

Transportation Safety Board
of Canada



Bureau de la sécurité des transports
du Canada

AVIATION INVESTIGATION REPORT

A05O0147



COLLISION WITH WATER

CESSNA A185F SEAPLANE C-FHOP

CONSTANCE LAKE, ONTARIO

18 JULY 2005

Canada

The Transportation Safety Board of Canada (TSB) investigated this occurrence for the purpose of advancing transportation safety. It is not the function of the Board to assign fault or determine civil or criminal liability.

Aviation Investigation Report

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Summary

The pilot of the Cessna A185F seaplane (registration C-FHOP, serial number 18502231) was on his first return flight of the season from his cabin at Norcan Lake, Ontario, to his home near Constance Lake, Ontario. This flight, conducted according to visual flight rules, included a stop for fuel at Centennial/Black Donald Lake. After refuelling, the pilot took off and, at approximately 1045 eastern daylight time, the aircraft was about 100 feet above the north shore of the eastern section of Constance Lake, proceeding in a southerly direction.

At approximately 1050 eastern daylight time, the aircraft cartwheeled on the lake, travelling in a northwesterly direction and adjacent to the north shore of the eastern section of the lake. The aircraft came to rest inverted in the lake with most of the aircraft visible. It floated approximately 500 feet east, then came to rest on the bottom of the lake, with only the bottom of the floats visible. Some local residents attempted a rescue, but they were unable to get the pilot out of the aircraft. The pilot had manoeuvred himself into the right seat, but he was unable to exit the aircraft and he drowned.

Ce rapport est également disponible en français.

Other Factual Information

At the time of the accident, that is about 1050 eastern daylight time,¹ the sky condition was reported as clear and the winds were estimated to be from the southwest at 10 to 15 knots, with variable gusts. According to the direction the aircraft was travelling when it cartwheeled (northwest), the pilot would have been landing the aircraft with a crosswind. In this area, the most common direction for the wind is from the north, and this pilot would typically land on the eastern section of the lake, into the wind. The pilot had been flying out of Constance Lake for more than 25 years.

The pilot held a private pilot licence with a seaplane endorsement and an instrument rating. He held a Category 3 medical certificate with restrictions that glasses and a headset must be worn. The last entry in the pilot's logbook indicated that, as of 11 July 2005, he had accumulated 3283 hours as pilot-in-command, including 3169 hours on seaplanes, most of which were flown on the accident aircraft that he had owned since 1973. The pilot had two reportable accidents within the last six years.

During the week preceding the accident, the pilot made three flights, all lasting less than one-half hour. His last flight before these was on 29 October 2004, and his last flight review was on 02 April 2001. The pilot's most recent copy of the "Flight Crew Recency Requirements Self-Paced Study Program" questionnaire was dated 09 April 2003. According to Section 401.05 of the *Canadian Aviation Regulations* (CARs), if a pilot has flown as pilot-in-command at least once in the previous five years² and has completed an acceptable recurrent training program, such as the "Flight Crew Recency Requirements Self-Paced Study Program" questionnaire,³ within the past 24 months, then the recency requirements have been met.

A review of the pilot's possessions did not locate a more recent "Flight Crew Recency Requirements Self-Paced Study Program" questionnaire, nor did it identify that the pilot undertook one of the alternate means of complying with the knowledge-based recency requirements of Subsection 401.05(2) of the CARs. Although the April 2003 copy exceeded the 24-month period, it could not be determined whether the pilot had completed a more recent questionnaire.

Most insurance companies will typically require pilots to undergo some level of flight review before their insurance policy takes effect. Also, pilots are typically required to undergo a check flight before they can rent an aircraft.

¹ All times are eastern daylight time (Coordinated Universal Time minus four hours).

² For flights without passengers

³ The Self-Paced Study Program is one of the seven forms of recurrent training specified in Subsection 421.05(2) of the CARs.

In the United States, to fly as pilot-in-command, a pilot must have had a flight review within the last 24 months. This flight review consists of a minimum of one hour of flight training and one hour of ground training, and includes a review of the manoeuvres and procedures that are necessary for the pilot to safely exercise the privileges of the pilot certificate.

Patrick (1992)⁴ provides a review of the literature on skill retention, including a number of conclusions applicable to the maintenance of pilot proficiency. Without regular re-enforcement, skills degrade with time following learning, and the amount of degradation is related to the following:

- the level of proficiency achieved at the completion of learning;
- the length of time since learning; and
- the degree to which the skills are rehearsed following training.

In essence, skills can be expected to be most effectively maintained when they are well mastered during training, retrained on a regular basis, and rehearsed regularly between training sessions. This cycle of retraining is most critical for procedural tasks, which consist of a number of discrete steps (for example, responding to an in-flight emergency such as an engine failure), since these types of tasks have been shown to degrade the most over time. Conversely, continuous tasks, which are more automatic and for which cues are provided by the environment (for example, manually flying an aircraft on a visual approach), show minimal degradation over time.

On the morning of the accident, the pilot appeared to be in good physical and mental health. He was seen moving around freely while he was up on the aircraft refuelling it. Based on the autopsy and toxicology testing, there was nothing to indicate that the pilot's performance was degraded by physiological factors. He did not sustain any immobilizing or incapacitating injuries during the crash. He was able to release his lap belt, manoeuvre to the right seat, and unlock the right door, indicating that he did not lose consciousness as a result of the impact.

The pilot's dog was found tethered in the back of the cabin. The rope used for restraint did not allow the dog access into the cockpit area, where it could otherwise have interfered with the pilot's safe operation of the aircraft.

Records indicate that the aircraft was maintained in accordance with regulations. It was established that the weight of the aircraft was less than the maximum allowable weight and that the centre of gravity was within the prescribed limits.

The aircraft was recovered from the water and examined to verify flight and engine control continuity and confirm float serviceability. A ground run was carried out on the engine to confirm its operation. About 45 gallons of gasoline, its colour consistent with that of 100-octane low-lead aviation gasoline, was recovered from the aircraft's fuel tanks. No pre-impact discrepancies were noted that would have prevented normal operation of the aircraft. There was no indication that the aircraft had struck a floating or submerged object at touchdown.

⁴ J. Patrick, *Training: Research and Practice*, London: Academic Press, 1992, pp. 96-104.

The left seat was found in the forward position and its lap belt was unlatched with the shoulder strap attached to the lap belt. The right seat was in the forward position and its lap belt was fastened tightly across the seat with the shoulder strap not attached. The rudder pedals on the right side were in the stowed position.

The two cabin doors serve as the only available emergency exits. The left door was closed and locked from the inside and the right door was closed but unlocked. The door lock mechanism includes a recessed, lever-type exterior door handle, flush with the door when closed, and a conventional, L-shaped interior door handle. The Cessna 185 Owners Manual Before Take-off Check List states that the cabin doors are to be locked during flight. Cessna indicated that the primary reason for locking the doors during flight is to prevent inadvertent opening due to fuselage flexure.

By design, when the door is locked from the inside, it cannot be opened from the outside. Cessna indicated the following:

As part of the aircraft design, testing and certification processes, safety issues relating to egress from the aircraft were considered at various stages. A variety of competing risks, safety factors and scenarios are evaluated through these processes. For example, risks associated with unexpected and/or unwanted opening of the doors are balanced against countervailing concerns such as access from outside the aircraft, with the goal being the development of a design that provides the best overall safety for the public.

The same design is currently being used in all new production single-engine Cessna aircraft.

Within minutes after the aircraft came to rest, a local resident made numerous attempts to open the left door. Because the handle was flush with the door and the underwater visibility was poor, the resident could not easily discern the handle and had to use his hand to feel for it.

The aircraft was equipped with a fixed, automatic emergency locator transmitter (ELT). The ELT switch was found in the OFF position. Unless the switch is in the armed position, the ELT will not activate on impact to transmit a distress signal. Subsection 605.38(1) of the CARs requires that the ELT be armed when the aircraft is being operated.

A headset and an eyeglass storage case, containing the only prescription eyeglasses that the pilot used for flying, were recovered from the aircraft.

Based on a previous TSB investigation and report (A04W0114), the TSB issued, on 13 September 2004, an Aviation Safety Advisory (A040044) to Transport Canada (TC), with a copy to the National Transportation Safety Board (NTSB), the Federal Aviation Administration (FAA), and the Cessna Aircraft Company. The advisory suggested that TC consider additional methods to facilitate rapid emergency exits from seaplanes in the event that the cabin becomes submerged.

TC responded to the advisory on 03 November 2004. TC has published another article for the *Aviation Safety Letter* and plans to prepare new or revised safety promotional material to address the advisory's subject matter. TC also intends to develop an emergency procedures training

program for its inspectors and to review information on seaplane operations to determine the best method to reach private operators with information on conducting thorough pre-flight briefings, including underwater egress and situational awareness.

Analysis

The aircraft cartwheeled in the same direction that the pilot would typically land. At the time of landing, there was a crosswind coming from the pilot's left. The pilot could have landed into the wind on the wider portion of the lake. It could not be determined why he decided to land, in a crosswind, on the eastern section of the lake.

The pilot made three short flights during the week preceding the accident. However, he had not flown within the eight months before, and his skills had not been assessed for over four years. Although this pilot's flying activity exceeded the requirements of Subsection 401.05(1) of the CARs, there were extended periods throughout his flying career when he did not fly.

Currently, the demonstrated proficiency required to complete a licence, permit or rating is defined in various flight test standards. TC's *Pilot Examiner Manual* states that the aim of a flight test is to determine that the candidate meets the skill requirements for the licence, and to ensure that acceptable levels of safety are maintained and improved throughout the aviation industry by requiring the application of sound airmanship and flight discipline.

However, once a candidate has successfully completed a flight test, the recency requirements allow a pilot to continue to exercise the privileges of his or her licence without having to demonstrate proficiency to another qualified person on a regular basis. As such, a pilot may continue flying for years without reinforcing, through practice, those skills considered essential for the initial issuance of a licence (for example, dealing with an engine failure, landing in a crosswind).

In this occurrence, although this pilot's flying activity exceeded the minimum requirements of Subsection 401.05(1) of the CARs, it is unlikely that critical flight skills and procedures were practised to ensure proficiency. The current recency requirements in Canada allow pilots to go for extended periods without any retraining in critical flight skills, presenting the risk that pilots will not be prepared to deal with unusual or critical flight situations when they arise. Yet, most insurance companies require pilots to demonstrate their skills before providing appropriate insurance, and, in addition, pilots are typically required to undergo a check flight before they can rent an aircraft.

If the aircraft doors are locked as required during flight, the design of the door lock mechanism does not permit access to the cabin from the outside by using the exterior door handles. Since the doors are the only available emergency exits, potential rescuers will not be able to readily gain access to the cabin in an emergency situation. Even if the doors were unlocked, the exterior door handle is mounted flush with the door and is not easily distinguishable in a poor visibility situation, such as encountered in this occurrence.

The ELT switch was found in the OFF position, which, in the absence of witnesses, would have increased the response time of search and rescue units. It could not be determined why the pilot had not switched the ELT to the armed position, as required by Subsection 605.38(1) of the CARs.

The prescription glasses that the pilot would wear for flying were found in their case in the aircraft. It could not be determined why the pilot was not wearing his prescription glasses, as required by his medical certificate.

The following TSB Engineering Laboratory reports were completed:

LP 077/2005 – Aircraft Recovery
LP 080/2005 – Instrument Analysis

These reports are available from the Transportation Safety Board of Canada upon request.

Findings as to Causes and Contributing Factors

1. For undetermined reasons, the aircraft cartwheeled after contacting the water and came to rest in an inverted position.
2. The pilot was unable to exit the aircraft and he drowned.

Findings as to Risk

1. The pilot had not flown a training flight with an instructor for more than four years. This likely resulted in a degradation of his skills and decision-making processes.
2. The current recency requirements in Canada allow pilots to go for extended periods without retraining on critical flight skills, presenting a risk that pilots will be ill-prepared to deal with unusual or critical flight situations when they arise.
3. The design of the door lock mechanism prevents opening of the doors from the outside when locked from the inside. This same design is currently being used in all of Cessna's new production single-engine aircraft.
4. The exterior door handles are not easily discernable when the handles are closed and the visibility is poor.
5. The pilot was not wearing his prescription glasses while flying.
6. The emergency locator transmitter switch was not in the armed position, preventing activation on impact.

Other Finding

1. It could not be determined whether the pilot had complied with the recency requirements of Subsection 401.05(2) of the *Canadian Aviation Regulations*.

Safety Action Taken

Transport Canada has undertaken a Risk Assessment, "Egress from Submerged Floatplanes," to identify the extant risks related to egress from submerged seaplanes and to identify the most effective means of mitigating those risks. The overall assessment is important to identify the dominant factors and, consequently, the most effective risk mitigation means. The Risk Assessment has been completed, but the results have not yet been promulgated.

Safety Concern

The following safety concern is similar to the one published in report A04W0114, referenced previously.

Based on historical data, occupants of submerged seaplanes who survive the accident continue to be at risk of drowning inside the aircraft. Existing defences against drowning in such circumstances may not be adequate. In light of the potential loss of life associated with seaplane accidents on water, the TSB is concerned that seaplane occupants may not be adequately prepared to escape the aircraft after it becomes submerged. Of equal concern is that the rescuers, in this occurrence, could not access the cabin from outside.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 22 February 2006.

Appendix A – Site Diagram – Constance Lake, Ontario

