

AVIATION OCCURRENCE REPORT

CONTROLLED FLIGHT INTO TERRAIN - MOUNTAIN

CESSNA A185F SKYWAGON N4758E

LAC MORIN, QUEBEC

14 JUNE 1997

REPORT NUMBER A97Q0118

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.

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### *Synopsis*

The pilot and his two passengers flew to Lac Portneuf, Quebec, in the float-equipped Cessna A185F (serial number 18503864) on 9 June for a fishing trip and had planned to return home to Pittsfield, Maine, on 13 June. The aircraft took off as scheduled on 13 June with a planned refuelling stop at Lac Sébastien, 51 nautical miles(nm) to the southwest; however, about 45 minutes after takeoff, the pilot returned to Lac Portneuf because fog and low visibility prevented him from reaching his destination. The pilot decided to put off the departure until the next day. On 14 June, the takeoff was delayed again because of fog and rain. About 0845 eastern daylight time (EDT), the pilot and his passengers eventually departed from Lac Portneuf on a visual flight rules (VFR) flight to Lac Sébastien. About 0930, two men in the area of the Monts Valin, about three miles west of Lac Morin, heard the sound of an aircraft engine pass overhead westbound and then the sound of an impact a few moments later. The witnesses reported that they did not see the aircraft fly overhead because the visibility was restricted by thick fog. The aircraft did not arrive at its destination at the estimated time as filed on the flight plan, and searches were undertaken. The aircraft was found at about 1330 on the same day by Search and Rescue (SAR). It crashed at the 2,500-foot level of the east side of a mountain rising to 2,650 feet above sea level (asl) in straight-and-level flight on a magnetic heading of 250 degrees. The seaplane was destroyed by the impact and fire. The pilot and the two passengers were killed instantly.

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<sup>1</sup> All times are EDT (Coordinated Universal Time (UTC) minus four hours) unless otherwise stated.



## *Other Factual Information*

The pilot and both passengers were sitting in their seats and wearing restraining devices. The belts gave way under the force of the impact, and the three occupants were thrown from the aircraft. The deaths of the three men were attributed to the multiple injuries sustained in the accident. An autopsy was performed on the pilot's body; toxicological test results were negative. No trace of soot was observed in his respiratory tract; indicating no pre-crash fire. There was no evidence that incapacitation or physiological factors affected the pilot's performance.

The pilot was certified and qualified for the flight in accordance with existing regulations. He had obtained his private pilot licence in the United States on 17 November 1993 and was authorized to fly day VFR only. He had successfully completed a checkout for single-engine seaplanes on 5 July 1995. His licence validation certificate (medical) was valid, and indicated prescription eyeglasses had to be worn in flight. Examination of the pilot's log book established that the pilot had approximately 386 hours total flying time, including 73 hours on seaplanes. The pilot had never flown in this area before.

The aircraft's journey log book was not found, but the technical log book was used to assess the airworthiness of the seaplane. Records indicate that the aircraft was certified, equipped, and maintained in accordance with existing regulations and approved procedures. The aircraft had a total of approximately 975 flying hours. The aircraft had been declared airworthy on 25 April 1997 following the annual inspection. The pilot installed the floats after the annual inspection; however, the installation of the floats was not documented in the aircraft's technical log books, as required by regulation. The pilot had not reported any deficiency during his trip or any specific problem since his departure. The weight and centre of gravity were within the prescribed limits.

The aircraft was equipped with the required instruments for flight in instrument meteorological conditions (IMC). Further, it was fitted with an autopilot that kept the wings level and with a global positioning system (GPS) navigation receiver. This navigation system is more efficient than traditional means of navigation and therefore reduces the pilot's workload. The GPS installed in this aircraft displays aircraft's geographical position, ground speed, time of arrival, distance, and track to programmed locations; it does not display ground elevation. The GPS receiver in the aircraft would indicate the bearing and distance to the destination at all times no matter where on earth the aircraft was physically located. Pilots tend to rely on this information and do not have to attend to where the aircraft is geographically located because they know they are not lost and they can always fly directly to their destination. The aircraft was not equipped with a radio altimeter or a ground proximity warning system (GPWS), nor was either required by regulation. An automatic fixed emergency locator transmitter (ELT) was installed in the tail of the aircraft and was in working order, but the signal was not received by any aircraft or the search and rescue satellite (SARSAT) because the antenna had broken off on impact.

About 0800 on the day of the accident, the pilot observed a commercial aircraft flying southwest, so he telephoned a Lac Sébastien aircraft operator to obtain current meteorological information at his destination. He was informed that conditions were favourable for visual flight, and that the ceiling was 2,000 feet asl. At 0820,

the pilot submitted a VFR flight plan to the specialist of the Roberval flight service station (FSS). The aircraft was to leave Lac Portneuf at 0845 and proceed direct to Lac Sébastien at an altitude of 2,500 feet asl. According to the flight plan, the estimated elapsed time of the flight was 45 minutes, with an endurance of 2 hours. The chosen flight route took the pilot over a heavily wooded area dotted with many lakes whose terrain consisted of mountains and valleys; the elevation of the summits ranged between 2,000 and 2,900 feet asl. The pilot did not request or receive any weather information relating to the planned route from the FSS.

Conditions at Lac Portneuf were favourable for VFR flight on take off. In the area where the accident occurred, visibility was very restricted or almost zero in fog. At the time of the crash, a bush pilot, who knew the area well was about six nm west of the accident site. He had departed Lac Sébastien flying north-eastbound and reported that the peaks of the mountains were concealed by clouds, and that to reach his destination, he had had to follow the valleys in order to keep the ground in sight. He added that, as the terrain was higher to the east, the area flown over by the occurrence aircraft was more conducive to conditions of poor visibility. Four hours after the accident, the pilot of the SAR helicopter observed localized low clouds in the area of the accident. While en route to the site, he had to navigate between the mountains because the mountain peaks were concealed by clouds.

The accident site is located in uncontrolled airspace on a magnetic bearing of 105 degrees magnetic, 14.5 nm from Lac Sébastien and 9 nm southeast of the direct flight route between the point of departure and the destination. The crash site is also 1 nm from a power transmission line running southwest.

The east side of the mountain where the aircraft crashed has a steep slope and is densely wooded. The seaplane hit the ground, and then a rock face, in a slightly nose-up attitude with 5 degrees of left bank. The fuselage was lying a few feet from the point of impact. The wings broke off at impact and were lying, with the instrument panel, in front of the main fuselage to the left of the flight path. The cabin was heavily damaged by impact forces and a severe fire that broke out after the accident. The flaps were retracted. The flight control system was heavily damaged, and its continuity could not be confirmed. Examination of all the components recovered did not reveal any pre-impact failure or malfunction. All failures were attributed to overloads. Examination of the engine and the propeller at the site suggest that the engine was turning on impact; however, the examination could not determine the power that it was producing. The TSB Engineering Branch Laboratory conducted the metallurgical examination of the engine exhaust system. The examination of the sections of the exhaust system suggests that they were crushed at a temperature greater than a range of 600 to 800 degrees Fahrenheit.

Examination of the wreckage did not produce any evidence suggesting that the aircraft had suffered a structural failure, flight control problems, electrical problems, power loss, or that fire broke out during flight.

The communication and navigation radios were tuned as follows: the very high frequency (VHF) radio on the Roberval mandatory frequency of 126.7 megahertz and the VHF omni-directional range (VOR) receiver selected to the Saguenay VOR; the automatic direction finder (ADF) frequency selected was 348 kilohertz (kHz) (this frequency is not assigned to any navigation aid in the area, Roberval's frequency is 378 kHz). No radio communications were received from the pilot; however, because of the distance between the aircraft and the Roberval FSS station, the aircraft would have had to fly at an altitude of 3,000 feet asl to be able to establish two-way communication.

A controlled flight into terrain (CFIT) accident is when an airworthy aircraft inadvertently strikes the terrain or water without the crew's suspecting the tragedy is about to happen. According to CFIT accident statistics collected by the TSB, the pilot had often tried to see the ground to fly VFR even though the flight was taking place in clouds, at night, in whiteout, or in other conditions that did not permit visual flight. More than half of such CFIT accidents occurred in VFR flight. More than a quarter of the aircraft were fitted with floats or skis, and half of the VFR accidents in instrument flight conditions (IMC) occurred in mountainous or valley areas. *Canadian Aviation Regulations* (CARs) state that for aircraft to fly VFR in uncontrolled airspace less than 1,000 feet vertically above ground or water, flight visibility must be at least 2 nm and the aircraft must be clear of cloud.

In 1995, the TSB recommended that the Department of Transport initiate a national safety awareness program addressing the operating limitations and safe use of GPS in remote operations. Transport Canada issued several special Aviation Notices since, which detailed the use of GPS in Canadian airspace and also published a number of articles on GPS in recent issues of the Aviation Safety Letter.

## *Analysis*

The possibility of a failure of the aircraft's engine or systems was discarded because examination of the aircraft did not reveal any irregularity and no distress call was received from the pilot. There is no evidence that there was an emergency, or that the aircraft presented problems before impact.

On take-off from Lac Portneuf, the prevailing weather conditions at the points of departure and arrival were favourable for visual flight. The pilot could not have known that local conditions along the way were poor, as the area is largely uninhabited and weather information was not available. The pilot, who was unfamiliar with the area, planned to fly at a cruising altitude of 2,500 feet asl whereas the ceiling at Lac Sébastien was 2,000 feet asl. The chosen route was over mountainous terrain, with some mountain peaks concealed by the clouds; consequently, the pilot was unable to recognize the dangers that he was likely to encounter. He would have found himself in reduced visibility conditions in which he lost sight of the ground and would no longer have the visual references necessary to avoid collision with obstacles.

Faced with deteriorating weather conditions, which made continuation of the flight hazardous, the pilot had to make a decision either to find a suitable lake for landing or to make a diversion. The pilot decided not to land, but to deviate from the direct route and try to reach his destination by veering southeast in order to fly in visual meteorological conditions (VMC); he may have even tried to follow the power transmission line.

It is likely that the pilot was not aware of his true position in relation to the terrain and topography of the area and was relying on the GPS to get to his destination because the weather conditions required him to focus the greatest part of his attention on manoeuvring the aircraft to maintain VMC. In low-altitude flight, his field of view had to be very limited, and, because navigation charts are planform views whereas nothing is seen in planform at this height, the pilot would have difficulty in following the progress of the flight on the VFR navigation chart on which the elevation of the terrain appeared. Consequently, although the pilot knew where Lac Sébastien was located in relation to his aircraft, he did not know his exact position and was flying at an altitude lower than some of the surrounding terrain.

The aircraft's attitude on impact suggests that the pilot was controlling the aircraft just prior to the accident. It is therefore conceivable that the pilot probably did not have the necessary visual references and did not see the ground in time to avoid it.

Why the pilot decided to continue the flight in adverse conditions could not be determined. It is likely that the nearness of the destination, and the pilot's reliance on the GPS, had an influence on his decision. As the return journey had already been delayed by one day because of adverse weather conditions, it is also possible that the desire of the pilot and the passengers to return home influenced the pilot's decision to undertake the flight.

## *Findings*

1. The pilot was certified and qualified for the flight in accordance with existing regulations and there is no evidence that incapacitation or physiological factors affected the pilot's performance.
2. There was no evidence found of any airframe failure or system malfunction prior to or during the flight.
3. The chosen route was over terrain whose high points were higher than the cloud ceiling and the pilot did not know the weather conditions along the route.
4. The pilot decided not to land, but continued pressing toward his destination.
5. In an attempt to remain VFR, the pilot probably relied on the GPS to navigate rather than map read when the weather conditions deteriorated.

6. In the moments preceding impact, the pilot probably did not have the necessary visual references to avoid striking the mountain.

### *Causes and Contributing Factors*

The pilot continued his flight in adverse weather conditions and probably did not have the necessary visual references to avoid hitting the steep slope of the mountain. Likely contributing to this occurrence was the pilot's reliance on GPS and not the navigation chart while attempting to maintain VMC.

*This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson Benoît Bouchard, and members Maurice Harquail, Charles Simpson and W.A. Tadros, authorized the release of this report on 27 May 1998.*