Transport Canada Transports Canada

TP 185E
Issue 1/2013

AVIATION SAFETY LETTER

In this issue…

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

TC-1004935

Canada

The *Aviation Safety Letter* is published quarterly by Transport Canada, Civil Aviation. The contents do not necessarily reflect official government policy and, unless stated, should not be construed as regulations or directives.

Letters with comments and suggestions are invited. All correspondence should include the author's name, address and telephone number. The editor reserves the right to edit all published articles. The author's name and address will be withheld from publication upon request.

Please address your correspondence to:

Paul Marquis, Editor
Aviation Safety Letter
Transport Canada (AARTT)
330 Sparks Street, Ottawa ON K1A 0N8
E-mail: paul.marquis@tc.gc.ca
Tel.: 613-990-1289 / Fax: 613-952-3298
Internet: www.tc.gc.ca/ASL

Electronic distribution:
To subscribe to the *Aviation Safety Letter* e-Bulletin notification service, visit: www.tc.gc.ca/ASL.

Print-on-Demand:
To purchase a Print-on-Demand (POD) version (black and white), please contact:

The Order Desk
Transport Canada
Toll-free number (North America): 1-888-830-4911
Local number: 613-991-4071
E-mail: MPS1@tc.gc.ca
Fax: 613-991-2081
Internet: www.tc.gc.ca/Transact

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

ISSN: 0709-8103
TP 185E

Table of Contents

Guest Editorial

Martin Eley

Canada: At the Leading Edge of Aviation Safety

Today, aviation is an essential part of Canada. It connects Canadians in large and small communities with one another; it contributes to the health of the economy, and it creates jobs. Canada's air industry employs more than 90 thousand personnel. We have the second largest civil aviation aircraft fleet in the world. Canada also has the second largest population of licensed pilots—my Director of Medicine enjoys reminding me of this fact. In 2011, more than 70 million passengers flew within Canada's borders. In that same year, domestic air carriers logged nearly three million flights. Our safety record is one of the best in the world.

Today, we have much to be proud of. We are internationally recognized as world leaders by the International Civil Aviation Organization. With one of the largest civil aviation systems in the world and flights touching down in almost every country across the globe, we cannot help but make an impression. And we don't take this for granted. We use this expertise and our best practices and lessons learned to enhance aviation safety worldwide for our international partners—but we often share our knowledge with foreign civil aviation programs in order to provide assistance when and where it is needed.

At home and abroad the Government takes pride in our safe, reliable and efficient air transportation system. It is the Minister of Transport's mandate to put in place and enforce regulations for safe skies. Canadians value this. The Government values this. Although we are doing better than we've ever done before—2011 recorded the lowest number of accidents in modern aviation history—this does not mean that we can sit back and relax. As always, continuous improvement remains a top priority. I cannot stress this enough. When it comes to aviation safety, continuous improvement is a way of life.

Traditionally, the program has been guided by long-term strategic plans. More recently, it was decided to pause to take a closer look at our short-term vision, which is reflected in an action plan that was released in April 2012: *Improving Canada's Civil Aviation Safety Program: An Action Plan to April 2013*. The plan contains specific activities designed to address issues that have been identified to us by the Auditor General as well as by the Transportation Safety Board of Canada to improve the program. One of those areas is in regards to the services we provide to the industry. We are taking action to continue to be able to meet the demands for services in the coming years. As the aviation industry continues to grow, the International Air Transport Association predicts that North American international passenger demand will have grown by 4.9 percent between 2011 and 2014. In order to maintain the most efficient and effective service provision, Transport Canada has developed a tool for compiling reliable data on the current use of resources. With full implementation scheduled for 2013, the new tool will provide performance data on our services and the resources we have dedicated to service provision. This new data will allow us to allocate resources as effectively as possible. Significant progress is being made towards completing this and other commitments for improving our program.

One thing I've learned during my career is that, even when taking action and delivering results can take time, it is the act of listening that goes much further in gaining and maintaining trust. I remain committed to solidifying and building on existing relationships with you, the stakeholders in our industry. Meeting with you and discussing important issues provides valuable insight on areas where aviation safety in Canada can be improved. It also provides an opportunity to discuss priorities and strengthen relationships—to find out what's working and what's not. This feedback is critical to the success of the Civil Aviation program and the continual advancement of aviation safety in Canada and abroad.

Aviation has never been safer and I know that collectively we are all committed to the pursuit of continuous improvement as we look to the future. Working together, we can keep that momentum going.

Martin J. Eley
Director General
Civil Aviation

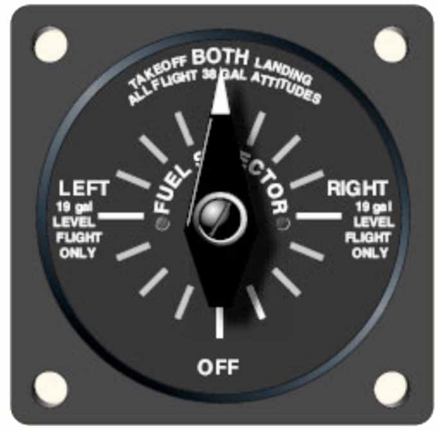
A simple mistake…

While working towards my private pilot's license, I was sitting in the left seat of a Cessna 172, shortly after "graduating" from the Cessna 152. I was very excited for my first flight in this new type, but it had been six months since my last flight, and I caught myself trying to remember all of the important safety steps. I began to go through the checklist and asked my instructor if the fuel valve was in the ON position. After a quick glance and an "ok" from him we completed the rest of our checks and taxied down the runway for the pre-takeoff run-up checks. I took another quick glance at the fuel valve and all was looking good to go.

Once lined up and cleared for takeoff, I applied full power and we rolled down the runway. So many things were running through my head: temperatures and pressures in the green, airspeed live, no fire, etc. Everything looked great as we lifted off the ground. Then, without any warning, the engine started to sputter and cough. Before I knew what was happening, my instructor said, "I have control", and he carried out an immediate landing. After a few nerve-wracking seconds we managed to land safely and taxi off the active runway. Once we came to a complete stop, my instructor began to examine the cockpit and quickly determined that the fuel valve was indeed in the OFF position.

The fuel valve on that C172 was different than the fuel valve I was used to in the C152. The rotary type of valve on the C172 could be selected to left tank only, right tank only, both tanks, or off. The C152 fuel valve I was accustomed to had only two options: on or off.

When I asked my instructor whether I had indeed switched the valve to ON, he likely misheard my question and probably didn't think that somebody could make a mistake with such a simple system. I found out later that many others made that same mistake. Better communication may have prevented



There is no ON position on this valve; only BOTH, RIGHT, OFF, and LEFT.

the occurrence. I should have asked how to operate the fuel system, which in turn would have given our full attention to that critical check, rather than a quick nod. Assumptions on the level of knowledge can also create dangerous situations.

In closing, students should not be afraid to ask for clarification or for a detailed answer on any system they are unfamiliar with. Instructors, in turn, need to remain vigilant and be on the lookout for students' mistakes, even for the simplest tasks. Finally, watch out for insidious routine checklist items which can be inadvertently skipped, missed or improperly done.

Frederic Floyd
Sydney, Australia

Thank you, Mr. Floyd. A related story was featured in the DEBRIEF section of ASL 3/2006, *involving the fuel selector of a Cessna 185, which is worth a second read! Circumstances were slightly different in that earlier event, but the main lesson out of the several you taught us is never to take our fuel system for granted, no matter how simple it appears to be. —Ed.* △

Cabin Safety: Passenger-provided Seat Belt Extensions

Operators are reminded that the use of passenger-provided seat belt extensions shall not be permitted as these devices may not comply with current standards for design, strength, compatibility of fittings to existing seat belts, or inspection requirements. Since operators are already required by regulations to only use safety equipment that meets existing standards, it is therefore their responsibility to plan accordingly by always having an adequate supply of approved seat belt extensions for each aircraft type they operate, for use by passengers who may require them.

Implementing SMS: NAV CANADA's Experience

by Heather Henderson, Corporate Manager, Safety Planning, Performance and Promotion, NAV CANADA

In January 2008, *Canadian Aviation Regulations* (CARs) came into effect requiring NAV CANADA to implement a Safety Management System (SMS). However, the company certainly wasn't new to the world of SMS.

In the mid 1990s the aviation industry began to recognize that a new approach was necessary if safety performance was going to continue to be enhanced. The new approach being recommended was SMS. Transport Canada had laid a strong safety foundation with respect to the provision of Air Navigation Services in Canada. NAV CANADA realized shortly after privatization in 1996 that if we were going to build on that foundation and continue to improve safety performance, an SMS needed to be established.

We undertook significant research into the application of safety management, the elements that make a strong and effective SMS, and the best approach for implementing one. Efforts began with reviewing current thinking and identifying best practices in safety management. Just some of the many questions that had to be answered included:

- "What is the philosophy upon which safety management in our organization will be based?"
- "What constitutes a robust and effective safety management system?"
- "How do we implement safety management in a very dynamic environment with many stakeholders, multiple and sometimes conflicting priorities, and finite resources?"
- "How do we do all of this in an organization that is undergoing significant change?"

Those efforts were followed with significant amounts of training for management to introduce the concepts and approaches for SMS and the benefits that a formal program would bring.

Ironically, one of the biggest challenges faced during the initial phases of implementing SMS was the fact that aviation is an environment in which significant amounts of knowledge, skill and effort are already spent to assure safety, and there is already a strong safety culture and an excellent safety record. This resulted in a belief that the existing way of doing things was just fine.

In some respects, this was correct. There were already a number of SMS elements in place, but these tended to focus on service delivery. Missing was a systematic, comprehensive and explicit system that integrated safety management across the company and addressed organizational factors.

We also undertook a detailed gap analysis to identify which elements were already established, which needed tweaking and what was missing. For example, a strong process for investigating aviation occurrences was in place, but it required updating to incorporate new understanding around the role of Human Factors in incidents and accidents. Additionally, while both the Transportation Safety Board of Canada and Transport Canada had processes in place for the confidential submission of safety concerns, NAV CANADA recognized the importance of having an internal process in order to react quickly and effectively to employees' safety concerns. In 1998 the company established ARGUS, a company-wide confidential safety reporting program.

One of the other important steps we took at that point was to establish a formal program for managing risk associated with change. The amount of change that was happening—organizational changes, equipment and facility changes, maintenance changes and so on—was substantial. A formal risk management approach was applied to these changes to ensure risks would not unknowingly be introduced into the air navigation system. This formal risk management approach evolved into what is known today as the Hazard Identification and Risk Assessment (HIRA) process.

A set of safety policies and procedures were approved in 2000 that covered off the key elements of our SMS across the company, extending the reach of SMS activities beyond our operational areas.

Effective integration is critical and not always easy to achieve. One action that was taken early on was to establish a working group to manage the integration of NAV CANADA's safety management activities and the associated resources required. Membership of the working group includes managers from all NAV CANADA groups.

Not only must safety management activities be integrated within the company, they must also be integrated with external stakeholders. It was necessary therefore to look at our industry working groups and formal and informal channels of communication and how we work with our industry partners and stakeholders on an ongoing basis. The objective is twofold: to identify and address safety issues of common concern; and to assess and, where required, enhance how our external communication activities integrated with our SMS.

Between 2000 and 2005 we continued to enhance and improve our SMS, focussing on both the policies and the process and our management of them. When the SMS regulation came into effect in 2008 one of the first questions we faced was whether to take a phased approach to validation or not. Transport Canada recommended the phased approach given that both organizations were on a learning curve with respect to the process for validating an SMS as it applies to an air navigation service provider (ANSP). We agreed and it certainly proved to be the best way forward.

The first phase involved, among other things, conducting a gap analysis between our existing SMS and the requirements as set out in the CARs. Merging Quality Assurance (QA) into our existing SMS emerged as a key challenge at this phase. There were elements of QA in place across the company but no overall program in some areas. The regulations provided the impetus to strengthen the program in those areas.

Another gap we had to address was the requirement for a corporate-wide SMS Manual. While we had a number of manuals and documents we had not taken the next step to link all of the safety-related activities to the SMS elements and consolidate the information into a single manual. The process of doing so was valuable in that it advanced our understanding of those linkages and an improved awareness of all of the activities that contribute to the success of our safety management system.

During the validation process it became clear that field discussions were critical. Engineers, technologists, flight service specialists, controllers and others understood their role with respect to their responsibilities. However, they were not always clear as to how those responsibilities related to the SMS. For example, flight service specialists and controllers knew they had to report Aviation Occurrences, but there wasn't necessarily a complete understanding of how occurrence reporting connected to the SMS and provided for safety analysis and lessons learned.

As Transport Canada and NAV CANADA progressed through the validation phases, regular communications and open discussions were critical. The validation of an SMS in an ANSP was a first for both organizations so there was learning on both sides. A positive and cooperative relationship between the Transport Canada and NAV CANADA teams was instrumental to a smooth, timely and effective completion of each of the four phases.

Language was one of those issues that needed to be dealt with early on. If you ask someone in an interview "What are your proactive SMS practices?" you might not get a full answer. So it was important for Transport Canada to further describe what they are looking for and probe intelligently to get the complete picture. And there is no question that Transport Canada was able to do so and do it effectively.

Our SMS will most certainly continue to evolve as we enhance our risk management processes and it will be important to work proactively with Transport Canada as that occurs. While the validation of our SMS over the past couple of years held some challenges and important lessons, it was certainly a valuable process.

Having an industry and regulator that is focussed not just on adhering to standards and regulations, but on potential weaknesses in processes and systems, promises to make a safe system even safer. △

Electronic Flight Bags

The following is a short introduction to Advisory Circular (AC) No.700-020 Electronic Flight Bags, *and is intended to provide an overview of the issue to our readers. We encourage all to read the complete AC at the link provided above.*

The AC on electronic flight bags (EFBs) was issued in recognition of the need for guidelines for the certification, airworthiness and operational approval of both portable and installed EFBs. It was also issued to:

- specify the principle that all EFBs to be used on an aircraft are to be subjected to a defined evaluation process;
- minimize the burden on operators, installers, manufacturers, and Transport Canada Civil Aviation (TCCA) by specifying that some EFB evaluations can be delegated;
- provide specific guidance material for certain EFB applications and approvals and establish certification, airworthiness/installation, and operational approval guidance for EFB systems; and
- provide checklists to assist operators, installers and TCCA in evaluating EFB implementations.

Here is the definition of EFBs as provided in the AC:

> **EFB:** An electronic display system intended primarily for cockpit or cabin use. EFB devices can display a variety of aviation data or perform calculations such as performance data and fuel calculations. In the past, some of these functions were traditionally accomplished using paper references or were based on data provided to the flight crew by an airline's "flight dispatch" function. The scope

of the EFB system functionality may also include various other hosted databases and applications. Physical EFB displays may use various technologies, formats, and forms of communication. These devices are sometimes referred to as auxiliary performance computers (APC) or laptop auxiliary performance computers (LAPC).

EFBs perform a variety of functions traditionally accomplished using paper references by electronically storing and retrieving documents required for flight operations, such as the *Flight Crew Operations Manual* (FCOM) and *Minimum Equipment Lists* (MEL). EFBs are developed to support functions during all phases of flight operations and may be authorized for use in conjunction with or to replace some of the hard copy material that pilots typically carry in their flight bags.

Before AC 700-020 was issued, TCCA had based the Canadian approval of EFBs on Federal Aviation Administration (FAA) AC 120-76A, which was given as a primary reference in two TCCA documents. These two documents were CBAAC No. 0231, which addressed operations considerations, and Transport Canada Aircraft Certification PL 500-017, which addressed certification considerations. The FAA AC 120-76A was not directly applicable in Canada as the specified approval processes are particular to the FAA organization and much of the approval task is assigned to the FAA Aircraft Evaluation Group (AEG).

In addition, there was a need to combine the two TCCA documents to meet new TCCA document protocols. It was therefore decided that, rather than continuing to reference FAA AC 120-76A with its known applicability issues, it would be preferable to produce a new TCCA AC based as closely as possible on the text of FAA AC 120-76A, but clarifying some aspects of the certification and operational approval processes. Thus, there would be a single document that would apply to Canadian regulations.

Implementation process

The AC describes how the implementation of an EFB into an air operator's operations will affect the following:

- EFB installation;
- EFB certification, where applicable; and
- operational approval.

The AC discusses these aspects and describes two evaluation processes: one is directed at the evaluation of the EFB installation, and the other is directed at the operational implementation. The operational evaluation is further divided into an evaluation of company procedures and processes and an aircraft evaluation. Depending on the circumstances, the aircraft evaluations may be carried out separately or as a combined exercise. The discussion on the EFB installation aspects evaluation covers both certified and non-certified aspects.

Classification of EFB systems

Hardware classification is based on the type of EFB installed in the aircraft.

1. **Class 1** EFBs:
    1. are portable;
    2. are not connected to an aircraft mounting device;
    3. are considered Portable Electronic Devices (PEDs); and
    4. do not require an aircraft certification approval.
2. **Class 2** EFBs:
    1. are portable;
    2. are connected to an approved aircraft mounting device during normal operations;
    3. are considered PEDs;
    4. require aircraft certification approval for their mounting device, data connectivity and power connections; and
    5. do not require certification approval for their operating system.
3. **Class 3** EFBs are installed equipment that require certification approval of all hardware, mounting and connectivity aspects.

Software applications have three types: A, B and C.

1. **Type A software applications:**
    1. may be hosted on any of the hardware classes; and
    2. do not require an aircraft certification approval.

    Examples of Type A software applications are provided in Appendix A of the AC.
2. **Type B software applications:**
    1. may be hosted on any of the hardware classes; and
    2. do not require an aircraft certification approval.

    Examples of Type B software applications are provided in Appendix B of the AC.
3. **Type C software applications:**
    1. require an aircraft certification approval.

The overview of the AC concludes here. For complete information on installations and related evaluation requirements, air operator electronic flight bags operational implementation procedures, and to view the appendices and checklists, please refer to the AC. For questions or comments on the document, e-mail us at AARTInfoDoc@tc.gc.ca. △

Fundamental Rights Bestowed by the *Canada Labour Code* (CLC)

by Darlene MacLachlan, Civil Aviation Safety Inspector, National Operations, Civil Aviation, Transport Canada

Did you know the *Canada Labour Code* (CLC) generally applies to industries that fall under federal jurisdiction? Air transportation happens to be one of those industries.

The *Aviation Occupational Health and Safety Regulations* (AOHSR), are made pursuant to the CLC, Part II, and apply to persons employed on board aircraft while in operation and in respect of persons granted access to those aircraft by the employer. Within Transport Canada Civil Aviation, enforcement of the CLC and the AOHSR fall to Health and Safety Officers (HSO) who are delegated under the Minister of Labour, and who are also delegated under the Minister of Transport as Civil Aviation Safety Inspectors.

The CLC bestows three fundamental rights to employees, of which one is the right to refuse dangerous work (the two others are the right to know and the right to participate). An employee, at work, has the right to refuse dangerous work if he or she has reasonable cause to believe that:

- a condition exists at work that presents a danger to himself or herself;
- the use or operation of a machine or thing presents a danger to the employee or a co-worker;
- the performance of an activity constitutes a danger to the employee or to another employee.

In order for an employee to be protected by the CLC when exercising the right to refuse, the employee must follow the proper procedures. More information on the process can be found by visiting: www.hrsdc.gc.ca/eng/labour/opd/905_1/page01.shtml#investigation.

Often, in aviation, the refusal concerns equipment or conditions on board the aircraft that the employee considers to be a danger to his or her health. Examples of this include air quality, crew member jump seats, exits and equipment not operating properly, etc.

Although the system or equipment may have met aircraft certification requirements and may be operating as it was designed and certified to do, it doesn't stop an employee from exercising their right to refuse, if they believe the equipment or condition is dangerous to their health.

This often causes confusion in separating the certification requirements of the *Canadian Aviation Regulations* (CARs) from the issue of employee safety under the CLC. One example involves a certified crew member seat, operating as it was designed to do, where there were injuries resulting from the occupancy of the seat. As a result of a right to refuse, it was later determined that the seat did constitute a danger to the employees occupying the seat and the employer was directed to take actions to protect employees sitting there.

The investigation is carried out under the auspices of the CLC and not under the CARs. Although a decision may be made that a danger does not exit, it does not stop any future refusals by employees for the same issue nor does it always mean the same decision will be rendered by the HSO.

Upon completion of an investigation into a right to refuse, the HSO decides whether or not danger exists as defined in section 122(1) of the CLC. IPG-062 *Definition of Danger* provides guidance on this subject. The HSO completes Appendix H, "Assessment of Danger and Points to Consider When Issuing a Direction under 145(2)*(a)* or 145(2)*(a)* & *(b)*" prior to rendering the decision and it forms part of the Investigation Report.

The HSO bases his/her decision in a situation involving a right to refuse on:

1. the circumstances prevailing at the time of the investigation, and not the situation existing at the time of the refusal (although past events may be relevant in assessing the likelihood of recurrence in the future), e.g. weather has changed or managers performed the task; and,
2. the ongoing practice, and not any interim measures which the employer has adopted to correct the danger temporarily until the HSO arrives.

The CLC, Part II, and the AOHSR are concerned with protecting the health and safety of the employee—the CARs are concerned with the safety of the aviation system. △

Invest a few minutes into your safe return home...

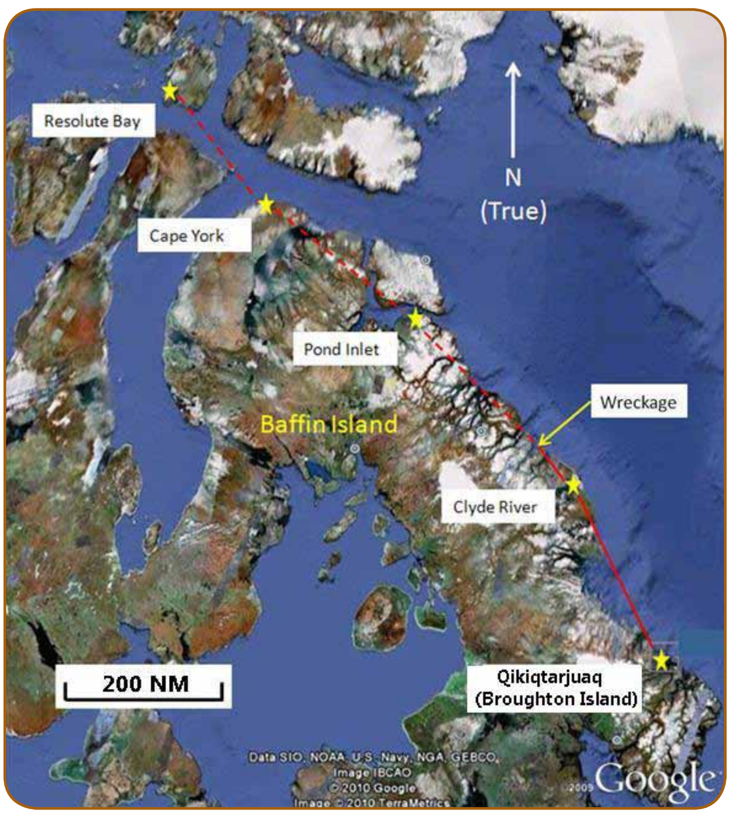
...by reviewing the VFR weather limits chart in section RAC 2.7.3 of the *Transport Canada Aeronautical Information Manual* (TC AIM), titled "Figure 2.7 – VFR Weather Minima."

Featured Accident Report: Alone Across the Pond...

In August 2010, an experienced helicopter pilot lost his life in a little-known accident in the remote waters off the coast of Baffin Island, between Clyde River and Pond Inlet, Nunavut. Due to the far-flung location and the absence of passengers, the reality of our world did not make it a newsworthy event. Very few know about it, even in our own industry. Nevertheless, this report should be noticed by operators, crews and clients. What was planned as a long and ambitious ferry-flight quickly developed into a challenging trek in marginal weather, and resulted in the death of a pilot. We believe this report to be useful as a multi-facetted case-study for operators. It can be used to discuss many issues such as flight planning, weather, pressure, decision making, self-dispatch, flight duty times, fatigue, single-pilot resource management, survival equipment, flight following, search and rescue (SAR), maintenance documentation and possibly more. The following summary is based on TSB Final Report A10Q0133—Collision with Sea *and does not include all issues covered in the extensive report. Therefore, we encourage our readers to read the complete report at their earliest opportunity. —Ed.*

Summary

On August 16, 2010, a Bell 206L helicopter departed Clyde River, Nunavut, at 1609 Eastern Daylight Time on a VFR flight to Pond Inlet, Nunavut. Reduced visibility and low ceilings were forecast along the eastern coast of Baffin Island. The aircraft was equipped with a flight following device and was reported overdue at 1819. A search was initiated in the area of the last known position and wreckage was recovered from the surface of the sea on August 17, approximately 40 NM northwest of Clyde River. The helicopter was destroyed by impact forces; there was no fire. The pilot, the sole occupant of the helicopter, was not found. The accident occurred during daylight hours. No emergency locator transmitter (ELT) signal was detected by the SAR system.



Route map

History of the Flight

The helicopter was being ferried from the island community of Qikiqtarjuaq (formerly known as Broughton Island), Nunavut, to Resolute Bay, Nunavut. The pilot selected a routing along the eastern coast of Baffin Island that would require fuel stops in Clyde River, Pond Inlet and Cape York (see Route map). A VFR flight plan was filed with an estimated time en route of 11 hr (9.5 hr flying with 3 stops of 30 min each). It was estimated that the pilot started his duty day at 0700. The filed departure time was 1000 which would have put the aircraft in Resolute Bay by 2100. This was just within the allowed 14-hr crew day and prior to sunset. Official sunset in Resolute Bay was after midnight. The SAR response time on the flight plan was for one hour after the estimated time of arrival in Resolute Bay.

The terrain along the eastern coast of Baffin Island rises dramatically from the sea and has many steep fjords. There are few locations to conduct a precautionary landing. Low cloud conditions would necessitate a routing along the coast line due to the steep terrain.

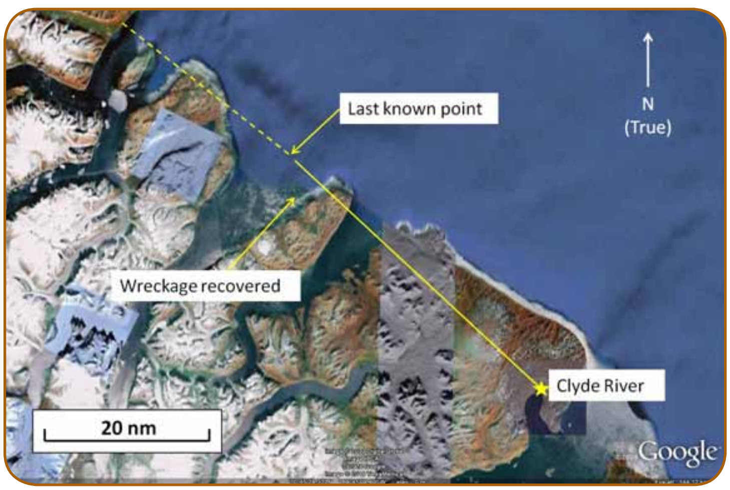
The pilot departed Qikiqtarjuaq at 1123 (*one hour and 23 minutes past the filed departure time*) and arrived in Clyde River at 1516 following two en route landings due to weather. The pilot departed for Pond Inlet at 1609. The last known position emitted from the flight following device was at 1639.

The pilot phoned his company's dispatch, from Qikiqtarjuaq, at 0700 to discuss the weather. Due to the weather, the planned departure was delayed. The pilot phoned Arctic Radio at 0804 and received another weather briefing. At the time of this briefing the actual weather in Clyde River at 0700 was easterly winds at 7 kt, visibility ⅜ SM and a ceiling at zero feet AGL. The forecast for Clyde River valid through to 1500 was calling for visibility of 3 SM in light drizzle and mist with an overcast ceiling of 300 ft AGL; temporarily, the overcast ceiling was to go up to 1 200 ft AGL. The Pond Inlet forecast at the time of the briefing was calling for vertical ceilings of 100 ft AGL until 1200 but improving after that with a broken ceiling of 3 000 ft AGL.

The pilot contacted the customer in Resolute Bay at approximately 0900 and discussed satellite and infra-red imagery for the Clyde River area as well the actual weather in Clyde River and Pond Inlet. The 0800 weather was available at that time and for Clyde River the reported visibility was 1⅛ SM with a ceiling at zero feet AGL. The 0800 weather for Pond Inlet was reported as visibility 9 SM with a ceiling at 7 600 ft AGL. There is no record that the pilot made further inquiries concerning the weather.

The Surface Analysis for 1400 on August 16, 2010, showed a large low pressure system centered over southern Hudson Bay. A weak surface trough extending northwards from this low into central Baffin Island resulted in a light easterly flow off Davis Strait and Baffin Bay onto the northeast coast of Baffin Island.

Satellite imagery indicated an extensive area of low cloud moving onshore in the light easterly flow all along the northeast coast of Baffin Island. Due to the topography of Baffin Island it is reasonable to conclude that the higher terrain to the west of Clyde River would have been obscured in the moist, onshore/upslope flow.



Last route segment

The Aviation routine weather reports (METAR) in Clyde River were as follows:

- At 1600: wind 050° True (T) at 4 kt, visibility 3 ½ SM, overcast ceiling at 200 ft AGL, with overcast layers to 7 600 ft AGL, temperature 7°C, dew point 7°C, and altimeter setting 29.91 in. of mercury (in. Hg).
- At 1635: wind 040° T at 4 kt, visibility 2 ½ SM, overcast ceiling at 200 ft AGL, with overcast layers to 5 700 ft AGL, temperature 7°C, dew point 7°C, and altimeter setting 29.92 in. Hg.

The METARs in Pond Inlet were as follows:

- At 1600: wind 250° T at 2 kt, visibility 15 SM with fog in the vicinity, few clouds at 500 ft AGL, few clouds at 2 000 ft AGL, broken ceiling at 6 800 ft AGL, temperature 7°C, dew point 6°C, and altimeter setting 29.93 in. Hg.
- At 1700: wind 240° T at 5 kt, visibility 15 SM with fog in the vicinity, few clouds at 500 ft AGL, few clouds at 2 000 ft AGL, broken ceiling at 6 600 ft AGL, temperature 7°C, dew point 6°C, and altimeter setting 29.93 in. Hg.

The following terminal aerodrome forecasts were valid at the time of the crash (1500 on August 16, until 0300 on August 17):

Clyde River:

> Wind 110° T at 3 kt, visibility 1 SM in light drizzle and mist, overcast ceiling at 200 ft AGL, temporarily for the period visibility 6 SM in mist, overcast ceiling at 800 ft AGL. Remarks: forecast based on automatic observations.

Pond Inlet:

> Wind variable at 3 kt, visibility greater than 6 SM, few clouds at 300 ft AGL, scattered clouds at 2 000 ft AGL, broken ceiling at 6 000 ft AGL, temporarily for the period visibility greater than 6 SM in light rain, scattered cloud at 300 ft AGL, broken ceiling at 2 000 ft AGL, overcast cloud at 5 000 ft AGL.

The Graphical Area Forecast valid for the period closest to the time of the crash depicted an extensive area of low cloud over Clyde River with local visibility 1 SM in light drizzle and mist and ceilings of 300 ft AGL in coastal sections. No icing or turbulence hazards were forecast in the Clyde River area.

There are no weather reporting stations between Clyde River and Pond Inlet. Additionally, there were no pilot reports (PIREP) transmitted in the timeframe surrounding the crash.

The pilot was very experienced on type but was not instrument rated. This was the pilot's third season working with the company in the Arctic. The pilot was off duty the first two weeks of July, then flew from July 14 to August 3; the pilot was off duty from August 4 to August 7, and had been flying from August 8 to August 16, the day of the accident. The average duty day in August was 10 hr. At the time of the occurrence he had been on duty 9.5 hr. According to those reported dates and times, the TSB determined that the pilot had been operating within the flight and duty time requirements.

The helicopter was not equipped with a radar altimeter nor was it required to be. An immersion suit was on board but not worn by the pilot as it was recovered with the wreckage. A life jacket and life raft were part of the helicopter equipment on this flight, but neither was recovered. The life jacket was required to be manually activated after egress. It is not known if it was worn. The pilot's helmet was recovered.

Wreckage Information

The engine, most of the cockpit, and most of the tail section were not recovered. The fracture surfaces observed on the recovered sections were attributed to overstress as a result of water impact. The degree of helicopter break-up and damage to the recovered sections indicate an impact at a speed in excess of that associated with an emergency landing. The fracture surfaces exhibited characteristics that indicate the helicopter hit the water in forward flight with a left bank. The degree of bank could not be determined. No indications of pre-existing fractures were observed on the recovered wreckage.

Recovered fuselage

The left landing gear had separated along with its pop-out floats. The pop-out floats on the right skid were found deployed when the wreckage was recovered, and were keeping the wreckage afloat. There was insufficient wreckage recovered to rule out the possibility of a mechanical anomaly which could have triggered a caution light and an emergency landing. The fuel tank was recovered intact and was partially full. A fuel sample was sent for laboratory analysis and no anomalies were detected.

Spatial Disorientation

On the ground, spatial orientation is sensed by the combination of vision, muscle sense, and specialized organs in the inner ear, which sense linear and angular accelerations. Vision is the strongest of the orienting senses, and in visual flight, the pilot relies on regular visual references with the ground and horizon to control the aircraft attitude and altitude. If a pilot is in cloud, the visual reference to the ground and horizon is lost. As a result, the available cues (solely from the external forces on the body) often produce spatial disorientation in flight, because the pilot has a false impression of aircraft attitude and motion. Under these conditions, the pilot is completely dependent on the flight instruments and learned flying skills for control of the aircraft. Pilots that are not experienced with flying the aircraft solely with reference to instruments are particularly susceptible to spatial disorientation when they are confronted with no external visual attitude references. Flying over low contrast surfaces such as snow or water during overcast cloud conditions poses similar orientation challenges.

TSB Analysis

No indications of pre-existing fractures were observed on the recovered wreckage. The damage to the main rotor mast and transmission indicates the rotor drive train was rotating at the time of impact; the rate of rotation could not be determined. Fuel exhaustion and fuel quality were not considered contributing factors.

The helicopter would have been flying below 200 ft ASL given the overcast cloud layer and therefore the float inflation system should have been armed. The airframe damage suggests the helicopter was travelling above 52 kt and therefore it is unlikely that the floats were manually triggered. Given the speed at impact, it is unlikely that the pilot was faced with an in-flight mechanical anomaly which would have prompted an emergency landing.

The forces of the initial impact on the left landing gear were sufficient to tear the left skid and its flotation bags from the airframe. Even though the separation of the left landing gear caused the break of the left inflating lines and the venting of a large amount of nitrogen, sufficient volume was delivered to the right flotation bags to permit buoyancy of the remaining aircraft wreckage.

Although the ceiling was quite low on departure from Clyde River, the flight visibility was within the limitations for uncontrolled airspace. Based on the forecasts and actual weather, the pilot likely had an expectation that the weather would improve as he flew towards Pond Inlet. It is possible that the pilot departed with the intention to test the weather along the coast and return to Clyde River if the weather prevented safe transit to Pond Inlet.

The helicopter was crossing the mouth of a 15 NM-wide fjord when it went missing. The last known position was approximately one-third of the way across. It is unlikely the pilot would attempt the crossing if the far side was not visible. This would imply the visibility must have improved in the area of the fjord, at least when the crossing was initiated.

The following scenarios were considered by the TSB in an attempt to explain why the helicopter struck the sea surface:

- There was insufficient wreckage to rule out the possibility of an in-flight mechanical anomaly (caution light). Due to the cloud ceiling the pilot would have been flying low-level over water. A minor distraction inside the cockpit could result in an inadvertent descent into the sea if the pilot was to lean forward and displace the cyclic while investigating a caution light or gauge display. This would result in a relatively high speed impact, which the wreckage also suggests.

- If the weather worsened during the crossing, due to the low ceiling and low visibility described in the area forecast, then the pilot would be faced with a low-level flight over water with no visible land to assist spatial awareness. Flying over water under overcast clouds in rain and mist may have compromised the pilot's spatial orientation. The pilot was not instrument rated and would have been challenged to maintain helicopter control under these conditions. This may have resulted in one of the following:
  - Without a close crosscheck of altitude, an inadvertent descent could develop. Due to reduced visual cues in the deteriorating weather it may have gone unnoticed until it was too late to prevent impact with the sea surface. This would result in a relatively high speed impact, which the wreckage also suggests; or
  - Faced with deteriorating weather the pilot may have initiated a turn to the left to return to the closest shoreline. Without a strong background in instrument flying, it is possible that the pilot lost altitude and struck the sea while turning. This would result in a relatively high speed impact, which the wreckage also suggests.

Conclusion

The TSB said that there was insufficient factual information to conclusively state why the helicopter struck the sea surface. Complementary findings related to ELT, SAR and maintenance documentation are worth reading, as well as internal measures taken by the operator involved to learn from this event.

A few areas of concern are worth reflecting on, and these apply for single-pilot crew resource management (SCRM) scenarios. Clyde River is approximately a quarter of the distance to destination. Yet, already eight hours and nine minutes of the pilot's duty day had been consumed by the time the flight departed Clyde River to continue the journey, and much of it included demanding flying in marginal weather over a hostile environment, while executing two en route stops to wait for weather to improve. Clearly, arrival to destination was no longer an option for that day.

The flight departed Clyde River at 1609 with an overcast ceiling of 200 ft (1600 and 1630 observations), visibility 3.5 SM decreasing to 2.5 SM and a zero spread between temperature and dew point. The ceiling and visibility required added concentration from the pilot who had just flown through marginal VFR weather in the previous leg of the flight.

Was the planning to destination overly ambitious? Were the three 30-min turnovers realistic? We encourage our readers to learn from this tragic accident. △

Ever Heard of the Commercial Aviation Safety Team (CAST)?

Founded in 1998 in the United States (U.S.), CAST is a multi-national working group with an overarching goal of reducing fatality risk in world-wide commercial aviation. It applies an integrated, data-driven strategy to implement the most promising safety enhancements in our industry. Its original goal of reducing the commercial aviation fatality risk in the U.S. by 80 percent by 2008 was not only met, but surpassed; the rate was reduced by 83 percent. This was achieved by enabling a continuous improvement framework built on the proactive identification of current and future risks, developing mitigations as needed and monitoring the effectiveness of implemented actions. CAST has now challenged itself again, with a new goal of reducing the commercial aviation fatality risk in the U.S. by a further 50 percent from 2010 to 2025, while continuing to work with its international partners to reduce fatality risk in world-wide commercial aviation. Transport Canada is a member of CAST, and we invite you to learn more about it and use the safety resources found on the CAST Web site (www.cast-safety.org/), which includes a comprehensive list of excellent documents on runway safety, among others.

Maintenance and Certification

Canadian Approved Maintenance Organizations (AMO) and Maintenance on United States (U.S.) Registered Aircraft

by Dean Barrett, Civil Aviation Safety Inspector, Operational Airworthiness, Standards Branch, Civil Aviation

Did you know that Canadian AMOs can perform maintenance on U.S. registered aircraft?

Canadian AMOs can also perform maintenance on components meant for installation on U.S. registered aircraft.

Canada and the U.S. entered into a safety agreement entitled *The Agreement for the Promotion of Aviation Safety* dated June 12, 2000. This led to the creation of guidance material to help organizations in implementing the maintenance and alteration or modification provisions of the Agreement. These new procedures are entitled *The Maintenance Implementation Procedures* (MIP) and were signed on March 14, 2011.

The objective of the MIP is to assist in the understanding of the requirements and conditions that need to be met for U.S. repair stations and Canadian AMOs along with Federal Aviation Administration (FAA) certificated mechanics and Canadian Aircraft Maintenance Engineers (AME).

What does this mean for Canadian AMOs?

Canadian AMOs can use these implementation procedures to their advantage to perform maintenance on U.S. registered aircraft and components for installation thereon.

There is some leg work that has to be accomplished before AMOs or AMEs can perform maintenance on U.S. registered aircraft, however this can be accomplished in a relatively short time frame should all the conditions be met.

An AMO or AME that has been approved or rated for maintenance and modification work by Transport Canada Civil Aviation (TCCA) in the form of a certificate or license, and complies with the special conditions of the MIP, will be eligible to perform maintenance, preventive maintenance, and alteration work on aeronautical products under the regulatory authority of the FAA (with the exception of annual inspections).

Some of the most notable, but not all, conditions an AMO or AME must address before they are able to take advantage of the MIP are the following:

1) An AMO must establish procedures to ensure they are able to comply with FAA requirements. This is usually a supplement to the Maintenance Policy Manual (MPM). This supplement must be submitted to your local Transport Canada Centre (TCC) or the TCCA regional office for approval (Note: An FAA supplement is only required when an AMO is performing maintenance on a Part 121/135 U.S. registered aircraft. No supplement or additional requirements are necessary for parts or private aircraft.);
2) The AMO or AME must hold a valid AMO certificate or AME license issued by TCCA;
3) The person responsible for supervision or final inspection and approval for return to service of a civil aeronautical product must be able to read, write, and understand English;
4) All repairs and alterations as defined by FAA regulations must be accomplished in accordance with data approved by or acceptable to the FAA;
5) In the case of work performed by an AMO, the work will not exceed the scope of the ratings and limitations contained in their AMO certificate and MPM;
6) In the case of work performed and certified by an AME, the work will not exceed the AME's privileges pertaining to their AME license.

To assist in the clarification of the MIP below, we have highlighted some of the more frequently asked questions:

1) Can an appropriately rated Canadian AMO located in Canada perform maintenance on a U.S. registered aircraft located in the U.S.?

The answer to this question is NO. The reference can be found in section 2.0 of the MIP. It stipulates:

An AMO or AME can only perform maintenance and alterations on FAA-controlled aeronautical products and return said product to service when the product is located in Canada.

2) Who can perform maintenance on a privately operated U.S. registered aircraft located in Canada?

The answer can be found in section 2.0 of the MIP. It stipulates:

A Canadian AMO or AME can perform maintenance on a privately operated U.S. registered aircraft located in Canada and return it to service.

3) **Can a Canadian AME perform and sign off on an Annual Inspection on a U.S. registered aircraft?**

The answer to this question is NO. The reference can be found in section 3.5.1. of the MIP. It stipulates:

A Canadian AME cannot perform annual inspections on aeronautical products under the regulatory control of the FAA.

4) **What is the required content of a Canadian supplement?**

The content that is required in a Canadian supplement varies depending on the type of operation involved and how your AMO intends on utilizing the MIP. It can be found in, but is not limited to, Chapter 3 of the MIP. Consultation with your local TCC or TCCA regional office is recommended.

5) **Can an FAA-approved repair station located outside the continental U.S. perform maintenance on a Canadian registered aircraft?**

The answer to this question is NO. The reference can be found in two parts, first in section 1.7 and second in section 2.0:

An FAA-certified repair station or FAA-certificated mechanic can only perform work on Canadian aeronautical products when the product is located in the U.S.

The geographical definition of the U.S. is found in section 1.7 of the MIP. It stipulates:

United States. In a geographical sense, (1) the States, the District of Columbia, Puerto Rico, and the possessions including the territorial waters, and (2) the airspace of those areas.

TCCA recommends that persons or organizations that intend on or currently maintain U.S. registered aircraft and components for installation thereon become familiar with the Agreement and the associated "NEW" MIP.

Canadian AMOs are encouraged to contact their local TCC or TCCA regional office regarding the procedures and requirements of the MIP should they be looking to perform maintenance on U.S. registered aircraft or components meant for installation thereon.

The MIP can found at the following Web address: www.tc.gc.ca/eng/civilaviation/standards/int-ta-usaimp2006-menu-3700.htm △

Aircraft Fuel System: Water Contamination of Fuel Tank Systems

The following is based on FAA Special Airworthiness Information Bulletin CE-12-06, and is reproduced in the ASL for the benefit of our stakeholders. These are recommendations only and are therefore not mandatory.

Introduction

This *Special Airworthiness Information Bulletin* (SAIB) is to inform pilots, owners, operators, and maintenance and service personnel of general aviation aircraft of the hazards associated with water contamination of fuel tank systems. The fuel tank system consists of all tanks, components, lines, fittings, etc., from the fuel tank to the engine.

This SAIB is similar to SAIB CE-10-40R1, dated July 30, 2010, which addresses specific Cessna aircraft models, and is meant to cover general aviation aircraft not included in SAIB CE-10-40R1.

Background

Water may enter the fuel tank system via any penetration in the wing fuel tank and from moisture condensation inside the tank. Water in the fuel may come out of solution, settle and make its way to a drain location in the form of a blob, pea, or BB-shaped translucent mass found at the bottom of the sampler cup.

Water suspended in the fuel may lead to a cloudy or hazy appearance in the sampler cup. Water may have dissolved in the fuel, but the conditions have not yet occurred to cause the water to come out of solution and perhaps adhere to the dry tank upper surface or walls (similar to condensation). Understanding this, all pilots, owners, operators, maintenance, and service personnel should assume some water exists in the fuel tank system on the airplane.

Recommendations

We recommend you do the following:

1. Become familiar with all drain locations on a specific model of airplane. From model to model in a series of airplanes, the number, type, and location of drains may not be the same. ***There is no single point of drainage that can be used to check for all fuel system contaminants simultaneously.*** Take the time to properly check all drain locations before each flight.

2. With the airplane in the normal ground attitude and starting at the highest drain location, check all drain locations for contaminants before every flight, whether

or not refueling has occurred. Have fuel sample disposal provisions and proper lighting at your disposal to properly check for fuel tank system contamination.

- Drain at least one cup of fuel (using a clear sampler cup) from each drain location.
- Drain the fuel strainer as required to completely flush its contents in each of the fuel selector positions.
- Check for water, clarity, cloudiness, haze, proper fuel type/grade (i.e. 100LL is light blue in tint, jet fuel is clear or yellowish), odour, or other contaminants.
- Allow time between fueling and draining. It takes time for any contaminates to settle to sump area prior to draining tanks.
- If any contamination is detected in the fuel tank system, thoroughly drain all drain locations again.
- If contamination is observed, take further samples until the fuel appears clear, and gently rock the airplane in both the roll and pitch axis to move any additional contaminants to the drain points.
- Take repeated samples from all drain locations until all contamination has been removed.
- If contaminants are still present, do not fly the airplane. Have qualified maintenance personnel drain and purge the fuel tank system. Remove all evidence of contamination prior to further flight.

3. Take proper precautions to preclude water from entering into your fuel tank system from an external source (washing, rain, snow, sleet, etc.). Regularly check all external entry sites (caps, access panels, etc.) for evidence of water ingress into the fuel tank system. When possible, store the airplane indoors. If stored outdoors or exposed to wet conditions (washing, rain, snow, sleet, etc.), examine the fuel tank system drains for contamination more frequently.

- Pay particular attention to airplanes that have been externally cleaned and/or refinished.
- Avoid using pressure washers near fuel system caps/filler areas when washing the aircraft.
- It is a good idea to remove accumulated snow/ice from the fuel tank entry sites to prevent ingress of water during melting.

4. During annual or 100-hr inspections, do the following:

- Check fuel caps, cap gaskets, cap adaptors, cap adaptor gaskets, fuel filler neck to adaptor sealer, fuel gage transmitter gaskets, gage transmitter access covers, and upper surface inspection covers for condition, proper sealing, security, alignment, etc. Ensure to service and clean these areas, replacing parts as necessary.
- Drain and flush the fuel strainer and carburetor bowl completely.
- Inspect the interior of metal fuel tanks for signs of corrosion, which may indicate water contamination.
- Inspect the interior of bladder tanks for wrinkles, broken or missing hangers, etc.
- If signs of contamination are found, alert the owner and fuel supplier of your findings for corrective action.

5. If the aircraft has a fuel drain valve replaced with a cap or plug, you should suspect water contamination in the respective tank. Strongly consider having a qualified maintenance technician install the proper drain valve prior to flight.

6. Take precautions to preclude water migration in the fuel tank system from an internal source (free water coming out of solution). Keep fuel tanks full when the airplane will not be operated regularly to minimize moisture condensation within the tanks. Keep fuel tanks full between flights, provided weight and balance limitations permit. Limit the fuel tank's exposure to large temperature fluctuations as much as possible. If the airplane has been exposed to sustained wing low or unusual attitudes or a fuel tank has been run dry, sump contaminants may have migrated throughout the fuel tank system.

7. Know your fuel supplier. Regularly check and verify quality controls are in place to ensure you receive only dry, uncontaminated fuel from a supplier. Have on-field checks and verify to ensure continued supply of dry uncontaminated fuel to an operator. Gain assurance that the fuel supply has been checked for contamination and is properly filtered before allowing the airplane to be serviced. When ordering fuel, specifically state the exact fuel grade and quantity needed. Be present at each and every refueling and observe the fueling process.

8. Collect all sampled fuel in a safe container and dispose of properly.

9. Replace all safety items removed during contamination checks. Correct all unsatisfactory conditions found during any examination prior to further flight.

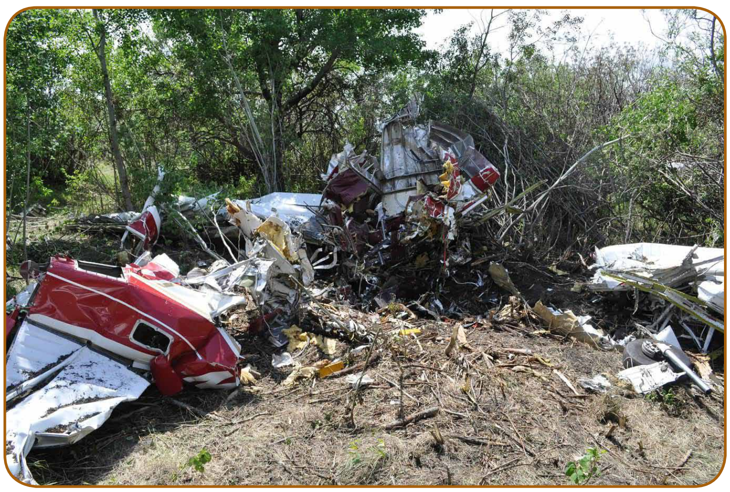
Additional background and reference materials are listed in the FAA SAIB link above. For further information, you can discuss with any of your local Transport Canada inspectors, or email us at services@tc.gc.ca. △

Recently Released TSB Reports

The following summaries are extracted from final reports issued by the Transportation Safety Board of Canada (TSB). They have been de-identified and include 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 A09W0105—Collision with Terrain

On June 15, 2009, a privately operated Beechcraft V35B Bonanza was on a VFR flight from Edmonton City Centre Airport, Alta., to view the Badlands area in the vicinity of Drumheller, Alta. When the pilot did not return by 1600, the family initiated the process to begin a search at 1700 on June 15, 2009. On June 16, Joint Rescue Coordination Centre resources from Winnipeg, Man., located the aircraft 12 NM northeast of Castor, Alta. The aircraft was destroyed by impact forces and the pilot, who was the sole occupant, was fatally injured. There was no post-impact fire.



Analysis

No evidence was found to suggest that the aircraft's structure or systems malfunctioned.

The pilot was deemed to be fit and capable.

The vertical impact and the energy with which the aircraft struck the ground do not support a hypothesis of an aerodynamic stall.

Given the tendency for the aircraft to roll, the aircraft may have unintentionally entered into the initial stages of a spiral dive. If this were the case, the 90° impact angle of the aircraft would suggest that the spiral dive had progressed to vertical. The relatively low altitude at which the aircraft entered into this near-vertical attitude would have made recovery unlikely.

Without corroborating evidence to support any hypothesis, the cause of the accident could not be determined.

Finding as to causes and contributing factors

1. For undetermined reasons, the aircraft departed controlled flight and crashed in an extreme nose-down attitude.

Other finding

1. The pilot had not filed a VFR flight plan detailing his intended flight path, which resulted in a delay in finding the aircraft by search-and-rescue resources.

TSB Final Report A09C0120—Loss of Control—Collision with Terrain

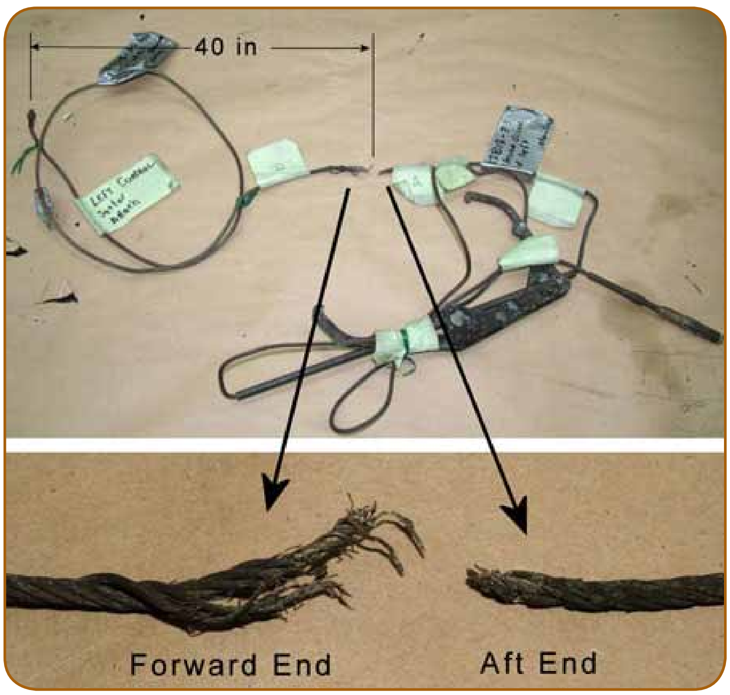
On July 19, 2009, a privately operated Piper PA-46-310P Malibu departed Kamsack, on an IFR flight to Saskatoon, Sask. The pilot and three passengers were on board. At takeoff from Runway 34, the aircraft began rolling to the left. The aircraft initially climbed, then descended in a steep left bank and collided with terrain 200 ft to the left of the runway. A post-impact fire ignited immediately. Two passengers survived the impact with serious injuries and evacuated the burning wreckage. The pilot and third passenger were fatally injured. The aircraft was destroyed by impact forces and the post-impact fire. The accident occurred during evening civil twilight at 2124 CST.

Analysis

The pilot was healthy and qualified. With 300 hr on the occurrence aircraft accumulated over 5 years, he would have been familiar with its operation and performance. The aircraft had no known defects and was operating within weight and balance limits. The runway was suitable for a normal takeoff, and weather conditions were benign. The pilot was known to be cautious and thorough; it is unlikely he deliberately operated the aircraft outside normal operating parameters.

The investigation could not identify a reason why the aircraft rolled to the left after takeoff. Consequently, a number of hypotheses were considered by the investigating team and are discussed in details in the analysis section of the final report at the link above. The list of hypotheses includes the following areas:

- Yaw effects
- Flap asymmetry
- Structural failure
- Automatic Flight Control System
- Left forward aileron drive cable
- Service letters and bulletins



Fractured left forward aileron drive cable assembly, as received at TSB Laboratory

Finding as to causes and contributing factors

1. The pilot was unable to maintain aircraft control after takeoff for undetermined reasons and the aircraft rolled to the left and collided with terrain.

Finding as to risk

1. The manufacturer issued a service bulletin to regularly inspect and lubricate the stainless steel cables. Due to the fact that the bulletin was not part of an airworthiness directive and was not considered mandatory, it was not carried out on an ongoing basis. It is likely that the recommended maintenance action has not been carried out on other affected aircraft at the 100-hr or annual frequency recommended in FAA SAIB CE-01-30.

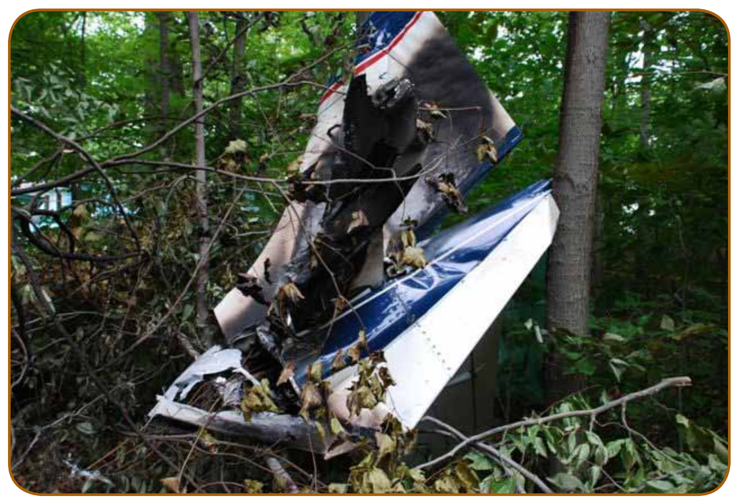
Other findings

1. Due to the complete destruction of the surrounding structure, restriction to aileron cable movement prior to impact could not be determined.

2. The use of the available three-point restraint systems likely prevented the two survivors from being incapacitated, enabling them to evacuate the burning wreckage.

TSB Final Report A09O0159—Tree Strike During Climb-Out

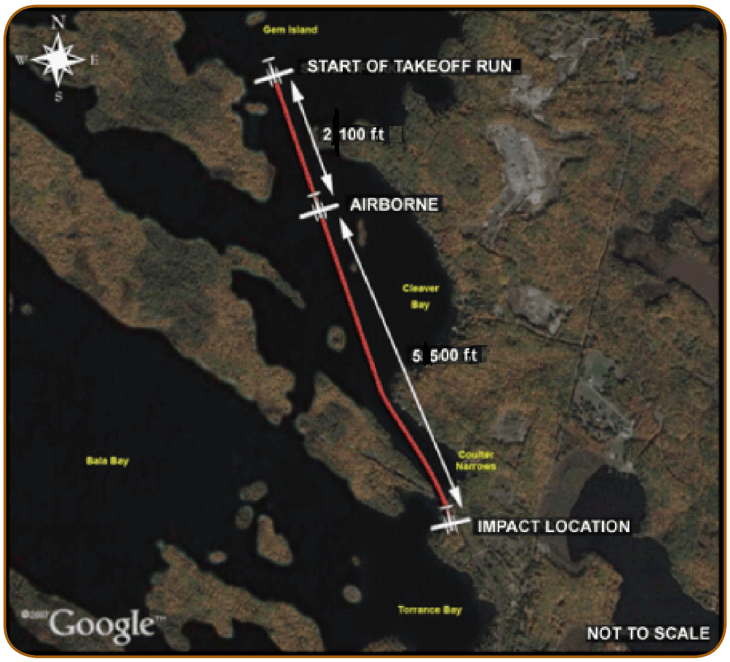
On June 3, 2009, a privately owned Cessna TU206G amphibious aircraft was taking off from Lake Muskoka near Torrance, Ont. On board were the pilot and one passenger. At approximately 1433 EDT, the aircraft became airborne, climbed initially to approximately 30 ft above the lake, and then continued climbing to approximately 90 ft above the lake. Shortly thereafter, the aircraft overflew a train trestle and began clipping trees on the shoreline. Several large trees were struck, resulting in substantial break-up of the aircraft. The aircraft struck the ground in an inverted attitude. A fire erupted after the ground impact and the majority of the aircraft was consumed by the fire. The two occupants were fatally injured. The emergency locator transmitter was destroyed and did not activate.



Analysis

The investigation attempted to determine why the aircraft struck the trees after successfully becoming airborne and maintaining level flight. Photographic evidence did not reveal any abnormalities during the take-off run or initial climb, and propeller damage is consistent with considerable power being produced by the engine at the time of impact. Although the aircraft was substantially damaged by the impact and post-crash fire, the examination that was performed on the wreckage did not reveal any pre-impact failures.

The aircraft appeared to be properly configured for flight as per the recommended procedures in the Pilot Operating Handbook (POH). There was no evidence found related to a flight control problem that might have prevented the pilot from avoiding a collision with the trees. The aircraft was airborne approximately 5 500 ft before the shoreline, a distance that is within its performance capability to continue a climb that would have avoided the tree impact. The investigation revealed no evidence that either an internal or external distraction diverted the pilot's attention away from controlling the aircraft. It is possible that the pilot, with limited flight time in this aircraft during the past two years, misjudged the height of the trees along the shoreline. If the aircraft had developed a mechanical abnormality shortly after lift-off that would have affected its climb performance, the pilot would have had sufficient lake surface remaining to land the aircraft.



Estimated flight path

Findings as to causes and contributing factors

1. The aircraft struck the trees for undetermined reasons.

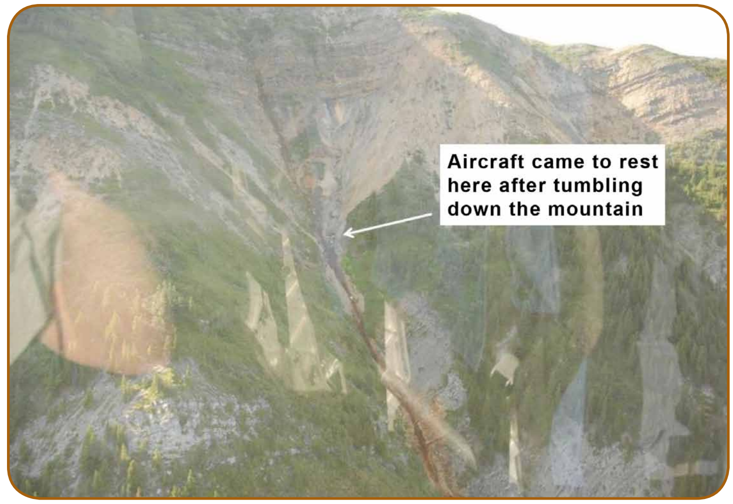
2. A fire erupted after the ground impact, consuming most of the aircraft.

Other finding

3. Transport Canada did not indicate a float endorsement on the current pilot's license although it had remained valid from the previous license issuance.

TSB Final Report A09W0146—Loss of Control — Tail Strike

On August 4, 2009, a Robinson R44 Raven II helicopter departed Nahanni Butte, N.W.T., with a pilot and two passengers on board for a day VFR flight. At 1655 MDT, during an aborted landing on a narrow ridge in steep mountainous terrain, the helicopter turned 180° and descended down a slope. The tail boom struck the ground, and the helicopter tumbled down the mountainside, breaking up and coming to rest about 900 ft below the ridge. The helicopter was destroyed by a post-impact fire. The emergency locator transmitter on board did not transmit. The pilot survived with serious injuries, and both passengers sustained fatal injuries.



Note: *canopy reflexions in bottom half of photo were not photoshopped to preserve integrity of photo. RCMP Photo.*

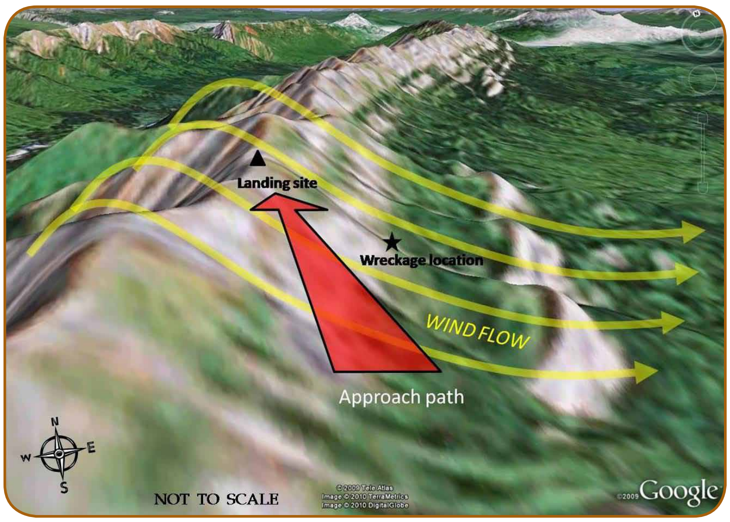
Analysis

There was no mechanical malfunction of the aircraft. Therefore, this analysis will focus on environmental, geographical and operating factors.

After overflying the ridge en route to the destination, the helicopter turned for a shallow approach, 60° to the ridge. The shallow approach was part of the recommended technique. The approach path downwind of the ridge, however, would have exposed the helicopter to subsiding air near the ridge. As the helicopter slowed through the speed where effective translational lift was lost before it entered the ground effect on the narrow ridge top, rotor pitch had to be increased substantially, accompanied by an increase in engine power. Since the helicopter's ability to hover out of ground effect was marginal under ideal wind conditions, its ability to do so in subsiding air was substantially reduced.

With deteriorating rotor speed and aircraft controllability nearing the landing zone, the pilot was faced with three choices: overshooting straight ahead, landing hard on uneven terrain on the ridge top, or turning around and attempting to dive down the steep slope. The option of continuing straight ahead into wind posed a risk of injuring the ground party near the landing zone either by striking them on the overshoot or by subjecting them to injury from the helicopter had it rolled over on uneven terrain on the ridge top. Diving off the ridge may have afforded space to allow a reduction of main rotor pitch and a recovery of rotor speed. However, placing the helicopter downwind with deteriorating rotor speed precluded maintaining sufficient height above the ridge to avoid striking the tail on the ground.

The aircraft's structural integrity was completely lost as it tumbled down the slope, with failure of the occupant retention systems.



Flight path and wind flow

Findings as to causes and contributing factors

1. The shallow approach downwind of the ridge placed the helicopter in an area of subsiding air, which increased the sink rate.

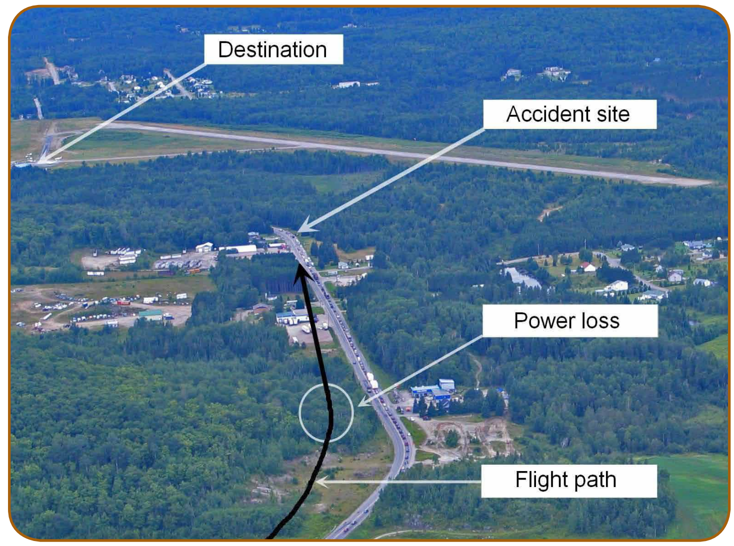
2. To overcome the sink rate, the pilot had to demand more engine power than was available, resulting in a loss of rotor speed.

3. To avoid injury to persons in the landing area, the pilot aborted the landing by turning 60°.

4. During the aborted landing, the helicopter's tail struck the top of the ridge, precipitating a fall down the steep shale slope, culminating in complete destruction of the helicopter and a post-crash fire.

TSB Final Report A09Q0131—Loss of Control and Collision with Cables

On the morning of August 5, 2009, a private Enstrom F-28C helicopter took off from Mont-Laurier Airport, Que., on a local VFR flight over the town of Mont-Laurier to provide a television cameraman with a bird's-eye of damage caused by a tornado. About 20 minutes later, as the helicopter was returning to the airport, the engine (Avco Lycoming HIO-360) experienced a power loss and backfiring. During an attempted emergency landing, the aircraft struck cables over Highway 117, struck the highway and rolled over in a ditch. The helicopter was completely destroyed in the post-impact fire. Both occupants were fatally injured.



Return path to Mont-Laurier Airport

Analysis

Note: *Due to space limitations, this analysis addresses mostly the actions of the pilot in handling the emergency. For additional information related to the partial power loss, to the maintenance of the aircraft, and to the pilot recency requirements, please see the full report at the link above.*

The accident occurred following a partial loss of engine power at about 250 ft AGL over an area that provided no suitable site for a safe emergency landing. When the engine backfired, the pilot was probably surprised by the noise and the fishtailing caused by fluctuations in engine power.

The pilot had to continually make corrections by modulating the throttle to maintain constant rotor rpm as the engine power fluctuated. In addition, these changes in power also caused the torque effect induced by the main rotor to fluctuate, which then had to be counteracted with the tail rotor through pedal input to control the direction of flight.

The resulting difficulty in maintaining directional control due to the fluctuations in power increases a pilot's workload at a critical time when analyzing the situation, identifying the problem, choosing the correct procedure and taking appropriate action. After the partial loss of engine power, the pilot could not maintain rotor speed if he continued in level flight. The only option available that allowed him to maintain rotor speed was to descend.

Aircraft altitude at the time of the power loss is an important factor in the success of an autorotation and emergency landing. The greater the altitude above ground level, the more time the pilot has to find a suitable landing site. Flying at low altitude reduces that time to the point where it might be impossible to autorotate and set the helicopter down on a safe surface.

The power loss occurred when the helicopter was overflying a wooded area, and the choices for a suitable landing site were limited. If the engine ceases operating completely, the pilot has no choice and must make an emergency landing, irrespective of the condition of the surface below his flight path. However, if the engine is still producing power, it is possible to prolong the descent in order to find a suitable landing site.

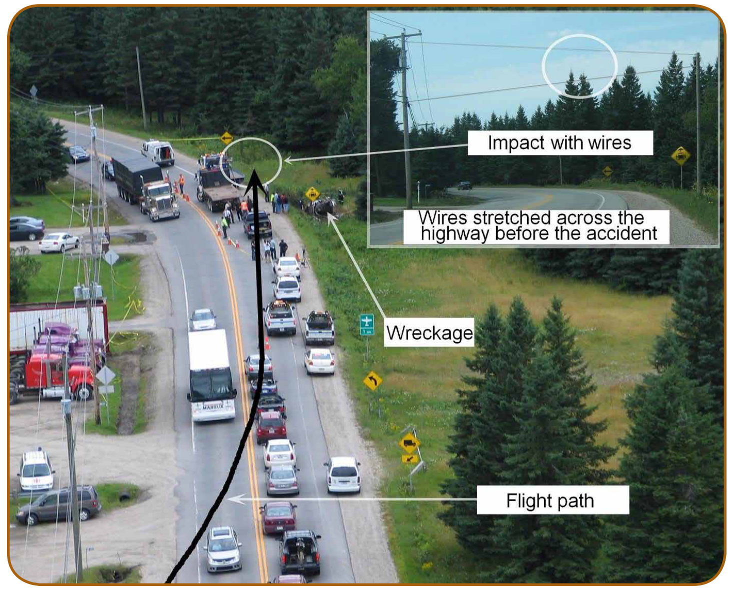
At an altitude of 250 ft AGL, the pilot had about 15 seconds to execute an emergency landing. He had little time to select a suitable landing site. In addition, the pilot was faced with a dilemma: making an emergency landing on an unsuitable surface or continuing the flight until he found a suitable landing surface while rotor rpm continued to decay. The pilot continued the flight to find a section of the road that would be suitable for landing. Consequently, when the pilot finally arrested the descent about 20 ft above the road, the tail rotor effectiveness had diminished to a point where the helicopter was considerably yawed to the right of its horizontal track along the road.

To land with horizontal velocity, the aircraft must be aligned with the direction of travel, otherwise it could roll over. Consequently, the pilot had to correct to align the aircraft with the direction of horizontal travel before setting down on the road. The complex task of simultaneously arresting horizontal travel along the road with the helicopter yawed, controlling the descent until touchdown, and counteracting engine power fluctuations without a speed governor was particularly difficult.

When the loss of directional control to the right occurred, the already high workload associated with an emergency landing increased further, most probably creating work overload for the pilot. In a work overload situation, pilots often concentrate on a particular task and ignore the overall situation. As a result, the pilot probably focused his attention on the execution of the manoeuvre and did not see the cables spanning the road.

Emergency manoeuvres, particularly helicopter autorotation, are demanding and require a high degree of skill, precision and judgment. Moreover, a helicopter pilot often has less than one minute to execute an emergency landing after a complete engine failure. These skills can only be acquired with training and retained with practice.

Although the level of experience among pilots engaged in commercial operations is generally high, these pilots are required to make at least one recurrent training session in flight or on a simulator every year to practise these emergency procedures. Pilots engaged in private operations, however, are not subject to this flight training requirement as long as they conduct at least one flight every five years.



Accident site

Findings as to causes and contributing factors

1. Fracture of the check ball retainer in the hydraulic tappet caused the malfunction of the No. 4 cylinder exhaust valve.

2. The malfunction of the No. 4 cylinder exhaust valve caused backfiring and partial loss of engine power. As a result, the aircraft could not maintain cruise altitude.

3. After the loss of engine power and during the following emergency landing, main rotor rpm decreased and caused a loss of directional control during the flare, followed by an impact with cables over the road.

4. At an altitude of 250 ft AGL, the pilot had very little time to react to the loss of engine power, complete the autorotation manoeuvre and the emergency landing.

Findings as to risk

1. It is possible for a pilot to be in compliance with the *Canadian Aviation Regulations*' recency requirements without making a single flight with an instructor.

Consequently, pilots in private operation could be inadequately prepared to deal with emergencies.

2. Owners of aircraft in private operation are not required to follow the recommendations of engine manufacturers. As a result, some aircraft parts can go without inspection or replacement for several years beyond the overhaul intervals prescribed by the engine manufacturer.

3. Some aircraft maintenance aspects were not in compliance with standards and requirements. Although these instances of non-compliance had no effect on the outcome of the occurrence flight, this practice could decrease the safety margin provided by the manufacturer.

4. Not all airtime was recorded in the aircraft journey log, which increased the risk that the limits prescribed by the manufacturer would be exceeded.

Other findings

1. The wear and erosion in the turbocharger was sufficient to prevent the engine from producing its full rated power under certain atmospheric conditions and, consequently, to limit the performance of the helicopter.

2. The intensity of the post-crash fire prevented rescuers from extracting the occupants from the wreckage.

TSB Final Report A10A0085—Collision with Water

On August 5, 2010, a privately owned Cessna 414A departed Toronto/Buttonville Municipal Airport, Ont., en route to Sydney, N.S. The flight was operating under an IFR flight plan with the pilot-in-command (PIC) and the aircraft owner on board. Nearing Sydney, the aircraft was cleared to conduct an instrument approach. At the final approach waypoint the pilot was advised to discontinue the approach due to conflicting traffic. While manoeuvring for a second approach, the aircraft departed from controlled flight, entered a rapid descent and impacted the water at 2335 ADT. The aircraft wreckage was located using a side-scan sonar 11 days later, in 170 ft of water. The aircraft had been destroyed and both occupants were fatally injured. No signal was detected from the emergency locator transmitter (ELT).

Occurrence aircraft

Analysis

The two occupants of the aircraft did not survive the accident. There were no witnesses to the final moments of the flight and there were no onboard recording devices to assist investigators. The aircraft impacted the water in a near vertical attitude, suggesting an in-flight loss of control. This analysis therefore focuses on possible scenarios explaining why the aircraft departed controlled flight and collided with the water.

Although the aircraft was extensively damaged by the impact, there was no evidence suggesting a problem with the flight controls or engines. All historic technical records were carried on the occurrence aircraft; only the most recent maintenance records could be reviewed as copies were retained by the facilities in Buttonville. This practice impeded the determination of the aircraft's maintenance history since new. The investigation ruled out turbulence as a factor for loss of control because there were no significant weather conditions in the area that could cause turbulence.

The PIC was communicating on the radio up until 1 min before the loss of control. During these communications, the PIC did not indicate any medical concerns or display any signs of impairment. This, coupled with the fact that the heater was recently overhauled and tested serviceable just days before the occurrence flight, allowed the investigation to rule out carbon monoxide poisoning. Pilot incapacitation was therefore not considered a contributing factor.

The PIC was in an unfamiliar aircraft, was flying in conditions which he did not like (night, inclement weather), and was operating into an unfamiliar airport. These factors would have contributed to the degradation of the PIC's conscious attention management capability. Simple tasks such as re-programming the GPS would have become difficult and may have taken attention away from flying for several minutes. Important steps were omitted such as reducing the airspeed or changing altitude when repeatedly instructed to do so. Additionally, the pilot turned to the left when instructed to turn right, and declined the offer for radar vectors which would have reduced pilot workload.

The owner had received limited experience flying a multi-engine aircraft 2 years earlier, had limited instrument flight experience and had not received any training on the occurrence aircraft or its systems. These factors would have contributed to the degradation of the owner's conscious attention management capability.

The aircraft track nearing OBVUP created a sharp closing angle on the OBVUP-GAGBU track. As the aircraft neared the OBVUP waypoint, the course track bar on the GPS would have moved very quickly toward the GAGBU waypoint. Due to the maximum rate of turn that an autopilot system allows, the aircraft would have flown through the OBVUP-GAGBU track before regaining course. To prevent this, a pilot would have to manually take control and initiate a steep turn. In an attempt to intercept the OBVUP-GAGBU course, an inexperienced pilot may try to follow the track bar using an increasingly steep bank angle. If this steep bank angle is left uncorrected, a spiral dive will result.

Aircraft flight path

The PIC and owner started their day in Calgary at 0800 (0500 local) and had been travelling for more than 15 hr. The training in Buttonville was carried out under conditions of high heat and humidity. During the final minutes of the flight, it is likely that the PIC and owner were task saturated. Although fatigue is not supported by any factual information received, the lengthy day may have exacerbated the level of task saturation. When a pilot is task saturated, the increased load on the conscious brain raises the potential for unrecognized spatial disorientation and/or loss of situational awareness. Erratic flying consisting of multiple heading and altitude excursions while the aircraft is flown manually is an indication that the pilot was possibly task saturated and disoriented. Spatial disorientation and the absence of a visible horizon have been identified as contributing factors to spiral dives. The radar track and the descent rate of the aircraft were indicative of a spiral dive. It is likely that the PIC and owner were both suffering some degree of spatial disorientation during the final portion of the flight. The crew was unable to recover control of the aircraft before contacting the surface of the water.

The investigation could not determine whether it was the PIC or the owner who was at the controls.

The PIC had arranged for a business meeting in Sydney on the morning of August 6, 2010. Self-imposed pressure to make this appointment likely influenced the crew's decision to depart Buttonville despite:

- their lack of experience on the aircraft type;
- their unfamiliarity with the destination airport;
- the night/IFR conditions; and
- the lengthy day.

Due to the severity of the impact damage, the aircraft likely sank quickly and the ELT would not have transmitted a signal. In 170 ft of water, attenuation would have masked the ELT signal if the ELT had withstood the initial impact.

Findings as to causes and contributing factors

1. It is likely that the PIC and the owner were both suffering some degree of spatial disorientation during the final portion of the flight. This resulted in a loss of control of the aircraft and the crew was unable to recover prior to contacting the surface of the water.
2. The PIC did not accept assistance in the form of radar vectors, which contributed to the workload during the approach.
3. Self-imposed pressure likely influenced the crew's decision to depart Buttonville despite the flight conditions, lengthy day, and lack of experience with the aircraft and the destination airport.

Other findings

1. It could not be conclusively determined who was flying the aircraft at the time of the occurrence.
2. The lack of onboard recording devices prevented the investigation from determining the reasons why the aircraft departed controlled flight.
3. The practice of placing aircraft technical records on board aircraft may impede an investigation if the records are lost due to an accident.

TSB Final Report A11P0027—Midair Collision

On February 9, 2011, at about 1600 PST in daylight conditions, a group of four light aircraft took off from the Langley Regional Airport in Langley, B.C., for a local formation flight to Chilliwack, B.C. At about 1615, during a turn, the Cessna 150G and the Cessna 150L collided. The two aircraft briefly descended joined together and out of control, but at about 400 ft above ground level, they separated. The Cessna 150G broke up in flight and fell into a shallow slough; the two occupants were fatally injured and the aircraft was destroyed. The pilot of the Cessna 150L regained control of the aircraft and landed in a farm field without injury; however, the aircraft was substantially damaged as a result of the collision. There was no fire and the emergency locator transmitter (ELT) on the Cessna 150G activated upon impact with the slough.

History of the flight

Earlier that afternoon, a local group of four pilots and two crew members decided to carry out a short flight to practise formation flying in the Mission-Chilliwack area. The group comprised a Cessna 150G, a Cessna 150L, a Cessna 305A (L-19), and a Piper PA-28-180. The group assembled for a formation flight pre-flight briefing at the Langley Regional Airport, where all four aircraft were regularly based. As discussed at the meeting, the round-trip flight was a daylight recreation VFR flight to the Chilliwack Municipal Airport. Originally, the leader had planned to fly to, and land at, a popular site near Harrison Mills, B.C., and then conduct a debriefing on the ground. However, following a discussion about the remaining daylight, the leader chose to fly to Chilliwack instead. The pilots' intentions were to practise simple formation flying en route, during which they would carry out basic station-keeping (maintaining position) with simple turning manoeuvres, in a loose diamond pattern (Figure 1).

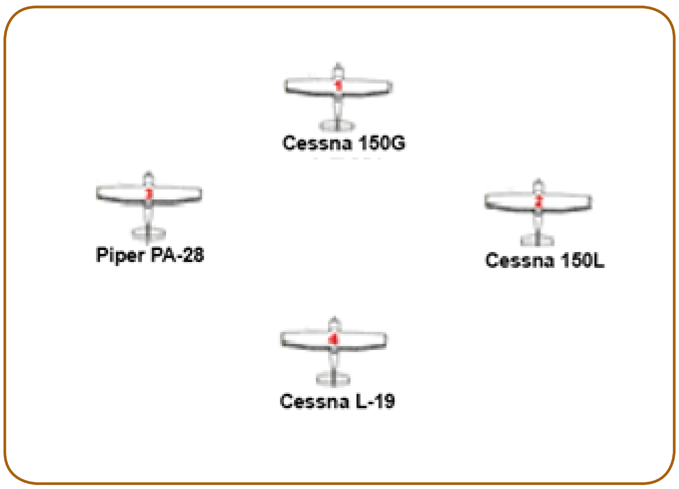


Figure 1

The briefing was straightforward and succinct, and did not include discussion of emergency or contingency procedures. However, a briefing was given by the leader about the join-up procedures, as well as instructions in the event a pilot could not find the formation, and about the formation break-out procedures at Chilliwack Municipal Airport.

Three of the pilots in the group were familiar with formation flying because they had flown together many times at various fly-past events and had practised over the Lower Mainland of B.C. As a newcomer to the group, the pilot of the Cessna 150L, having previously accompanied other pilots during two formation flights, was flying as the pilot of his own aircraft in the formation. The group planned to introduce the newcomer progressively to the basics of formation flying. They discussed having an observer/spotter fly with the pilot of the Piper PA-28-180 for the outbound leg to Chilliwack, and then change aircraft and return with the pilot of the C150L on the leg back to Langley. The pilot of the C150L, however, was unwilling to have another person in the aircraft with him because of likely distraction.

The lead aircraft was the Cessna 150G with two occupants on board. On the right-hand wing of the leader, in the number 2 position, was the Cessna 150L with only the pilot on board. Also in the group was the Piper PA-28-180, with two occupants on board, in the number 3 position on the leader's left side. The solo Cessna 305A (L-19) was in the number 4 position at the rear of the other three aircraft.

At about 1600, the four aircraft took off separately, but in a pre-arranged sequence, from the Langley Regional Airport and cleared the control zone to the north-east. In the next few minutes, the aircraft joined up and formed the diamond pattern as briefed. After the aircraft had settled in together, they flew in stable formation for several minutes as they proceeded eastwards in the Glen Valley, above the Fraser River, towards the township of Mission, B.C. During this time, the flight carried out gentle turns, with the flight leader communicating to the group on the appropriate radio frequency.

When the formation flight neared the township of Dewdney, B.C., at 1 500 ft ASL, about 1 450 ft AGL, and at a speed of 90 mph, the leader initiated a 15° angle-of-bank left turn for about a 90° heading change, and rolled out heading north. In preparation for this turn, the leader advised the number 2 aircraft (the C150L, on the outside of the turn) to increase engine power to account for the increased radius of turn. This instruction is in accordance with conventional station-keeping practice during formation flight, and was a practice this leader had often used with newcomers to the group. During this left-turn manoeuvring, the lateral distance and step-back of the number 2 aircraft on the leader's right side increased somewhat, but the C150L returned to its original position once the flight rolled out on the northerly heading (Figure 2).

Shortly after, the leader announced a right turn and this time advised the number 2 aircraft to reduce engine power since it was on the inside of the turn. The four aircraft then entered a level, 15° angle-of-bank right turn at 1 500 ft ASL to return to the southerly heading.

During the turn, the pilot of the number 2 aircraft (the C150L) lost sight of the lead aircraft (the C150G), turned away to the right and descended. After a brief interval, the C150L turned left and climbed while the pilot searched for the leader to rejoin the formation above.

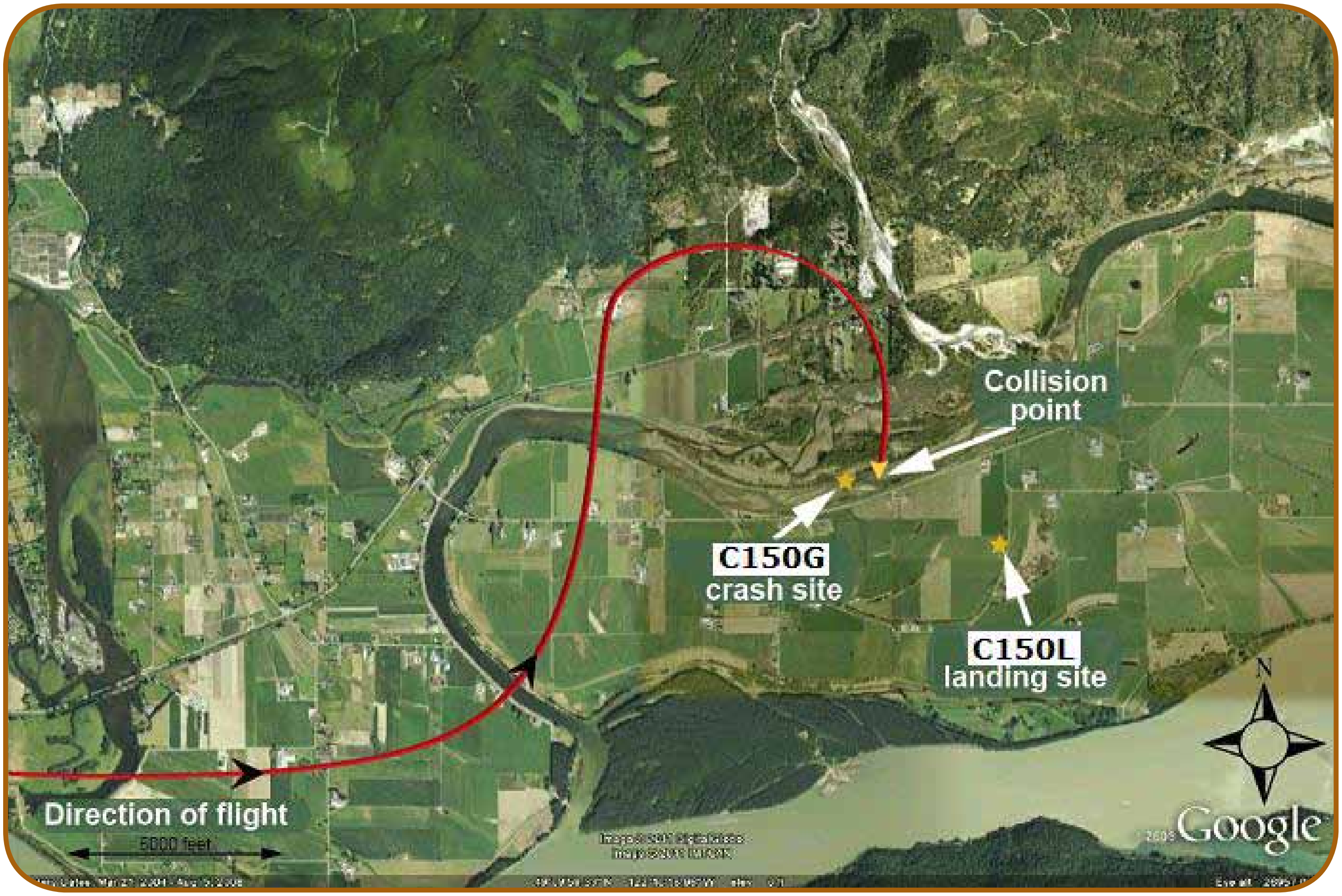


Figure 2. Site map showing route of formation flight

At 1615, seconds after the leader called a roll-out, the two aircraft collided at almost 70° to each other (Figure 3). The aircraft began to rotate and descend joined together, and fell out of control for several seconds. At about 400 ft AGL, the aircraft separated; the C150G broke up in flight and fell into a shallow slough, while the pilot of the C150L regained control and landed the aircraft without engine power in a farm field.

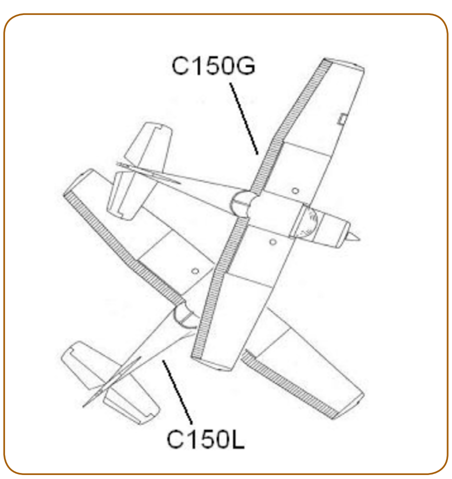


Figure 3. Collision diagram

TSB laboratory flight path interpolation

The Transportation Safety Board of Canada (TSB) Laboratory examined the known flight path information and, using computer-assisted drawing and design software, estimated a plausible flight path for the two accident aircraft. Several assumptions were made as the basis for these calculations: 90 mph airspeed, 1 500 ft ASL altitude, and 15° angle-of-bank. It was assumed that the lead aircraft maintained the airspeed and the angle-of-bank throughout the manoeuvre, as there was no information to suggest otherwise. It was also assumed that the number 2 wingman aircraft (the Cessna 150L) did not slow down sufficiently to maintain the assigned formation station on the right wing of the leader.

Although it is possible that the aircraft in the formation flew at different speeds and angles of bank than the assumed values, the Laboratory calculations found that no significant variations occurred by using other values. For the purpose of understanding the basic dynamic situation of this accident, it is reasonable to use the assumed values in the analysis and recognize that there could be small inaccuracies.

In summary, the Laboratory analysis concluded that, during the entry to the right turn (Figure 4), the speed differential would have caused the C150L to overtake and lose sight of the leader. This would also have prevented the pilot of the C150L from seeing the leader during the last left turn before the collision. It was also concluded that the leader would have been unable to see the wingman aircraft approaching from the right side until it was too late to avoid contact.

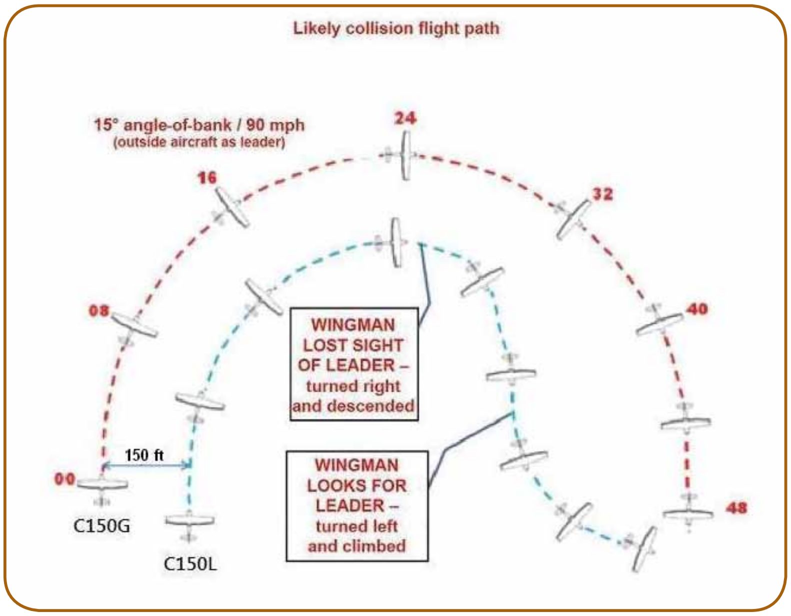


Figure 4. Likely collision flight path (diagram not to scale)

Analysis

Note: *the comprehensive analysis section of the final report is too long to reproduce here and should be of interest to anyone involved or wishing to get involved in formation flight. For more please refer to the full report linked in the title of this summary.*

Findings as to causes and contributing factors

1. During the right-hand turn in formation flight, the pilot of the C150L lost sight of the leader (the C150G).

2. After initially adopting a flight path that effectively eliminated the risk of collision, the pilot of the C150L turned back toward the leader so as to rejoin the formation, thereby unintentionally placing the aircraft on a course leading to their collision.

3. The high-wing configuration of the C150L significantly restricted the field of vision, and, during the left-hand turn, the pilot was unable to see the lead aircraft on a collision course.

4. The impact damage resulting from the in-flight collision rendered the C150G uncontrollable, and the aircraft was unable to maintain flight; it descended rapidly and collided with the terrain.

5. During its pre-flight briefing, the group had not discussed the contingency procedures for loss-of-sight of an aircraft, and it did not review the accepted practices for returning to the formation.

6. For the occupants of the C150G, the forces of the in-flight impact and the collision with the terrain exceeded normal human tolerance, and the accident was not survivable.

Findings as to risk

1. Formation flying involving high-wing aircraft poses elevated risk due to the limited cockpit vision angles.

2. Formation flying involving aircraft of dissimilar aircraft types is challenging and demands higher skill levels, particularly when combining high-wing and low-wing aircraft. This aircraft combination creates an even greater risk for casual formation flyers.

3. Formation flying demands higher levels of skill, discipline, and training than conventional flying. Without appropriate formal training to achieve those increased levels, the risk of in-flight collision is elevated.

4. The ELT on board the C150G only transmitted on 121.5 megahertz (MHz), and the signal was only received by high-flying aircraft in the local area. When using such ELTs, there is a risk that the emergency situation will not be detected.

5. Not having a qualified observer on board initial formation flights increases the risk of inappropriate pilot actions during loss-of-sight events.

Other findings

1. Several civilian organizations in North America are dedicated to formation flying and collectively provide information, advice, and assistance for the pilot who wishes to participate in formation flying.

2. Even though the two onboard GPS units were functioning at the time of the accident, no flight-path data for either aircraft were available to the investigation because neither GPS unit had been set up to record flight track. The absence of such data prevented the determination of the actual flight paths of the aircraft.

Safety action taken

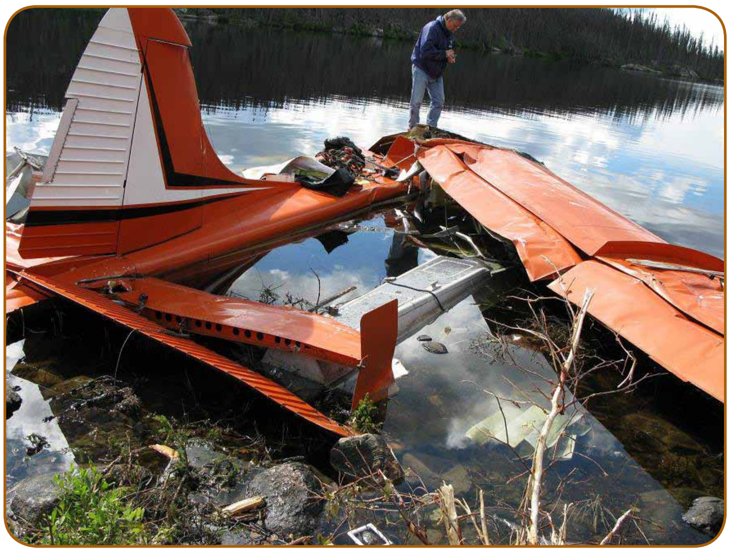
Transport Canada

Transport Canada (TC) issued a safety bulletin regarding the hazards surrounding formation flying. TC's *Take Five* "Formation Flight" brochure (TP 2228E-39) highlights the importance of pre-flight planning and flying skills in reducing the risks associated with formation flying. This *Take Five* was included in Issue 1/2012 of the *Aviation Safety Letter*.

From June 24 to 26, 2011, TC attended the annual Canadian Owners and Pilots Association (COPA) convention in Langley, B.C., and distributed the newest *Take Five* brochure dealing with formation flying. TC also presented information on a variety of related safety issues to the attendees.

TSB Final Report A11C0100—Collision with Terrain

On June 30, 2011, a float-equipped de Havilland DHC-2 departed from a lake adjacent to a remote fishing cabin near Buss Lakes, Sask., for a day VFR flight to Southend, Sask., about 37 NM southeast. There were four passengers and one pilot on board. The aircraft crashed along the shoreline of another lake located about 2 NM southeast of its point of departure. The impact was severe and the five occupants were killed on impact. The emergency locator transmitter (ELT) activated, and the aircraft was found partially submerged in shallow water with the right wing tip resting on the shore. There was no post-crash fire. The accident occurred during daylight hours at about 1111 Central Standard Time (CST).



Analysis

Both the images recovered from the wreckage and the meteorological assessment indicate that the pilot had waited until the weather was suitable to accomplish the flight to and from Buss Lakes. The meteorological assessment suggested that light winds would prevail during the flights. Therefore, it is unlikely the flight encountered unusual winds or turbulence that would have led to the accident. The assessment suggested that local dense fog patches could have formed in the Buss Lakes area, possibly obscuring shorelines and/or higher terrain in the area. While it is unlikely the pilot would have flown into dense fog at low level, it is possible that manoeuvres had to be performed to avoid it. Fog patches near the aircraft would have been a distraction and would have contributed to the pilot's workload.

Airframe and engine problems were not considered to be factors in the accident. The indications of a relatively high power setting at impact and the condition of the fuel pump suggest it is unlikely that the fuel pressure warning light was illuminated and a factor in the accident. Since the fuel pressure warning light illuminated at low power settings when taxiing, the minor stretching of the filament could have occurred on a previous flight.

Forward movement after impact was limited to 10 ft. While this can be attributed to the steep angle at impact, it also suggests low forward speed. Consequently, the speed was likely in the lower range of the airspeed marking of 50 to 83 mph. Likewise, the severe damage to the aircraft and limited forward movement suggests the rate of descent was likely at the higher end of the range of 500 to 1 200 ft/min identified on the instrument. A low forward speed, high rate of descent and steep angle are consistent with an aerodynamic stall. Consequently, while manoeuvring the aircraft, the pilot likely exceeded the critical angle of attack for the aircraft weight. Since the propeller appeared to be in a low pitch condition, suggesting that the propeller governor did not have time to adjust RPM, and the rate of descent had developed to only 1 200 ft/min, the stall likely occurred at low level, from an altitude that would preclude recovery. The weight of the aircraft and possible aft centre of gravity (CG) could have contributed to the aerodynamic stall.

The location of the accident site was close to, but not easily accessible from, the lake on which the fishing cabin was located. The aircraft's heading to the southwest at impact rather than toward Southend, and its low altitude, suggest that the pilot was manoeuvring along the shoreline, possibly to permit the passengers to observe the area.

Findings as to causes and contributing factors

1. While manoeuvring at low level, the aircraft's critical angle of attack was likely exceeded and the aircraft stalled.
2. The stall occurred at an altitude from which recovery was not possible.

Findings as to risk

1. The separation of the propeller blade tip likely resulted from impact forces.
2. The investigation could not determine whether the fuel pressure warning light was illuminated prior to the accident. △

Flying Floats? Explore www.tc.gc.ca/eng/civilaviation/standards/commerce-floatplanes.htm!

Note: *The following accident synopses are Transportation Safety Board of Canada (TSB) Class 5 events, which occurred between May 1, 2012, and July 31, 2012. 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 May 1, 2012, a student and an instructor were conducting multi-engine flight training in a **Piper PA-30 Twin Comanche** at Cranbrook Airport (CYXC), B.C. During a touch-and-go the student unintentionally retracted the gear instead of the flaps. The aircraft was already beginning to lift off and the weight-on-wheels switch was ineffective in preventing gear retraction prior to lift-off. The aircraft settled onto the runway causing significant damage to both propellers and the belly of the aircraft. There were no injuries. *TSB File A12P0066.*

— On May 2, 2012, a **float-equipped Cessna A185F** was taking off from Lac Noir near Saint-Jean-de-Matha, Que., with a pilot and one passenger on board. When the aircraft reached about 50 mph during the take-off run, it suddenly began to turn to the left. The pilot attempted a correction but the aircraft hit some rocks and flipped over. Both occupants were wearing personal flotation devices and they evacuated the submerged aircraft. No mechanical anomaly was observed during the event. *TSB File A12Q0064.*

— On May 2, 2012, a commercially operated **Beech 1900** was en route from Iqaluit, Nun., to Dewar Lakes (CYUW), Nun. On landing, just after touching down, the pilot in the right-hand seat (who was not at the controls) noticed a bank of compacted snow just as it went under the right engine. Although the landing run was not affected, there was a loud noise. The landing gear unsafe horn sounded and the right landing gear light went off. The brake de-icing hose was also torn off. The aircraft completed its landing run and made a U-turn in order to proceed back up the runway. The intention was to clear the runway, shut down the right engine and have the aircraft inspected. While the aircraft was moving back up the runway, the right landing gear collapsed and the right-hand propeller struck the ground. *TSB File A12Q0066.*

— On May 5, 2012, a **Consolidated Aeronautics LA-4-200 amphibious aircraft** was on a flight from Gimli, Man., to Kapekun Lake, Man. At approximately 2200 the aircraft was overdue and a search was initiated. Search and rescue personnel found the aircraft capsized in the water at Kapekun Lake at approximately 0030 on May 6. The pilot, who was the only person on board the aircraft, was fatally injured. *TSB File A12C0048.*

— On May 6, 2012, an **amateur-built Bushby Mustang II** was departing Pitt Meadows Airport (CYPK), B.C., for Vernon Airport (CYVK), B.C., on the first leg of a flight to Montreal, Que. The aircraft took off on Runway 26L and briefly became airborne, but the pilot put the aircraft back on the runway, landing straight ahead, due to a rough-running engine (Lycoming O-360-A1D). After selecting a different fuel tank, the pilot requested clearance to backtrack on Runway 26L for another take-off attempt but accepted an ATC clearance to take off on Runway 08R (the reciprocal runway heading, 4 692 ft long). After takeoff on 08R the aircraft climbed approximately 200 ft before the engine had a significant reduction in power. The pilot executed a left turn in an attempt to land on Taxiway Golf but crashed in the infield short of the taxiway. The aircraft came to rest upright in a ditch about 700 ft north of Runway 08R. The pilot was able to exit the aircraft but suffered back injuries and burns. The aircraft was destroyed by the impact and post-crash fire. About 40 min prior to the accident, the temperature was 6°C and the dew point was 5°C. Twenty minutes after the accident, the temperature was 8°C and the dew point was 5°C. Winds were calm and humidity very high throughout. These conditions are conducive to serious carburetor icing at any engine power. A teardown of the engine did not reveal any anomalies that would have caused a power loss. *TSB File A12P0068.*

— On May 10, 2012, a privately operated **Piper PA34-220T** was taxiing for takeoff at Deer Lake Airport (CYDF), N.L., for a planned flight to Charlottetown Airport (CYYG), P.E.I., with the pilot and one passenger on board. While manoeuvring on the apron, a loud noise was heard; the pilot informed ATC and shut down the aircraft to investigate. It was discovered that the right propeller came in contact with a length of reinforcement bar that was being used as a marker for maintenance being conducted at the airport. The damaged propeller was subsequently removed for repairs, and the right engine was also to be removed for internal inspection. *TSB File A12A0055.*

— On May 13, 2012, a privately operated **Beaver RX-28 ultralight** was on a local VFR flight out of Dolbeau, Que., with a pilot on board. During manoeuvres while cruising, the aircraft began to spin and the pilot was unable to regain control before impact with trees and the ground. The pilot was not injured but the aircraft was substantially damaged. *TSB File A12Q0072.*

— On May 14, 2012, a privately operated **Cessna 185F** was on a VFR flight from Joliette (CSG3), Que., to La Macaza/ Mont-Tremblant (CYFJ), Que., with a pilot and two passengers on board. When landing, the aircraft bounced, and when it made final contact with the runway, it ground-looped. No one was injured but the aircraft was substantially damaged. *TSB File A12Q0073.*

— On May 16, 2012, a **Piper PA-44-180** was on a training flight at Saint-Hubert (CYHU), Que., with an instructor and a pilot on board. After an engine failure exercise, the landing gear was not extended during landing and both propellers struck the runway. The crew pulled up and then returned and landed without further incident. The crew did not declare an emergency or report the problem to ATC. Both propellers were damaged. *TSB File A12Q0108.*

— On May 16, 2012, during landing at a farm strip 6 NM west of Blackfalds, Alta., a private **Cessna 182P** porpoised twice, resulting in separation of the nose gear. The aircraft settled onto its nose, damaging the propeller. There were no injuries to the pilot who was the only person on board. The emergency locator transmitter (ELT) activated briefly before the pilot deactivated it. *TSB File A12W0058.*

— On May 17, 2012, a **de Havilland DHC-2 Beaver** was landing toward the west at Lammers airstrip, Y.T., following a flight from Dawson City, Y.T. The aircraft touched down on a frost heave on the gravel runway, bounced, and departed the left side of the strip. Upon striking a gravel pile close to the edge of the strip, the left main landing gear, fuselage and propeller were substantially damaged. There were no injuries to the pilot or passenger. This was the pilot's second trip to the Lammers airstrip; the first was earlier in the day, accompanied by an experienced pilot for line indoctrination. The pilot had flown approximately 6 hr on type since being recently checked out. *TSB File A12W0059.*

— On May 17, 2012, a **Messerschmitt MBB-BK117** helicopter was on the ground shutting down at Winnipeg James Armstrong Richardson International Airport (CYWG) in Winnipeg, Man., when the cyclic was displaced forward and the main rotor contacted the upper wire strike protector. One main rotor blade was damaged beyond limits. No crew members were injured. *TSB File A12C0058.*

— On May 18, 2012, a **Pilatus PC-12/45** departed Sioux Lookout, Ont., en route to Thunder Bay, Ont. Shortly after departure, the flight deviated around a known thunderstorm to the southeast of Sioux Lookout. The aircraft then encountered rain, which gave way to hail at 4 000 to 5 000 ft ASL. The aircraft continued to its destination without further incident. Inspection revealed substantial damage to the leading edges of the wings, and the aircraft was removed from service for repairs. *TSB File A12C0059.*

— On May 19, 2012, a privately operated **Schleicher ASW 27single-seat glider** was on a cross-country flight[1] from Saint-Dominique (CSS4), Que., to Bromont (CZBM), Que., with the intention of returning to the point of departure. The pilot was unable to continue the cross-country flight and landed in a field 3 NM north of CZBM. After landing, the right wing touched the grass, which was about 20 cm high, and the glider ground-looped. The pilot was not injured but the aircraft's tail boom and flight controls were substantially damaged. *TSB File A12Q0088.*

— On May 20, 2012, a **Cessna 152** took off from Saint-Hubert (CYHU), Que. for Saint-Donat (CSY4), Que., with one pilot and one passenger on board. Upon arrival, the aircraft overflew the runway at low altitude at a speed of about 70 mph, with the flaps at 20°. After pulling up and positioning the flaps at 10°, the pilot judged the aircraft's climb rate insufficient to clear the terrain ahead of him, and decided to land on the runway. The aircraft went off the end of the runway. The nose wheel became stuck in the sand and the aircraft nosed over. The aircraft was substantially damaged. The two occupants were not injured in the accident. *TSB File A12Q0075.*

— On May 20, 2012, an **amateur-built Sonerai II** was taking off from Mascouche (CSK3), Que., for a local recreational flight, with the pilot alone on board. At an altitude of about 1 500 ft, the canopy opened all the way, remaining attached at the hinge on the left side of the cockpit. The aircraft was not able to maintain altitude and the pilot decided to make a forced landing in a ploughed field. The aircraft was substantially damaged during the landing. The pilot was not injured in the accident. *TSB File A12Q0076.*

— On May 25, 2012, an **amateur-built Dan-B-Wolf on floats** was on a VFR flight from Lac Pipmuacan, Que., to Lac Damasse, Que. The aircraft was reported missing on Friday, May 25, 2012, and was found on Sunday, May 27, 2012, at the bottom of Lac Pipmuacan. Debris was spotted Saturday morning on the shore of the lake by a military search and rescue team. The aircraft was spotted by a group of divers from Sûreté du Québec. The pilot was fatally injured and the aircraft was destroyed by the force of the impact. *TSB File A12Q0081.*

— On May 26, 2012, a **Piper Cherokee PA-28-181** was en route from Rockcliffe Airport (CYRO), Ont., to London, Ont. In the vicinity of Oakville, Ont., the aircraft engine (Avco Lycoming, O-360-A4M) lost power and the pilot made an emergency landing in a field. There were no injuries but the aircraft was substantially damaged. A post-flight

1 The term "cross country flight" applies to gliders which, when upslope wind conditions allow, leave their local area and fly cross country or make a large circuit while keeping emergency landing fields in sight in case thermal uplifts are not available.

inspection revealed that there was zero fuel in the left tank and carburetor, while the right tank had full fuel. *TSB File A12O0073.*

— On May 27, 2012, the pilot and owner of an **RS Ultra Kangook B powered parachute** had been flying for about 15 min some 150 ft above a field bordering the St. Lawrence River in Bécancour, Que. The aircraft was seen making a tight turn and then descending with a spinning motion. The pilot was unable to regain control before impact with the ground and he succumbed to his injuries. Inspection of the aircraft revealed no damage to the chute or the controls, and the engine was gaining power at the time of impact. *TSB File A12Q0082.*

Artist impression of occurrence A12W0069.

— On May 28, 2012, a **Bell 206B** helicopter was conducting mosquito control operations 3 NM north of the Erik Nielsen Whitehorse International Airport (CYXY) in Whitehorse, Y.T. During the initial departure to commence application operations, the pilot flew towards the rising sun and suffered a wire strike when the helicopter's forward transmission fairing contacted an unmarked three-strand power line. The pilot was able to maintain control and conducted an immediate landing onto a creek bed. The helicopter remained upright; however, the tail rotor struck the application hopper during the flare and touchdown. The pilot was uninjured. *TSB File A12W0069.*

— On June 5, 2012, a **Quad City Challenger II ultralight** was being used for pilot training at the Carleton Place aerodrome (CNR6) in Carleton Place, Ont. The airspeed was allowed to decay on final approach and the instructor took control. The aircraft stalled from approximately 10 ft, bounced off the runway and struck trees to the left of the runway before the instructor had regained control. The aircraft was substantially damaged but neither pilot was injured. *TSB File A12O0079.*

— On June 6, 2012, a **Glastar amateur-built** aircraft was on a local pleasure flight near Exeter, Ont., when the engine lost power. The pilot conducted a forced landing in a wheat field. As the aircraft touched down, the main wheels caught in the crop and the aircraft nosed over. The pilot was not injured. The power loss was due to fuel exhaustion. *TSB File A12O0082.*

— On June 8, 2012, a **Eurocopter AS 350B2** helicopter was engaged in aerial wildlife management activity 40 NM northwest of Hebron, N.L. While manoeuvring near wildlife at low altitude, the tail rotor struck rocks and a large vibration was noted in the pedals. The pilot landed beside the nearby river without further incident and called the company to report. The subsequent inspection revealed damage to the tail rotor blades and drive shafts, the tail boom, and the vertical and horizontal stabilizers. The aircraft was to be slung to Goose Bay for repairs. *TSB File A12A0063.*

— On June 9, 2012, a **Pezetel PZL-104 WILGA 35 on floats**, with one pilot and one passenger on board, was on a VFR flight from Gouin, Que., to a private campsite. As the aircraft was flying alongside the Saint-Maurice River in the area of Weymontachie, Que., the pilot noticed a higher than normal cylinder temperature. Thinking that he might have to land, the pilot turned to align himself above the river and into the wind. During the steep, low-altitude turn, the aircraft lost altitude. Once the wings were level again and even though full power was applied, the aircraft touched the ground on the bank of the river. It travelled some 75 ft before coming to rest at the edge of the forest. The two occupants suffered minor injuries. Once out of the aircraft, they used a satellite telephone to call for help. *TSB File A12Q0093.*

— On June 10, 2012, an **amateur-built Aerocruiser SE on floats** was on a low-altitude flight in the area of Notre-Dame-de-Pontmain, Que., when the aircraft was seen nosing down after a steep turn. It crashed in the water. The two occupants managed to evacuate the aircraft and were rescued by people on shore. The aircraft was substantially damaged. *TSB File A12Q0091.*

— On June 10, 2012, a **Cessna 172** with a student pilot and an instructor on board had just touched down. At the end of the landing run, the aircraft left the runway. Neither occupant was injured. The propeller contacted the ground or some object, which made an internal check of the engine necessary. *TSB File A12Q0096.*

— On June 11, 2012, the pilot of a **Zenair CH-701** was conducting high-speed taxi training at 108 Mile House Airport (CZML), B.C., in preparation for a solo flight. The pilot was unable to maintain directional control and decided to abort the taxi. During the process, the aircraft inadvertently became airborne for a short distance and, after crossing a fence, struck trees just beyond the aerodrome boundary. The aircraft was substantially damaged and the pilot was uninjured. *TSB File A12P0088.*

— On June 16, 2012, a **Cessna 180AA** was on a camp service flight from Tasumitt Lake, Ont., to Ear Falls, Ont. While en route at low altitude, the aircraft manoeuvred to avoid a flock of birds, struck a tree and came to rest overturned in a small lake near Confederation Lake, Ont. An overflying pilot observed the aircraft and passed the information to the Red Lake flight service station (FSS), who initiated a communications search. It was discovered that the Cessna was overdue; an aircraft from Ear Falls was dispatched to the scene and transported the pilot to Red Lake with serious injuries. There were no passengers on board. The aircraft was substantially damaged. *TSB File A12C0075.*

— On June 22, 2012, a **Robinson R44** helicopter was conducting a visual patrol of the oil fields northeast of Whitecourt, Alta. After being airborne for approximately 35 min, the engine (Avco Lycoming O-540-F1B5) began to lose power. The pilot picked an oil well lease site for a precautionary landing and while descending to the intended landing spot, the engine lost and regained power and then finally quit. The pilot entered autorotation and the aircraft bounced on landing, resulting in the skid gear spreading and the mast rocking. The pilot, who was the sole occupant, was uninjured. *TSB File A12W0081.*

— On June 22, 2012, an **amateur built Rotorway Exec 162F** was conducting a local sightseeing flight in the Red Deer, Alta. area, when power to the tail rotor was lost. The helicopter began to rotate and the pilot entered autorotation. However, while avoiding high tension power lines, the aircraft landed with a sideways motion resulting in a rollover. There were no injuries to the pilot or passenger. The helicopter was substantially damaged. The middle/centre Kevlar tail rotor drive belt was found to have split in two. *TSB File A12W0082.*

— On June 25, 2012, a **Cessna 180E on floats** was on a VFR flight from the Gouin Reservoir, Que., to Lac à la Tortue, Que. When the aircraft was at its cruising altitude of 2 700 ft and about 9 min from its final destination, the engine (Teledyne Continental O-470-R) sputtered and then stopped completely. The pilot tried to restart the engine, but without success. He made an emergency landing, but no convenient body of water was available and the aircraft ended up in some trees. The two people on board were not injured but the aircraft was substantially damaged. The two people contacted the Quebec City flight information centre (FIC) by satellite telephone. *TSB File A12Q0105.*

— On June 30, 2012, a **Grumman American AA-1C** took off from Runway 33 at Saint-Mathieu de Beloeil (CSB3), Que., for a recreational flight, with two people on board. After takeoff, the aircraft was unable to climb and it crashed on Highway 20 just northwest of the runway. After touching the ground, the aircraft struck a vehicle before coming to a stop. At the time of takeoff, the outside temperature was 26°C and the wind was 230° at 15 kt gusting to 25 kt. The aircraft was severely damaged and the two occupants suffered serious injuries. *TSB File A12Q0106.*

— On July 5, 2012, a private **Cessna 177B** was on a VFR flight from Rimouski (CYXK), Que., to Île aux Grues (CSH2), Que., with one pilot and one passenger on board. During landing, the aircraft touched down about half way along the runway and completed its landing run about 20 m beyond the threshold. No one was injured, but the aircraft was substantially damaged when the nose wheel broke. *TSB File A12Q0110.*

— On July 7, 2012, a **Piper PA-23-160** took off from Runway 23 at the Vernon Airport (CYVK), B.C. The pilot retracted the landing gear and stayed in ground effect prior to climbing steeply at the end of the runway. The aircraft reached about 400 ft then banked steeply left and, after about a 120° turn, descended with a steep nose down and bank attitude until it collided with the ground. It impacted the ground hard, bounced, and skidded to a stop on its belly facing 180° from the take-off heading. An explosion occurred and the aircraft was engulfed by fire and black smoke. The two occupants died and the fire destroyed the aircraft. A person sitting on a bench that was hit by the aircraft escaped without physical injury. *TSB File A12P0097.*

— On July 9, 2012, a **float-equipped Cessna 180A** was taking off on Pigeon Lake, Ont., in a northwest direction. At the same time a transport barge was crossing the lake in a southerly direction with seven people on board. As the aircraft approached the barge there was no aircraft change of heading. The aircraft was on the step when its right wing collided with the barge. The aircraft cart-wheeled to the right and eventually sank in an inverted position. Nearby witnesses rushed to the scene on boats, and after several attempts to gain access, they eventually removed the pilot and brought him to the surface where CPR was administered. A boat carried the pilot to the nearby marina where emergency services were waiting to transport the pilot to hospital. The pilot succumbed to serious injuries in hospital and one passenger on the barge suffered minor injuries. *TSB File A12O0106.*

— On July 9, 2012, a privately operated **Bell 206B** helicopter was on a VFR flight from a private residence to Lake Germain, Que, which is about 18 NM from Rouyn-Noranda, Que., with a pilot and one passenger on board. After the helicopter landed, a decision was made to move it slightly and the right-hand skid sank into the ground. There was a dynamic rollover, and the blades of the main rotor hit the ground, causing significant damage to the aircraft. The pilot sustained minor injuries. *TSB File A12Q0113.*

— On July 15, 2012, the pilot of the **amateur-built Myers M-2** and his passenger were in cruise flight at about 2 000 ft ASL in the vicinity of Nanoose Bay, B.C., when the engine (Lycoming 0-235) began to lose power progressively from 2400 RPM down to 1400 RPM; it stopped abruptly. There was no indication of engine distress with oil pressure or temperature. The propeller was not wind milling and the pilot attempted to restart the engine but it did not crank over. He radioed a "Mayday" call to the Nanaimo flight service station (FSS) and prepared to ditch the aircraft about 300 m from Ada Islands. The aircraft impacted the water hard at about 45 kt; it remained upright. The two occupants wore their shoulder harnesses and lap belts and managed to egress the aircraft uninjured. They grabbed life preservers and began to swim toward the island shoreline. After 25 min in the water, having gained only about 200 ft because of the current, they were rescued by a Canadian Coast Guard cutter and taken to Nanoose Bay, B.C., where they were attended to by RCMP and ambulance services, but were not taken to hospital. *TSB File A12P0102.*

— On July 15, 2012, a **Eurocopter AS 350 B3** helicopter was on a routine ferry flight between Brandon, Man., and Winnipeg, Man. Shortly after departing Brandon the pilot noted a vibration in the rudder pedals. After discussion with an onboard maintenance person, the decision was made to land and assess the cause of the vibration. During the landing, it was determined that the vibration was coming from the tail rotor. The flight to Winnipeg, where maintenance would be available, resumed, but approximately 20 min after lift-off, the vibration worsened and was accompanied by a noise; the pilot initiated a precautionary landing near Austin, Man. The maintenance engineer inspected the tail rotor and noted that the tail rotor half-shell bearings had failed and that the rotor blade cuff appeared to have separated from the rotor spar. The helicopter was removed from service and is awaiting replacement parts. On July 6, 2012, the tail rotor half-shell bearings (P/N 704A33-6332-61) on the tail rotor blade (P/N 355A12-0055-00 S/N 18126) were replaced. The aircraft had 91.3 hr total airframe time. *TSB File A12C0089.*

— On July 23, 2012, a privately operated **Cessna TR182** was on a VFR flight from Rockliffe (CYRO), Ont., to Montreal/Mascouche (CSK3), Que. to take on fuel and pick up another passenger. When landing on Runway 11, touchdown came too late and the pilot pulled up and went around for a second approach and second landing. While the pilot was pulling up, the flaps were raised completely and the aircraft lost altitude and struck some trees about 1 NM from the end of the runway. Both people were injured and taken to hospital. The aircraft was severely damaged. *TSB File A12Q0123.*

— On July 24, 2012, a **Cessna 172S** was being used to practice landings at Greenbank Airfield (CNP8), Ont., with an instructor and a student on board. During approach to Runway 34 in gusty wind conditions the aircraft pitched down. The instructor attempted to recover by adding full power and pitching up; however, the aircraft struck the up-sloping terrain approximately 100 ft short of the runway. The student suffered minor injuries and the instructor was uninjured. The aircraft was significantly damaged. *TSB File A12O0114.*

— On July 26, 2012, a privately owned **Robinson R44-II** helicopter was on a VFR flight in the area of Murdochville, Que. The pilot was accompanied by one passenger. During the initial climb, the low rotor rpm warning horn sounded and the pilot attempted to land on a highway. The aircraft flipped over into the ditch at the side of the road. Both people on board suffered minor injuries and the aircraft was substantially damaged. *TSB File A12Q0125.* △

Planning to fly in mountainous areas?

Take a few minutes to read Transport Canada's

"Take-Five" pamphlet on mountain flying!

Are you seeing your Civil Aviation Medical Examiner (CAME) too often?

by D.A. Salisbury, MD, MHSc, FACPCM, FRCPC, Director, Medicine, Civil Aviation, Transport Canada

One of the complaints I often hear from pilots is that they have to get a medical exam too often, which takes time and money. Recently, this has also included the observation that if they were in the United States, they could get a medical certificate with their driver's licence.

So let's look at the requirements in Canada, where they come from, and how you can minimize your interaction with my profession. It's not that we don't love seeing you, but less time spent in the doctor's office is potentially more time spent in the cockpit!

There are four levels of medical certification in Canada, appropriately enough known as categories 1 through 4.

Category 1 Certification

Category 1 is for pilots engaged in commercial air operations; everything from instructing on light aircraft to flying for an airline. Of necessity, the medical standards for this group are quite high as the travelling public is putting their lives in their hands. These pilots will also likely be flying internationally into other countries.

In order to facilitate international commerce and flying, the International Civil Aviation Organization (ICAO) has established training, experience and medical standards that allow pilots to exercise the privileges of their Canadian licence in the other 190 signatory countries of the ICAO Treaty, without having to repeat their licensing exams and medical certification. While each country is free to implement the ICAO Standards and Recommended Practices (SARPs) as it sees fit, significant deviations from the Standards have to be communicated to ICAO and the other nations, and could result in those nations refusing entry of the aircraft. Canada has implemented all of the existing medical standards.

These standards are not unchanging and in my professional lifetime, we in Canada have led the charge in making them less restrictive and more accommodating. Canada was the first ICAO nation to allow licensure (under special circumstances) of diabetics treated with insulin. We were also a leading nation in pushing for the licensure of pilots using SSRI anti-depressants for non-psychotic psychiatric conditions.

Medical Categories

Transport Canada	Federal Aviation Administration	ICAO / EASA
Category 1 • Airline Transport Pilot Licence (ATPL) • Commercial Pilot Licence (CPL) • Flight Engineer Licence (F/E)	**Class 1** • Airline Transport Rating (ATR)	**Class 1** • Airline Transport Pilot Licence (ATPL) • Commercial Pilot Licence (CPL)
Category 2 • Air Traffic Control (ATC)	**Class 2** • Commercial Pilot Licence (CPL) • No equivalent for ATC	**Class 3** • Air Traffic Control (ATC)
Category 3 • Private Pilot Licence (PPL) • Balloon Pilot Licence (BPL) • Gyroplane Permit (PG)	**Class 3** • Private Pilot Licence (PPL)	**Class 2** • Private Pilot Licence (PPL)
Category 4 • Recreational Pilot Permit (RPP) • Ultralight Pilot Permit (U/L) • Glider Pilot Licence (GPL)	• No equivalent (Sport Pilot)	• Leisure Pilot Permit (EASA only)

Category 2 Certification

Category 2 is used for the medical certification of air traffic controllers in Canada. Just to be confusing, it is equivalent to ICAO Class 3 certification.

Category 3 Certification

Canadian Category 3 certification is for PPL, which is equivalent to ICAO/European Aviation Safety Agency (EASA) Class 2 certification. The PPL, as currently constructed, is an ICAO compliant document that allows Canadian private pilots to engage in non-commercial flight operations in any ICAO signatory nation. The standards are set by international agreement and again, Canada has not filed any significant differences, which gives Canadian private pilots the maximal international flexibility, including flying into the United Sates.

Category 4 Certification

Several years ago when ultralights and other recreational aircraft were starting to become quite popular, Canada decided to create a non-ICAO compliant medical certificate, Category 4. The only requirement needed to obtain this level of medical certification is a form of self-declaration similar to that of a driver's licence. To that end, a screening medical questionnaire was created and the need to see a Civil Aviation Medical Examiner (CAME) eliminated. However, you need to have your family physician countersign the questionnaire if you want to carry a passenger on your aircraft. That's right: no physical examination, unless of course you have or have had one of the conditions that we are concerned about, in which case you may need to see a CAME.

So what can you do with a Category 4 medical certificate? It is the medical document required to validate a Student Pilot Permit, a RPP, a U/L Pilot Permit and a GPL. With an RPP you can fly day VFR, on a non-high-performance, four-seat or less single engine aircraft with a single passenger. In other words, virtually all of the aircraft most recreational pilots fly. So, if you are a light aircraft driver who doesn't need or want to fly to the U.S. or IFR, you don't need to visit your CAME. Unlike the Sport Pilot Permit in the U.S., it is possible to receive a Category 4 medical certificate if you have previously been denied a Category 1, 2 or 3 certificate, assuming of course the medical condition has been dealt with and does not pose a flight safety hazard. You don't need to have a driver's licence and any decision made by Transport Canada (TC) can be appealed. The certificate can also be issued with a restriction as well, unlike the U.S. where you get it or you don't, such as "no passenger" if your medical condition warrants.

In TC's experience, over 90 percent of Category 4 applicants get the certificate, no questions asked. The other 10 percent may need to supply Civil Aviation Medicine with more information and less than 1 percent are denied. The standards are very close to those of a Class 5 driver's licence in Canada, although TC is more stringent on issues such as respiratory disease requiring oxygen and seizure disorders.

So if you don't like visiting your friendly neighbourhood CAME, take a look at the Category 4 Medical Certificate and the RPP and see if it meets your flying needs. Over 7 000 of your fellow pilots can't be wrong!

In an upcoming issue we'll talk about what you can do if you don't like the medical certification decision made by Civil Aviation Medicine. △

Hot, High and Heavy in Penticton

…continued from page 34

we gain enough altitude to clear the valley ridge and set our course on a GPS heading to the west. At some point it becomes clear that we cannot out climb the next ridge, that we don't have enough altitude to turn away from the ridge, and that we have left ourselves no options.

So, let's rewind this video. Before departing Penticton on a hot summer day:

- ✓ take a mountain flying course with a qualified instructor, or, at the very minimum read Sparky Imeson's book *Mountain Flying*, prior to arriving at Penticton
- ✓ know the density altitude, the field elevation, the temperature and the wind speed and direction
- ✓ know your aircraft weight and performance limitations
- ✓ know when and why you should abort the takeoff
- ✓ fly as light as possible
- ✓ consult your VFR charts, plan your flight, and do not rely solely on GPS navigation
- ✓ plan to cross ridges at 45° and at least 1 000 ft above the ridges
- ✓ depart in the cooler time of day, preferably early morning
- ✓ on departure climb to cruise altitude before departing the valley

Fly safe and come back to visit us in Penticton. △

Hot, High and Heavy in Penticton

by Gerhard Schauble, CPL (A), SMELS, GL25, IR, Penticton, B.C.

Penticton Regional Airport (CYYF) is an absolute jewel in British Columbia. It is ideally located on VFR routes to the Pacific coast, the B.C. interior and Alaska

Recent crashes of aircraft departing from CYYF have begged the question, "why?" While the accidents are under investigation by the TSB and we recognize that there are complex issues in determining the cause of aviation accidents, several of the accidents share common threads. These flights

- departed from Penticton
- departed in the afternoon on a clear, hot summer day
- departed with full fuel and four persons on board
- flew over mountainous terrain, and
- terminated when the aircraft flew into terrain.

The best source of information about local weather, navigation and specific airport nuances is often local pilots. So, on an August afternoon in Penticton, a group of experienced mountain pilots sat in the shade of a hangar and shared their thoughts on "why?" with a view to preventing similar accidents.

Density altitude: We learned about it in ground school. It is commonly referred to as the actual altitude at which the plane "feels" like flying. The pilot examiner in the group tells us that candidates will answer density altitude questions correctly but often seem surprised by the lack of performance in the air. For instance, it is 5:00 pm on August 18, 2012 at CYYF. Field elevation is 1 130 ft. It is the hottest time of the day, at 32°C. Dew point is 11°C. Clear skies with visibility at 15 SM. Winds out of the north at 7 kt. Barometric pressure is 29.86. It is a typical Penticton summer day. Perfect, right? Well, we haven't left the tie down area and density altitude has already placed our aircraft at 3 562 ft.

Density altitude will sap power from your engine. It can eliminate any chance of a climb rate on departure. Density altitude not only affects the take-off distance and rate of climb, but it also applies to the service ceiling of the aircraft while flying en route. It may be possible to fly your aircraft with a service ceiling of 12 650 ft toward the mountains near Princeton that top out at 10 000 ft, yet because of density altitude the aircraft is unable to clear the mountains.

Weight: In a typical light aircraft, you have four seats, a baggage compartment and fuel tanks. Fill them and your aircraft will be overloaded. This creates the following problems:

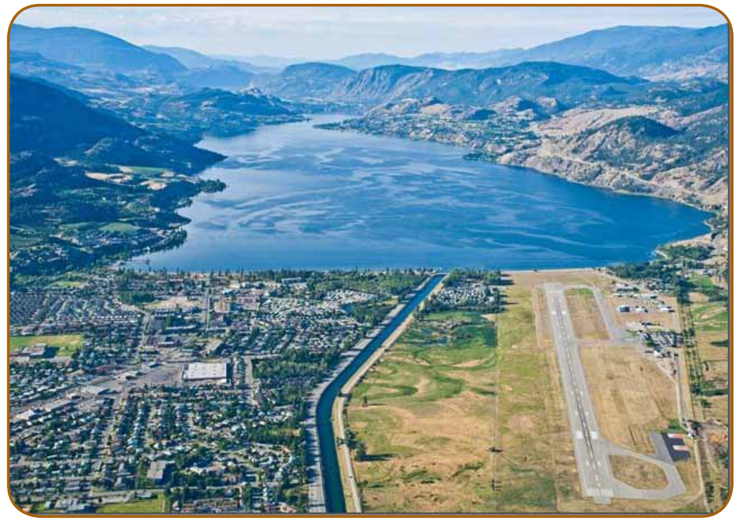


Photo © Mike Biden

- the aircraft will need a higher take-off speed, resulting in a longer take-off run
- both the rate and angle of climb will be reduced
- the service ceiling will be lowered
- the cruising speed will be reduced
- the cruising range will be shortened
- manoeuvrability will be decreased

Mountain flying: It is different out here. It is different from the prairies and it is different from the coast. Mountain flying requires specific decision making challenges resulting from the mountain flying environment, mountain weather trends, density altitude, pre-flight planning and preparation, take-off and departure techniques, and approach and landing considerations. We have mountainous terrain on all sides of Penticton; the beauty is unsurpassable but requires our respect.

Route planning is critical, and GPS direct navigation to and from Penticton may not be the best way to go. Pick a route that avoids the rugged areas and highest peaks, where an emergency landing cannot be made. It usually takes little extra time to bypass the most mountainous areas and follow the designated VFR routes through lower terrain.

Let's go flying! Let's go back to August 18. Let's pull out that rental, top it up with fuel and invite three of our buddies. Our take-off roll into wind on Runway 34 takes us past the terminal building. Our rate of climb is 200 fpm. We call clear of the zone over Trout Creek Point in Summerland and decide to continue north, because, at this rate of climb, we haven't cleared the valley ridge on the west side of Lake Okanagan yet. Somewhere between Summerland and Peachland

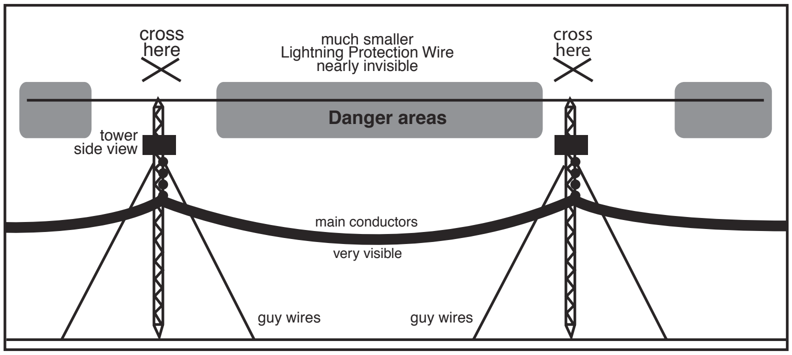
...continued on page 33

TP 2228E-4 (04/2003)

TAKE FIVE...

for safety
Five minutes reading could save your life!

Flying near Power Lines



Main power lines are easy to see, but when flying in their vicinity you must take the time to look for what is really there and then use safe procedures. Remember, the human eye is limited, so if the background landscape does not provide sufficient contrast then you will *not* see a wire or cable. Although hydro structures are big and generally quite visible, a hidden danger exists in the wires around them.

The main conductor cluster is made up of several heavy wires. These heavy, sagging conductors are about two inches in diameter, and very visible, so they tend to distract one from seeing the guard or lightning protection wires, which are of much smaller diameter.

Guard wires do not sag the way the main conductors do and are difficult to pick out event in good visibility. The only way to be safe is to avoid the span portion of the line and **always cross at a tower**, maintaining a *safe altitude*, with as much clearance as possible.

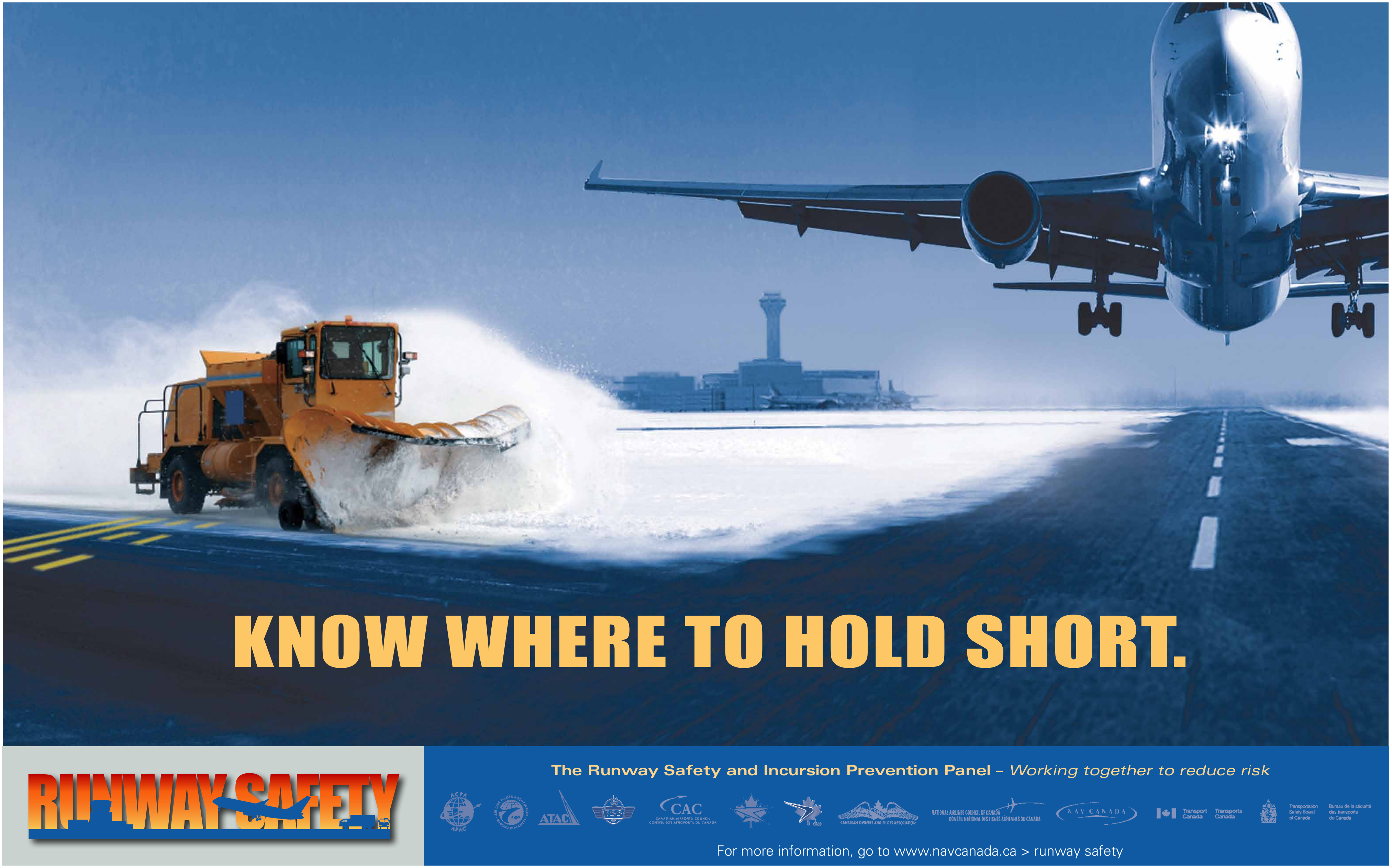
- When following power lines, remain on the right-hand side relative to your direction of flight and watch for cross lines and guy cables.
- Expect radio and electrical interference in the vicinity of power lines.
- For operational low flying, do an overflight and map check first.
- Leave yourself an "out"—**cross at 45 degrees** to the line.
- Reduce speed in low visibility (for VFR—two mile visibility; clear of cloud; 165 kt max.).

Warning—Intentional low flying is hazardous.Transport Canada advises all pilots that low flying for weather avoidance or operational requirements is a high-risk activity.

To view the complete updated *Take Five* list, please click here.

Transport Canada Transports Canada

Canada


KNOW WHERE TO HOLD SHORT.
RUNWAY SAFETY
The Runway Safety and Incursion Prevention Panel – *Working together to reduce risk*
For more information, go to www.navcanada.ca > runway safety