the MEF and close to the ground are at risk of encountering uncharted obstacles.

Safety action taken

NAV CANADA

On August 25, 2011, NAV CANADA published Aeronautical Information Circular (AIC) 26/11 entitled "VNC Charts - Clarification of the Maximum Elevation Figure". The AIC contains the following text:

"The MEF is depicted in thousands and hundreds of feet above sea level. The MEF represents the highest feature in each quadrangle. Flight at or below the MEF may be at or below the highest obstruction in that quadrangle. Pilots need to provide a margin for ground and obstacle clearance and for altimeter error. Please see AIM RAC 5.4 602.15 2b (NOTE) and AIM AIR 1.5 for detail. The MEF is calculated based on terrain data and known and unknown obstacles."

In addition, the AIC describes how the MEF is calculated and states the equation used to complete the calculation.

TSB Final Report A10P0242—Loss of Engine Power and Landing Rollover

On July 29, 2010, a Bell 214B-1 helicopter with two pilots on board, was engaged in firefighting operations approximately 20 NM northwest of Lillooet, B. C. At 11:24 PDT, after refilling the water bucket, the helicopter was on approach to its target near a creek valley. As the helicopter slowed and started to descend past a ridgeline into the creek valley, the engine lost power. The pilot-in-command, seated in the left-hand seat, immediately turned the helicopter left to climb back over the ridgeline to get to a clearing, released the water bucket and the 130-foot long-line from the belly hook, and descended toward an open area to land. The helicopter touched down hard on uneven, sloping terrain and pitched over the nose. When the advancing main rotor blade contacted the ground, the airframe was in a near-vertical, nose-down attitude, which then rotated the fuselage, causing it to land on the left side. A small post-crash fire ignited. The pilot-in-command sustained a concussion and was rendered unconscious. The co-pilot escaped with minor injuries and dragged the pilot-in-command from the wreckage. The pilot-in-command regained consciousness a few minutes later. The helicopter was substantially damaged. The 406 MHz emergency locator transmitter (ELT) activated, but its antenna fitting was fractured; as a result, the search and rescue satellite network did not receive a signal. *The TSB authorized the release of this report on April 17, 2013.*

Analysis

The occurrence helicopter experienced a loss of power at a critical phase of flight while the pilot was preparing to drop a load of water. In response to the power loss, the pilots identified a nearby landing area and carried out an emergency landing. However, the nature and slope of the terrain in the touchdown area caused the helicopter to roll over after touchdown. The combination of low airspeed, high-density altitude (approximately 9 000 ft), height above ground at the time of the power loss, gross weight of the helicopter, and nature and slope of the terrain precluded an uneventful landing.

Findings as to causes and contributing factors

1. The engine fuel control unit (FCU) was contaminated with metallic debris that likely disrupted fuel flow and caused the engine to lose power.

2. The nature and slope of the terrain in the touchdown area caused the helicopter to roll over during the emergency landing.

Findings as to risk

1. In circumstances where contact between parts results in relative and mutual movement, there is a risk that this can cause wear, generate debris and ultimately result in fractures.

2. If overhaul procedures and documentation are not clear and detailed, there is increased risk that an impending failure of a component or one of its subcomponents will go undetected and the component or sub-component will be returned to service.

3. If recurring component failures are not tracked and monitored, there is increased risk that problems associated with the reliability of components will go undetected.

4. Special Bulletin JFC31 No. 3012 was not incorporated completely, and this bulletin applies to several other aircraft types. Without thorough application of the bulletin, other aircraft are at risk for similar fractures.

5. If the available shoulder restraints are not worn, there is increased risk of injury during an accident.

Other findings

1. The FCU was designated as a -22 configuration with a time between overhaul of 2 400 hours; however, it did not have the required modifications. Sixteen additional FCUs were similarly misidentified.

2. Transport Canada provides the regulatory framework to original equipment manufacturers for the development of instructions for continued airworthiness but does not define the level of overhaul instruction. In this occurrence, the manufacturer's instructions for continued airworthiness were interpreted to allow for overhaul without complete disassembly of subcomponent parts of the FCU.

3. Both pilots were wearing helmets. The pilot-in-command suffered head and neck injuries during the impact and subsequent rollover.

4. The investigation could not establish whether wear of the components of the FCU contributed to the power loss and drooping issues reported on this model of FCU, or whether the power loss and drooping issues were related to sending these FCUs for repair before the expected time between overhauls.

5. Company pilots regularly disabled the engine's overspeed protection system in the Bell 214-B1 model helicopter, and by doing so, removed an engine protection system.

TSB Final Report A10C0159—Engine Shut-down and Forced Landing

On September 10, 2010, a privately registered Piper PA 31-310 Navajo was on a VFR flight from Pickle Lake to Kashechewan, Ont., with a pilot and three passengers on board. Shortly after reaching cruise altitude, there was a brief rumble from the left engine, accompanied by decreases in exhaust and cylinder head temperatures. Consequently, the pilot reversed course. While en route to Pickle Lake, left engine performance deteriorated and the pilot shut the engine down. Unable to maintain altitude, the pilot made a forced landing about 30 NM east of Pickle Lake at 12:15 CDT. The pilot and one passenger sustained minor injuries. The aircraft sustained substantial damage, but there was no post-crash fire. The emergency locator transmitter (ELT) activated on impact. *The TSB authorized the release of this report on July 4, 2011.*

Analysis

The initiating event of the occurrence was a magneto failure in the left engine. This failure was the result of the loss of retention of the bushing in the distributor block of the left magneto. The subsequent misalignment of the distributor rotor caused the rotor to fall out of synchronization with the engine. This caused the left engine to run rough, backfire and lose power. The clean, shot-blasted appearance of the piston crowns indicates that the rough running and back firing likely released combustion products that contaminated spark plugs of both magneto systems. It could not be determined whether the engine would have been capable of producing significant power running on the right magneto alone.

The aircraft should have been able to sustain level cruising flight with a single engine. This analysis will consider why the aircraft was unable to do so.

The pilot had not received emergency procedures training on the Navajo and was unfamiliar with its handling characteristics while one engine was inoperative. This unfamiliarity may explain why the pilot did not increase the power on the right engine to maximum when the left engine was shut down. The airspeed decreased incrementally, requiring a corresponding increase in rudder to maintain directional control, which in turn, increased drag. The airspeed continued to decrease and subsequent power increases on the operating engine were insufficient to maintain altitude. The aircraft became difficult to control as it entered the turbulent air and altitude was gradually lost. Eventually, the pilot was required to execute a forced landing.

The Navajo *Pilot's Operating Handbook* (POH), Section 3, Engine Inoperative Procedures, does not contain a precautionary engine shutdown procedure. Unlike the Engine Securing Procedure (Feathering Procedure), other engine inoperative procedures in Section 3 contain specific guidance with respect to engine power settings. Consequently, pilots using only this procedure to perform a precautionary shutdown may not apply sufficient power to the operating engine to sustain level flight. The Navajo emergency procedures that pertain to engine failures require the pilot to be practiced and familiar with the procedures for them to be used effectively in a single engine situation.

The aircraft magnetos had been inspected every 100 hr, as required by Piper Navajo service manual checklists. These inspections are sufficient to satisfy the routine maintenance that is required as the magneto accumulates hours in service. However, the inspections were not sufficient to detect an incipient failure that had developed over many hours of operation. If the SB 643B 500-hr inspection recommendations had been completed by following the procedures contained in the *Service Support Manual*, there would have been several opportunities to detect and correct any distributor block bushing looseness before the magneto failed.

Findings as to causes and contributing factors

1. The left magneto distributor rotor gear teeth uncoupled from the input pinion gear, placing the distributor rotor out of time with the engine. As a result, the left engine began to run rough, backfire and lose power.
2. The pilot shut down the left engine, but did not immediately adjust the power on the operating engine. Airspeed then decreased to a point where the addition of power resulted in the aircraft becoming difficult to control in turbulent conditions.
3. The gradual loss of altitude eventually required a forced landing.

Findings as to risk

1. If the Navajo POH, Section 3, Engine Inoperative Procedures, Engine Securing Procedure (Feathering Procedure) is used as a stand-alone procedure, there is a risk that sufficient power may not be applied to the operative engine to maintain flight.
2. If the 500-hr magneto inspection recommendation of Service Bulletin 643B is not followed, there is a risk that the looseness of the distributor block bushing will go undetected and uncorrected.

TSB Final Report A10C0214—Engine Power Loss and Autorotative Landing

On December 12, 2010, during daylight hours, a Eurocopter AS 350 B2 helicopter was conducting slinging operations approximately 6 NM northeast of Pickle Lake Airport, Ont. The pilot had picked up a load of fuel barrels with a longline and was transitioning into forward flight. At low airspeed, and approximately 250 ft AGL, the helicopter's engine lost power. The pilot jettisoned the load and attempted an autorotative landing. The helicopter struck the ground in a level attitude, and one of the main rotor blades severed the helicopter's tail boom. The pilot was not injured and was able to exit the aircraft without assistance. The helicopter was substantially damaged. There was no post-crash fire and the emergency locator transmitter (ELT) did not activate. The accident occurred at 08:00 CST. *The TSB authorized the release of this report on January 3, 2012.*

Analysis

Testing of the engine and its fuel system could not identify a mechanical reason for the engine power loss. A blockage in the air inlet or fuel delivery system could cause an engine to flame out, but no such blockage or contamination was noted. Testing of the fuel system showed that air can become entrapped in the fuel system which could not be bled out by normal maintenance action prior to flight. The analysis will therefore examine the role that air entrapment may have played in this occurrence.

The investigation determined that air can be introduced into the fuel system through a leaking fuel control unit (FCU) NTL or Ng[2] drive fuel–pump seal, routine maintenance of the fuel system, or by draining the fuel filters with the boost pumps off. In this occurrence, the likely source of the air was a leaking FCU NTL or Ng drive fuel–pump seal which was identified during the hard start troubleshooting problems approximately 10 hr prior to the occurrence. However, the significance of this leakage, in combination with fuel boost pump check valves that incorporate bleed ports, was unknown at the time of the troubleshooting and the FCU was reinstalled on the helicopter.

An engine flameout likely occurred as a result of an interruption in fuel flow due to the entrapment of air in the fuel system. In response to the engine power loss, the pilot attempted to carry out an autorotation to the ground. However, the engine power loss occurred at an altitude from which a safe landing was not assured.

Some operators have adopted the informal practice of draining the Le Bozec airframe filter with the boost pumps off. The *Rotorcraft Flight Manual* (RFM) and the *Aircraft Maintenance Manual* (MM) make no reference to a daily draining procedure for the Le Bozec airframe filter. On helicopters equipped with boost pump check valves that incorporate bleed ports, the practice of draining the Le Bozec fuel filter with the boost pumps off may inadvertently introduce air into the aircraft's fuel system.

The Arriel 1D1 engine is not equipped with an auto-ignition system, nor is it required by regulation. On helicopters without an auto-ignition system, if a flameout occurs, there may be insufficient time to attempt an engine relight.

Findings as to causes and contributing factors

1. A leaking FCU NTL or Ng drive fuel-pump seal, in combination with fuel boost pump check valves that incorporate bleed ports, likely allowed air to be introduced into the fuel system.
2. The engine lost power, likely as a result of a flameout caused by an interruption in fuel flow due to entrapment of air in the fuel system.
3. The engine power loss occurred at an altitude from which a safe landing was not assured.

Findings as to risk

1. On helicopters equipped with boost pump check valves that incorporate bleed ports, the practice of draining the Le Bozec fuel filter with the boost pumps off may inadvertently introduce air into the aircraft's fuel system, thereby increasing the risk of an engine flameout.
2. After routine fuel filter maintenance, the fuel system bleeding procedure does not ensure the system is completely purged of air, thereby increasing the risk of an engine flameout.
3. The Arriel 1D1 engine is not equipped with an auto-ignition system. Therefore, if a flameout occurs there may be insufficient time to attempt an engine relight.

Safety action taken

Due to similarities between this occurrence and a concurrent NTSB investigation, Eurocopter France initiated a test program to see if air that had been introduced into the fuel system could result in engine operating difficulties. The tests were conducted in conjunction with the engine manufacturer Turbomeca, the airframe filter manufacturer Le Bozec and the French accident investigation bureau BEA (Bureau d'Enquêtes et d'Analyses).

2 Ng denotes gas generator and NTL denotes free turbine where N is a speed and TL is free turbine *(turbine libre)*.

On July 26, 2011, Eurocopter released Information Notice No. 2351–I–28 informing operators of AS350 B, BA, BB, B1, B2 and D models of the possibility of air being introduced in the fuel system by activating the drain located at the bottom of the airframe filter unit assembly. Eurocopter reminded operators that the drainage of the fuel filter is not required in daily operation. However if draining is to be performed, it must be performed with at least one of the two booster pumps operating to prevent air from being drawn into the system.

Turbomeca has developed a design improvement of both the FCU NTL and Ng seals, with a NTL seal replacement in the field by the end of 2011 and a planned introduction date of the Ng seal by the end of 2012.

TSB Final Report A11A0035—Runway Overrun

On July 16, 2011, at 06:45 NDT, a Boeing 727-281 departed Moncton International Airport, N.B., for St. John's International Airport, N.L., on a scheduled cargo flight with three crew members on board. An instrument landing system (ILS) approach was carried out and at 08:09 NDT the aircraft touched down on Runway 11. Following touchdown, the crew was unable to stop the aircraft before the end of the runway. The aircraft came to rest in the grass, with the nose wheel approximately 350 ft beyond the end of the pavement. There were no injuries and the aircraft had minor damage. *The TSB authorized the release of this report on January 23, 2013.*

Analysis

Hydroplaning

The aircraft touched down about 1 850 ft from the threshold and at a higher than required airspeed, which reduced the available runway length to stop the aircraft.

About 8 seconds after touchdown, the crew applied the wheel brakes and almost immediately noted that the aircraft was skidding. Braking was maintained throughout the landing roll and up until the aircraft stopped. Pieces of reverted rubber were found on the runway near the touchdown point and along the left side of the runway up to where the aircraft departed the pavement. This indicates the aircraft experienced reverted rubber hydroplaning almost immediately after the brakes were applied and periodically throughout the landing roll.

Should skidding be experienced, the typical recovery method is to completely release the brakes momentarily to let the wheels spin up and establish an adequate speed reference.

When hydroplaning occurs, which reduces wheel contact and friction, a crosswind will exacerbate the aircraft's natural tendency to weathervane into the wind. Both smooth runway surfaces and smooth tread tires will induce hydroplaning with lower water depths.

Although the exact depth of water could not be determined, the presence of water on the runway caused the aircraft to hydroplane. This led to a loss of directional control and braking ability and increased the required stopping distance. This condition was exacerbated because the brakes were held on throughout the landing roll and the tires had excessive tread wear.

Tire Wear

In this occurrence, three of the four tires were in excess of 80% worn, while the fourth tire was about 65% worn. On a wet runway, once a tire is about the 80% worn the wet-runway friction-coefficients drop markedly.

Utilizing tires that are more than 80% worn reduces wet-runway traction, thereby increasing the risk of hydroplaning and possible runway overruns.

Wet Runways

Both the macro and microtexture characteristics of a pavement surface can significantly affect its friction values. When TSB investigators touched the surface of runway 11/29, they found it smooth, which is inconsistent with the gritty feeling of a good microtexture. Good microtexture is the principal means of combatting viscous hydroplaning. Both the FAA and ICAO recommend that a complete runway friction survey should include tests at both 65 km/h (macrotexture condition) and 95 km/h (microtexture condition). Even though Advisory Circular (AC) No. 300-008 states that the quality of the runway surface, including the microtexture condition, may contribute to the runway's slipperiness under wet or dry conditions, TC does not require microtexture testing to be carried out. The practice of not testing the runway surface microtexture increases the risk of wet runway hydroplaning due to an incomplete assessment of the runway's overall friction characteristics.

The TSB calculated the wear, based on an initial retread depth of 0.43 in. and the average tread depth remaining, on the occurrence aircraft's no. 1 tire to be about 65%, no. 2 tire about 90%, and the no. 3 and no. 4 tires, shown above, were in excess of 95% worn.

Findings as to causes and contributing factors

1. The aircraft touched down about 1 850 ft from the threshold, and at a higher than required airspeed, which reduced the available runway length to stop the aircraft.
2. Excessive tread wear and the wet runway caused the aircraft to hydroplane, which led to a loss of directional control and braking ability, resulting in the aircraft overrunning the runway.
3. The brakes were not released when the skid occurred, which reduced the effectiveness of the anti-skid system.

Findings as to risk

1. Utilizing tires that are more than 80% worn reduces wet runway traction, thereby increasing the risk of hydroplaning and possible runway overruns.
2. The practice of not testing the runway surface microtexture increases the risk of wet runway hydroplaning due to an incomplete assessment of the runway's overall friction characteristics.
3. The lack of adequate runway end safety areas (RESA) or other engineered systems or structures designed to stop aircraft that overrun increases the risk of aircraft damage and passenger injuries.
4. The use of non-grooved runways increases the risk of wet runway overrun due to a reduction in braking characteristics.
5. If all employees do not fully understand their reporting obligations and have not adopted a safety reporting culture as part of everyday operations, the safety management system (SMS) will be less effective in managing risks.
6. When an operator's SMS is not fully effective, there is an increased risk that hazards will not be identified and mitigated.
7. The lack of clearly defined runway surface condition (RSC) reporting standards related to water on runways increases the risk of hydroplaning.
8. If cockpit voice recorders (CVR) and flight data recorders (FDR) are not checked in accordance with regulations, there is risk that the recorded data will not be useable and potentially valuable information may not be recorded.

Safety action taken

Operator

Following the occurrence, the operator updated its crew resource management training to include landing distances, braking, wet and contaminated runways, and crosswind landings. Following the occurrence, the operator enhanced the test procedures for FDR recordings.

St. John's International Airport Authority

Following the occurrence, the St. John's International Airport Authority implemented an expanded runway friction testing program. This program includes more extensive friction testing, increasing the number of longitudinal test runs at various offset distances from runway centreline and conducting runway macrotexture measurements.

TSB Final Report A11W0152—Continued Visual Flight into Instrument Meteorological Conditions—Collision with Terrain

On October 5, 2011, a Bell 206B helicopter was on a VFR flight from Whitecourt, Alta., to Drayton Valley Industrial Airport, Alta. The flight encountered and continued into instrument meteorological conditions (IMC). The aircraft collided with terrain approximately 1 NM south of Drayton Valley Industrial Airport, at 18:20 MDT, during daylight hours. There was no post-crash fire. The pilot, who was the sole occupant, was fatally injured. No emergency locator transmitter (ELT) signal was received by search and rescue authorities. *The TSB authorized the release of this report on October 31, 2012.*

Analysis

There was no indication that an aircraft system malfunction contributed to this occurrence. This analysis will focus on the decision-making, operational and environmental factors that contributed to the occurrence.

Two days prior to the occurrence flight, the pilot had decided to terminate a trip and return to base due to deteriorating weather. Regulations, company operational procedures and prior training likely had some influence in that decision-making process. In the case of the occurrence flight, it could not be determined why the pilot chose to deviate from the planned routing.

Once on top, the only recourse was to descend through the cloud to regain visual reference. The pilot did not contact the Edmonton area control centre (ACC) and request assistance, such as vectors to a larger airport. However, had the pilot done so, a descent through cloud would still have been necessary. In addition, there is no indication that the pilot attempted to turn back towards Whitecourt, where the weather was better.

Although the pilot had indicated concern about possible icing, the investigation discounted this possibility, as there likely would have been a loss of control due to tail rotor icing, which would have resulted in a different impact signature.

During the descent through cloud, the pilot was able to control the rotorcraft, but lost awareness of the aircraft's height above ground, and did not arrest the rate of descent prior to impact with terrain. Disorientation or loss of situational awareness could have played a part to some degree.

The pilot was in the habit of not wearing the available shoulder harnesses. These harnesses serve to maintain occupants in an upright position in order to take full advantage of all the crashworthiness features of the aircraft. To what extent this may have contributed to the injuries sustained could not be determined. The fact that the pilot was not wearing a helmet likely would not have been a factor in survivability due to the severity of impact forces.

Findings as to causes and contributing factors

1. The pilot continued the VFR flight into weather conditions that required descent through cloud to reach destination.
2. The pilot did not arrest the rate of descent, resulting in a collision with terrain in which the impact forces were not survivable.

Finding as to risk

1. Not wearing the available shoulder harnesses or a helmet increases the risk of severe injury or death.

Other finding

1. The ELT switch was found in the OFF position.

Safety action taken

The operator's pilots have all received human factors training and pilot decision-making training since the accident. △

New Floatplane Safety Video at Smartpilot.ca!

Enjoy this very well-done production by the Smartpilot.ca team where you will learn important floatplane pre-flight precautions and how to prepare for what to do in the event of an upset! While you're at it, subscribe to their YouTube© channel at SmartPilotCanada and view all of their excellent aviation safety videos, available in both official languages.

Accident Synopses

Note: *The following accident synopses are Transportation Safety Board of Canada (TSB) Class 5 events, which occurred between November 1, 2012, and January 31, 2013. These occurrences do not meet the criteria of classes 1 through 4, and are recorded by the TSB for possible safety analysis, statistical reporting, or archival purposes. The narratives may have been updated by the TSB since publication. For more information on any individual event, please contact the TSB.*

— On November 6, 2012, the pilot of a **Cessna 182C** was returning to Alexandria, Ont., from a flight to Lachute, Que. During the approach to Alexandria Aerodrome (CNS4), the aircraft was high and subsequently landed long. The aircraft was unable to stop in the remaining distance and overran the runway into an adjacent ploughed field. The aircraft was substantially damaged; there were no injuries. *TSB File A12O0189.*

— On November 10, 2012, two privately registered aircraft, a **Pitts Special** and a **Mooney M20R**, collided while taxiing on the apron at Boundary Bay Airport (CZBB), B.C. After landing and exiting the active runway from Taxiway C, the Pitts was taxiing westbound on the apron. Due to the tail dragger configuration, the pilot was manoeuvring in an "S" style and following the yellow painted transit marker in order to view the direction of travel. The Mooney, piloted by an instructor and its student owner, was taxiing eastbound and following the same yellow painted transit marker in preparation for a training flight. The Mooney veered to the right to avoid a collision, but the pilot of the Pitts did not see the Mooney until impact. He indicated that the setting sun created a glare that may have inhibited his vision. There were no injuries but both aircraft were damaged. The Mooney's left hand wing tip was chewed up by the Pitts' propeller. *TSB File A12P0193.*

— On November 11, 2012, a **Bellanca 7GCBC Citabria** was departing on a pleasure flight from DeBolt Aerodrome (CFG4), Alta., to Peoria, Alta. During the takeoff roll, the pilot realized that the aircraft would not clear the fence across the end of the runway and aborted takeoff. The aircraft departed the end of the runway and slid into the fence. The aircraft sustained damage to the right horizontal stabilizer. There were no injuries. *TSB File A12W0167.*

— On November 13, 2012, the pilot of a **Cessna 172S** had departed Edmonton City Centre (CYXD), Alta., and was conducting touch-and-go landings at Warren Thomas Airport (CFB6) in Josephburg, Alta. During the takeoff roll, after the application of full power, the aircraft veered left with no response to brake application. The runway condition consisted of ice with some standing water off the centreline. The aircraft departed the left side of the runway into a snow bank and overturned. The aircraft was substantially damaged, but the pilot was not injured. *TSB File A12W0170.*

— On November 13, 2012, a **Diamond DA20-A1** was taxiing for a night flight at Ottawa/McDonald Cartier International Airport (CYOW), Ont., when a propeller strike with two taxi light batons occurred. Both tips of the propeller were sheared off. There were no injuries. The engine (Bombardier Rotax 912 F3) gearbox was removed and sent for non-destructive inspection. *TSB File A12O0199.*

— On November 17, 2012, the student pilot of a **Piper PA-28-140** was practicing solo touch-and-go landings on Runway 36 at Winnipeg/St. Andrews Airport (CYAV), Man. On the last touchdown, the pilot lost directional control of the aircraft on the snow covered surface of the runway. The aircraft departed the runway and struck an adjacent snow bank. The pilot was not injured, but the aircraft's forward fuselage, propeller and nose wheel were substantially damaged. *TSB File A12C0159.*

— On November 18, 2012, an **amateur-built Mosquito XE** helicopter was above Lac Britannique, Que., and on final approach to land on private property when the aircraft hit the water. Glassy water conditions caused the pilot to misjudge his height. The pilot was alone on board and managed to evacuate the aircraft before being rescued by a local resident. The pilot was transported to hospital with minor injuries and hypothermia. The aircraft sank to the bottom of the lake. *TSB File A12Q0196.*

— On November 21, 2012, a **DTA Combo 912S ultralight** took off from St-Hyacinthe (CSU3), Que., in the morning. The aircraft was seen making several turns at low level before crashing in a field approximately 20 NM west of CSU3. The pilot was fatally injured. *TSB File A12Q0200.*

— On December 4, 2012, the pilot of a **Mooney M20D** was conducting touch-and-go landings on Runway 26 at Villeneuve (CZVL), Alta., when a landing was carried out with the landing gear up. The pilot attempted to power up as the aircraft sank; however, the belly was scraped and a propeller strike occurred. The pilot got airborne and circled for a normal landing with the gear down. There were no injuries to the pilot or the one passenger. *TSB File A12W0183.*

— On December 5, 2012, a privately operated **Robinson R44 II** helicopter crashed approximately 12.5 NM southwest of Slave Lake, Alta. The helicopter was substantially damaged and the pilot was fatally injured. Substantial icing had occurred on both the main and tail rotors. *TSB File A12W0184.*

— On December 7, 2012, an **amateur-built Pelican PL** airplane was on a VFR flight from a private airport at Saint-François-de-Laval, Que. with one person on board. During the takeoff run, the aircraft went off course to the left and departed the grassy surface. The nose wheel sank into a ploughed field, and the aircraft flipped over about 20 m from the runway. The pilot was uninjured. The aircraft was substantially damaged but did not catch fire. *TSB File A12Q0211.*

— On December 11, 2012, a **Christen Husky** aircraft was on a VFR flight from Drummondville Airport (CSC3), Que. While the aircraft was in the area of Farnham, Que., the pilot chose to land in a ploughed field that he thought was frozen. When the wheels touched the ground, the aircraft flipped over on to its back. The two people on board were not injured. The aircraft was substantially damaged. *TSB File A12Q0213.*

— On December 16, 2012, an **Aeronca 7AC on wheels**, with only the pilot on board, was taxiing on Taxiway Charlie towards Runway 05 at Trois-Rivières Airport (CYRQ), Que. Just before the runway, the pilot lost directional control of the aircraft. The aircraft veered to the right and departed Taxiway Charlie before crossing a ditch and coming to a stop on its belly. The landing gear was torn off, and the propeller hit the ground several times. The pilot was not injured. At the time of the occurrence, the wind was blowing from the east-northeast at 10 to 23 kt. *TSB File A12Q0214.*

— On December 26, 2012, a **Cessna 170A**, with three people on board, was on a pleasure flight overflying a sector of Lac Croche and Lac des Chicots (near Sainte-Thècle), Que. While flying low and in a turn over Lac des Chicots, the aircraft stalled; it was substantially damaged when it collided with the lake's frozen surface. The pilot was seriously injured. The two passengers sustained minor injuries. *TSB File A12Q0220.*

— On January 5, 2013, a **Piper PA28-140 Cherokee** was on a VFR flight in the area of Mascouche Airport (CSK3), Que. While the aircraft was on very short final for Runway 29, it hit a snow bank, pitched nose down and came to a stop on the runway. The two people on board were not injured. The aircraft's nose wheel, propeller and engine were substantially damaged. *TSB File A13Q0003.*

— On January 9, 2013, a **Bell 206B** helicopter was tasked with picking up two hunters stranded on sea ice roughly 8 NM northeast of Arviat Airport (CYEK), Nun., and transporting them to Arviat. The helicopter landed approximately 200 ft away from the hunters. The pilot maintained approximately 60% torque to keep the helicopter light on the skids. As the pilot gestured to the hunters to approach the aircraft, the right skid broke through the ice. As the helicopter tilted to the right, the main rotor struck the ice. The helicopter began to sink and water entered the cockpit. The right front windscreen was partially dislodged, and the hunters helped extricate the pilot from the cockpit through the windscreen opening. Later, two rescuers parachuted to the site. All personnel were evacuated to Arviat by helicopter approximately 2.5 hr later and treated for hypothermia. The Bell 206B was substantially damaged. *TSB File A13C0003.*

— On January 14, 2013, a pilot instructor and an instrument flight training pilot were on board a **Piper PA30**. They were conducting an instrument landing system (ILS) approach on Runway 24 at Montréal/Mirabel (CYMX), Que., when the pilots saw that the landing gear had not deployed after the landing gear control lever had been lowered. The crew noted that the gear motor circuit breaker had popped. The circuit breaker was reset. The green light indicating that the landing gear was extended and locked still did not come on. A go-around was conducted and the aircraft headed towards Lachute Airport (CSE4), Que., where it is based. The procedure for manually extending the landing gear was attempted but unsuccessful. A low approach was conducted and ground staff were able to determine that the right wheel had not extended properly. The aircraft remained in flight until fire and ambulance services arrived on the scene. The aircraft conducted a visual approach for Runway 28. At about 3 mi. on final, the right engine propeller was feathered and placed in a horizontal position to limit damage to the right engine. The left engine was cut just before impact. During landing, the landing gear completely collapsed, and the aircraft came to a stop approximately 1 100 ft from the threshold of Runway 28, slightly to the left of the runway centreline. The aircraft's two occupants evacuated and were not injured. The aircraft's belly skin panels and left engine propeller were damaged. *TSB File A13Q0009.*

— On January 15, 2013, a twin-engine **Piper PA-34-200 Seneca** was damaged during landing on Runway 07 at Chilliwack Airport (CYCW), B.C. An instructor and a student were on a training flight during a planned full stop landing. Shortly after a hard landing, the pilot applied brakes and the left propeller struck the runway. The aircraft swerved to the left and came to a stop in grass about 30 ft off the runway, with a collapsed nose gear. Both propellers were bent and there was some damage to a wing. *TSB File A13P0003.*

— On January 24, 2013, a **Van's RV-9A** took off on Runway 32 at Kitchener/Waterloo Airport (CYKF), Ont. On climb out, at approximately 150 ft AGL, the engine (AVCO LYCOMING O-235-N2C) began to lose power and it eventually quit. The pilot decided to turn around and attempt to land on the runway, but the aircraft quickly lost altitude and crashed on a taxiway.

It skidded to a stop against the airport fence. Airport emergency services responded to the scene, but there was no fire and the pilot was not injured. The nose gear collapsed, and the propeller and left wing tip were damaged. This was a local flight conducted after minor maintenance was performed by the pilot. The aircraft was equipped with two tanks but only the right tank was selected and it was reported to be half full. There were no prior indications that the engine was not capable of producing full power. *TSB File A13O0013.*

— On January 29, 2013, a privately operated **Piper Meridian PA46-500TP** was on a VFR flight from La Crete (CFN5), Alta., to Three Hills (CEN3), Alta. On short final to Runway 29, the pilot lost visual reference to the runway due to blowing snow. The aircraft touched down approximately 100 ft short of the runway on an inclining slope. The PA46's left wing struck a snow bank causing it to bend back along the fuselage. The aircraft came to rest near the left side of the runway threshold. The pilot and one passenger were not injured; however, a second passenger did sustain minor injuries. A considerable amount of fuel was spilled, but there was no post-impact fire. *TSB File A13W0011.* △

Answers to the 2013 Self-Paced Study Program

1. The lesser of: (a) the height above ground or water of the base of the lowest layer of cloud covering more than half the sky; or (b) the vertical visibility of a surface-based layer which completely obscures the sky.

2. NOTAM

3. controlled flight into terrain (CFIT) or obstacles

4. the identification of the ATS unit controlling the RCO; the aircraft identification; the name of the location of the RCO followed by the individual letters R-C-O in a non-phonetic form

5. 122.75; 123.4

6. AGL, ASL

7. the available weather information that is appropriate to the intended flight

8. 24 hours and 1-866-WXBRIEF or 1-866-992-7433

9. 222300Z to 230600Z

10. 800 ft

11. 1800Z

12. The ceiling lowered and then increased.

13. The visibility remained constant and then increased.

14. Flight level unknown.

15. active; monitored; 126.7 (bcst)

16. does not

17. require a clearance; must establish two-way communication with the appropriate ATC agency

18. permission has been obtained from the user agency

19. SFG/N

20. FAL 2.3.2

21. Call 1-888-CANPASS or the nearest RCMP office as soon as possible.

22. (a) Inspect the ELT to ensure that it is secure, free of external corrosion, and the antenna connections are secure;
(b) Ensure that the ELT function switch is in the "ARM" position;
(c) Ensure that the ELT batteries have not reached their expiry date;
(d) Listen to 121.5 MHz to ensure the ELT is not transmitting.

23. Yes, switch your ELT to "ON" at the time you will be reported overdue.

24. significant aeronautical information to update the current aeronautical charts; NOTAM

25. permitted

26. abnormal occurrence

27. (a) Air is a perfectly dry gas;
(b) 29.92 in. of mercury;
(c) 15˚C; (d) 1.98˚C per 1 000 ft; -56.5˚C and then remains constant.

28. as per the NAV CANADA Aviation Weather Web Site

29. 75.7 L

30. Factors include: fuel available; angle of attack; airspeed; aircraft weight; centre of gravity; density altitude; engine efficiency; wind; aircraft condition.

31. Factors include: weight; location of the centre of gravity; turbulence; bank; the use of flaps; wing contamination; heavy rain; load factor.

32. 1 mi.

33. sufficient; meteorological

34. 100LL; Aviation turbine fuel

35. rolling inverted

36. safe altitude; flapping

37. Straight ahead.

38. In the same direction as the glider already in the thermal.

39. A propane leak at the valve stem.

40. rip-out/deflation

SECURITAS—Report Transportation Safety Concerns in Confidence

The Transportation Safety Board of Canada (TSB) administers a program called SECURITAS that enables you to report—in confidence—concerns you may have about safety in the marine, pipeline, rail and air modes of transportation. The incidents and potentially unsafe acts or conditions you report through SECURITAS are not always reported through other channels.

How is confidentiality protected?

The *Canadian Transportation Accident Investigation and Safety Board Act (CTAISB Act)* protects the confidentiality of the statements that witnesses or those involved in transportation occurrences make, as well as the identity of persons who report confidentially to SECURITAS, so they can be frank with TSB investigators without any fear of reprisal, self-incrimination or embarrassment.

Letters, faxes, e-mails and telephone messages to SECURITAS come directly into the SECURITAS office and are handled only by authorized SECURITAS analysts. The analysts are specialists in marine, pipeline, rail and aviation safety. A confidential record is kept of the reporter's name and contact information because the SECURITAS analyst may need to reach the reporter to follow up on the details of his or her report—but the reporter's identity is kept confidential.

The *CTAISB Act* (Section 31) and the *TSB Regulations* prohibit the release of any information that could reveal a confidential reporter's identity without the reporter's written consent.

Here are some examples of the types of situations that could affect air transportation safety and that your report might help correct.

Unsafe conditions

- Chronic lack of repair of aircraft, poor maintenance practices
- Unsafe runway or aerodrome conditions
- Inadequate or poor air traffic services in a particular area
- Poor reception of navigation signals, weak radio coverage, inadequate weather services
- Errors in aeronautical publications; unsafe procedures published in manuals of instructions for pilots, cabin crew, ground crew, or aircraft maintenance or air traffic services

Unsafe procedures and practices

- Routinely descending below minimum en route altitude or approach in instrument meteorological conditions
- Non-compliance with airworthiness directives, minimum equipment list
- Pilots flying in excess of regulatory flight-time limits
- Unsafe aircraft circuit procedures and/or communications
- Air traffic control practices that could jeopardize the safety of flight, e.g., use of non-standard phraseology, compromising separation criteria, inadequate manning and supervision
- Unsafe cabin baggage stowage procedures; unsafe passenger seating or cargo securing arrangements
- Aircraft maintenance procedures not completed correctly but signed off
- Shortcuts in following checklist procedures
- Crew scheduling problems: inadequate crew composition, unqualified crew, inadequate crew rest
- Scheduling personnel who are not professionally or medically qualified for the assigned duties
- The use of unapproved parts, time-expired equipment

The Transportation Safety Board of Canada will never reveal your identity or any information that could identify who you are. By reporting an unsafe act or condition, you can help make a real difference towards improving transportation safety.

Send your reports to SECURITAS

E-mail: securitas@bst-tsb.gc.ca
Toll-free: 1-800-567-6865
Fax: 1-819-994-8065
Mail: P.O. Box 1996, Station B
Gatineau QC J8X 3Z2 △

Transport Canada / Transports Canada

TP 15223E
07/2013

SNOWBIRDS CAN FLY OVER PARLIAMENT HILL…

CF photo

YOU CAN'T.

Know the RESTRICTED AREAS (CYRs) on your route!

For information on CYR 537 (Parliament Hill), CYR 538 (Rideau Hall) and all other CYRs and specially designated airspace in Canada, consult the *Designated Airspace Handbook* at www.navcanada.ca.

TC-1005204

Canada

2013 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 until October 31, 2014. 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.

All pilots are to answer questions 1 to 28. In addition, aeroplane and ultra-light aeroplane pilots are to answer questions 29, 30 and 31; helicopter pilots are to answer questions 32, 33 and 34; gyroplane pilots are to answer questions 35 and 36; glider pilots are to answer questions 37 and 38; and balloon pilots are to answer questions 39 and 40.

Note: *References are listed at the end of each question. Many answers may be found in the* Transport Canada Aeronautical Information Manual *(TC AIM). Amendments to that publication may result in changes to answers and/or references. The TC AIM is available online at:* www.tc.gc.ca/eng/civilaviation/publications/tp14371-menu-3092.htm

1. What is the definition of "ceiling"? ______________________________
______________________________. **(GEN 5.1)**

2. Prior to using any NAVAID and prior to flight, pilots should check __________ for information on NAVAID outages. **(COM 3.3)**

3. When navigating VFR with GNSS, the risk of becoming lost is small but the risk of ____________________ increases in low visibility. **(COM 3.15.16)**

4. What information should you include on initial contact with an RCO? ______________________________
____________________; and ______________________________
______________________________. **(COM 5.8.3)**

5. In Canadian Southern Domestic Airspace, the correct frequency for two pilots to use for air-to-air communication is ______ MHz. Frequency ______ MHz is allocated for soaring activities which include balloons, gliders, sailplanes, ultralights and hang gliders. **(COM 5.13.3; COM 5.13.2)**

6. Heights in METAR and TAF are always stated as height <u>AGL/ASL</u>. Heights in GFA and PIREP are normally stated as height <u>AGL/ASL</u>. **(MET 1.1.5(a))**

7. The PIC of an aircraft shall, before commencing a flight, be familiar with ______________________________. **(MET 1.1.9, CAR 602.72)**

8. What are the hours of service and the common telephone number of FICs?
______________________________. **(MET 1.3.1)**

TAF CYYZ 221740Z 2218/2324 10012G22KT P6SM SCT015 OVC100 TEMPO 2218/2219 2SM -SHSN BKN020 OVC080
FM221900 10012G22KT 3SM -SN OVC020 TEMPO 2219/2221 1SM –SHSN VV008
FM222100 10010G20KT P6SM -SN OVC025 TEMPO 2221/2223 5SM –SHSN OVC020
FM222300 10010KT P6SM OVC025 TEMPO 2223/2306 3SM -FZRA BR OVC010
FM230600 11008KT 4SM -FZDZ BR OVC010 PROB30 2306/2310 1SM –SHSN VV008
FM231500 20010KT 6SM -SHRA BR OVC010
FM231700 24015KT P6SM BKN025
RMK NXT FCST BY 222100Z=

9. In the above TAF, during which time period would you expect the freezing rain to occur? ________________________ ________________. **(MET 3.9.3)**

10. In the above TAF, what is the lowest forecast ceiling? _________. **(MET 3.9.3)**

SPECI CYVR 221858Z 13013KT 8SM BKN011 OVC027 06/ RMK SF5SC3=

SPECI CYVR 221833Z 13015KT 8SM BKN008 OVC022 06/ RMK SF5SC3=

METAR CYVR 221800Z 12015KT 4SM -RA BKN006 BKN012 OVC030 06/04 A2969 RMK SF5SC2NS1 SLP054=

SPECI CYVR 221745Z 12015KT 4SM -RA BKN007 OVC012 06/ RMK SF6SC2=

SPECI CYVR 221714Z 14016G21KT 4SM -RA BKN010 OVC027 06/ RMK SF6NS2=

METAR CYVR 221700Z 12016G22KT 4SM -RA SCT010 OVC027 06/03 A2972 RMK SF4NS4 SLP063=

11. In the above reports, at what time did the lowest ceiling and visibility occur? ______________________. **(MET 3.15.3)**

12. In the above reports, what was the trend in the ceiling? ____. **(MET 3.15.3)**

13. In the above reports, what was the trend in the visibility? ______________________________________. **(MET 3.15.3)**

UACN10 CYXU 221915 YZ UA /OV CYOO 180020 /TM 1914 /FLUNKN /TP C414 /IC LGT-MDT MXD 080-100

14. In the above PIREP, what does FLUNKN mean? ____. **(MET 3.17)**

15. If a FISE RCO is using one of the following four frequencies: 123.275, 123.375, 123.475 or 123.55 MHz, the frequency 126.7 MHz will be retained but will not be _____________ or ________________ by an FIC. RCOs with 126.7 MHz operated in this manner are published as _________. **(RAC 1.1.3)**

16. Declaring a MINIMUM FUEL advisory does/does not imply ATC traffic priority. **(RAC1.8.2)**

17. Before entering Class C airspace, VFR flights _____________________, and before entering Class D airspace, VFR flights____. **(RAC 2.8.3; RAC 2.8.4)**

18. No person may conduct aerial activities within active Class F restricted airspace, unless __________________________ ___________. **(RAC 2.8.6)**

19. Which letters should be inserted in item 10 of your flight plan, if your aircraft is equipped with 2 VHF radiotelephones, a VOR, an ADF, an ILS, a GPS and a Transponder—Mode C that is not functioning? ______________. **(RAC 3.16.4)**

20. The requirements for transborder flights are contained in section _________ of the TC AIM. **(GEN 4.0)**

21. In a transborder flight into Canada, what should a pilot do if he/she has to land at a site not designated as a customs AOE due to weather conditions or some other emergency? ____ ____. **(FAL 2.3.3)**

22. List the four steps that should be accomplished during your pre-flight inspection of the ELT. **(SAR 3.4)**

(a) ____; (b) ____;

(c) ____; (d) ____;

23. If you land to wait out weather, or for some other non-emergency reason, and you cannot contact anyone, a search will begin when you are reported overdue. Should you switch your ELT to "ON", and if so, when? _____________________ ____. **(SAR 3.5)**

24. The VFR Chart Updating Data section of the *Canada Flight Supplement* (CFS) provides a means of notifying VFR chart users of ____.
New or revised information of this nature, which is required to be depicted on visual charts, is advertised by __________ until such time as the information can be published in this section. **(MAP 2.4)**

130143 CZUL MONTREAL FIR
CYR- 606 LAC SAINT PIERRE ACT SFC TO 7000 FT MSL
FEB 12 1730-2300, 13 1500-2300 AND 15 1500-2300
1302121730 TIL 1302152300

25. According to the above NOTAM, a flight through this area is permitted/not permitted on February 14 at 2200Z. **(MAP 5.6.1.2; RAC 2.8.6)**

26. In addition to the particulars of any defect in any part of the aircraft or its equipment that becomes apparent during flight operations, pilots must also enter the particulars of any ___________________ to which the aircraft has been subjected into the aircraft's records. **(LRA 5.6.1)**

27. What are the ICAO Standard Atmosphere conditions?

(a) ______________; (b) Mean sea level pressure is ___________________; (c) Mean sea level temperature is _____;

(d) The rate of decrease of temperature with height is _________to the height at which the temperature becomes _____________________. **(AIR 1.5.2)**

28. Go to the NAV CANADA Aviation Weather Web Site. From the "Forecasts and Observations" page, open the AICs and bring yourself up to date. Record the number of the last AIC here. ___________. **(Aviation Weather Web Site)**

Aeroplane-specific questions

29. Convert 20 U.S. gallons into litres. ______________. **(GEN 1.9.2)**

30. List five factors that affect the range of your aeroplane. ____ ____. **(use aeroplane references)**

31. Name at least three factors affecting the stall speed of an aeroplane. ______________________________________ ____ ______________________. **(use aeroplane references)**

Helicopter-specific questions

32. The minimum flight visibility for a helicopter in VFR flight within uncontrolled airspace at less than 1 000 ft AGL during the day is _________. **(RAC 2.7.3; CAR 602.115)**

33. VFR helicopter pilots shall carry ____________fuel to fly to the destination plus 20 min at normal cruising speed and account for any foreseeable conditions that could delay the aircraft including the likelihood of adverse _____________ conditions. **(RAC 3.13)**

34. Good airmanship ensures that positive identification of the type and grade of aviation fuel is established before fuelling. What type of aviation fuel is blue in colour? ________. What type of aviation fuel is straw-coloured or undyed? ______ _______________________. **(AIR 1.3)**

Gyroplane-specific questions

35. A steep turn beyond the bank limitation could lead to _______________, due to adverse roll combined with yaw. **(use gyroplane references)**

36. In vertical autorotation, caution must be exercised to recover at a ____________ but the recovery must not be too rapid in order to avoid ___________. **(use gyroplane references)**

Glider-specific questions

37. If the tow pilot releases the tow rope below 300 ft AGL, where should you normally plan to land? _________________ _________________________. **(use glider references)**

38. When joining another glider in a thermal, in which direction should you circle? ______________________________ __________________. **(use glider references)**

Balloon-specific questions

39. If frost develops at a propane tank valve stem, what should you suspect is the cause? ___________________________ _________. **(use balloon references)**

40. Should power line contact become inevitable, the best action to take is __________________. **(use balloon references)**

Answers to this quiz are found on page 34 of ASL 3/2013.