

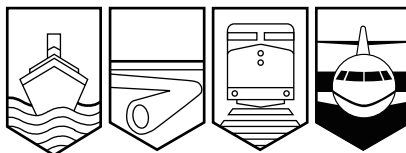
Transportation Safety Board
of Canada



Bureau de la sécurité des transports
du Canada

AVIATION INVESTIGATION REPORT

A02Q0005



COLLISION WITH TERRAIN

AIR TUTEURS LTÉE

PIPER PA28-161 C-GBQY

PATAPEDIA RIVER VALLEY, NEW BRUNSWICK

20 JANUARY 2002

Canada

The Transportation Safety Board of Canada 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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Piper PA28-161 C-GBQY
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Report Number A02Q0005

Summary

The Piper PA-28-161, registration C-GBQY, serial number 288216119, took off from Gaspé, Quebec, at 1630 eastern standard time (EST) on a flight to Québec, Quebec making a night flight in accordance with visual flight rules. At 1635 EST, the pilot notified the Québec flight service station that he was 5 nautical miles west of Gaspé Airport and confirmed that he was going to the en route frequency. That was the last message received from the aircraft. The plane was reported missing after its flight plan expired.

Almost 11 months later, on 08 December 2002, an airliner flying high over the area of L'Ascension-de-Patapédia, New Brunswick, picked up a signal from an emergency locator transmitter (ELT). The search and rescue team dispatched to the site identified the missing aircraft. The two occupants were fatally injured; the aircraft was destroyed.

Ce rapport est également disponible en français.

Other Factual Information

According to the maintenance records, the aircraft was certified and maintained in accordance with existing regulations. It was equipped for instrument flight (IFR). Although the aircraft had dual controls, only the occupant in the left seat was acting as pilot-in-command while the occupant in the right seat was a passenger.

Both occupants of the aircraft were taking lessons at Air Tuteurs ltée, a flight training school certified by Transport Canada, to obtain their commercial pilot licences. Both held private pilot licences. They were also qualified for night flying. Their flight experience was similar: each had accumulated about 95 hours, with 10 hours of instrument experience with an instructor on board. Neither was qualified for IFR flight. They had obtained their night endorsements on 23 November 2001. The pilot and the passenger (for the return flight) had 12 hours and 19.2 hours of night flying, respectively.

To meet the flight experience requirements for a commercial pilot licence, they had to complete a cross-country flight of 300 nautical miles (nm) with two stops en route. The purpose of the exercise was to reach the destination by using topographical maps and by identifying landmarks on the ground. The pilots decided to do a round-trip flight together between Saint-Hubert and Gaspé, Quebec. They intended to fly to Gaspé on Saturday 19 January 2002 and return the next day. They had agreed that they would take turns as pilot, one piloting on the flight from Saint-Hubert and the other on the flight from Gaspé.

The day before departure, on the afternoon of 18 January, the weather specialist at the Québec flight service station (FSS) told the pilots that weather conditions would be good for the VFR flight planned the next day between Saint-Hubert and Gaspé. He also warned them about a low coming in from the southern United States that could result in instrument meteorological conditions (IMC) on the day after, 20 January.

On 19 January at 0739 eastern standard time (EST),¹ the pilot for the Saint-Hubert to Gaspé segment received an oral weather briefing from the Québec FSS for the areas east and west of Montréal. Poor conditions for visual flight were moving from west to east. VFR conditions were still forecast to Gaspé for that day and IMC conditions for the return flight the following day. After the briefing, the pilot informed the FSS specialist that he would make the return trip on the same day. He then filed a VFR flight plan from Saint-Hubert to Gaspé. After the pilots submitted the flight plan and relevant weather reports for the trip to Air Tuteurs ltée, the school authorized the pilots to make the flight, instructing them to wait in Gaspé if conditions became unsuitable for VFR flight. Before the flight, the pilots rented a Garmin 295 portable global positioning system (GPS) from the school. The aircraft took off at noon, and after stopping at Québec and Mont-Joli, Quebec landed in Gaspé at 1727. The flight was without incident, and no malfunctions were reported by the pilots. They spent the night in Gaspé.

On 20 January at 1025, the pilot for the return flight contacted the Sept-Îles FSS for a weather briefing. The FSS specialist informed him that conditions were marginal and that VFR flight was not recommended. The pilot indicated that the sky was blue over Gaspé, and filed a VFR flight plan to Saint-Hubert. The flight-planned altitude was 4500 feet above sea level (asl). A stop was planned at Rivière-du-Loup, Quebec, then at Québec, weather permitting. Thirty minutes later,

¹ All times are eastern standard time (Coordinated Universal Time minus five hours).

the pilot obtained the usual pre-take-off information from the Québec FSS. After being warned once again that weather conditions were poor west of Gaspé, the pilot confirmed that he wanted to take off, stating that he intended to return to Gaspé if there were any problems and planned to fly above the cloud layer if necessary. Before take off, the Québec FSS specialist tried in vain to discourage the pilot from flying. The aircraft took off at 1110. Fourteen minutes later, the FSS relayed a message to the pilot from Air Tuteurs Ltée that he should not risk flying in the prevailing conditions and should head to VFR conditions. After stating that he was in VFR conditions, the pilot returned to Gaspé where he landed at 1141.

Back on the ground, the pilot called the Québec FSS twice, once at 1150 and once at 1348, for the weather. In both weather briefings, the specialists advised against VFR flight because of a cloud ceiling of less than 1000 feet and a visibility of ½ statute mile in snow showers. Possible improvement was anticipated after 1800. The pilot then mentioned that he wanted to take off after sunset. Around 1500, in a personal telephone conversation, the pilot indicated that he would stay in Gaspé because of the bad weather.

At 1533, rather than calling the Québec FSS again, the pilot preferred to get the weather from the Montréal FSS. The forecast conditions were variable until 0100, changing to alternating VFR and marginal VFR and, at times, IFR conditions in snow showers. A slight improvement was expected early the next morning. Reduced visibility in snow showers and low ceilings were forecast for the late morning. Half an hour later, the pilot filed a VFR flight plan to Québec with an altitude of 4500 feet asl. At 1635, five minutes after taking off, the pilot reported that he was five nautical miles west of Gaspé and confirmed that he was going to the en route frequency. That was the last message received from the aircraft. The plane was reported missing soon after its expected arrival time in Québec expired.

The search and rescue operations were difficult and unsuccessful. The aircraft's emergency locator transmitter (ELT) was not transmitting a signal, and the fact that the extensive search area was quite rugged, sparsely populated, and densely wooded further complicated the searchers' efforts. The search was called off 11 days later because it was thought unlikely that the occupants had survived.

On 12 February, 12 days after the search effort ended, American authorities sent radar data to the Canadian Search and Rescue (SAR) service showing part of the flight path at 12-second intervals. Before that date, Canada's Air Force was unaware of the extent of trans-border radar coverage by the United States, so during the search effort the information provided to SAR was limited. Although another official search was not started, SAR carried out several unsuccessful aerial searches over the area of the last radar target.

Close to 11 months after the aircraft disappeared, its ELT started transmitting. The aircraft was found in a densely wooded area 1½ nm south of the planned route and 135 nm from Gaspé at an altitude of 1200 feet asl. The plane had crashed into the western slope of the Patapedia River valley, which is very steep and rises to 1500 feet asl.

The aircraft's initial path through the trees was about 235° Magnetic (M). The aircraft penetrated the trees at a left bank angle of about 20°, a nose-down angle of 5°, and an angle of descent of 20°. The aircraft began to break apart upon initial impact with the trees.

Because twilight ended at about 1632, the flight took place at night. This was the pilot's first night flight since he had obtained his endorsement. Given the pilot's qualifications and the flight-planned altitude, existing regulations require that in-flight visibility should have been at least 3 miles, and the aircraft's distance from the clouds should have been at least 500 feet measured vertically and at least 2000 feet measured horizontally. Because the pilot did not have an IFR rating, nor a rating for flying over the cloud layer, the aircraft should have been flown under the clouds using visual landmarks on the ground.

The aircraft followed a direct path between Gaspé and Québec, staying within about 100 feet of an altitude of 5000 feet, with a relatively steady ground speed of 95 knots. At 1758, at 130 nm from Gaspé and 170 nm from Québec, the aircraft turned slightly south of its path. One minute later, the aircraft turned its heading even more to the south. It then banked right on a heading to return to the direct path to Québec. At 1801, the aircraft initiated a banked left turn of about 20°. During the turn, the aircraft's altitude went from 5000 feet asl to 4600 feet asl, and the ground speed increased from 93 knots to 159 knots in 30 seconds. Ten seconds later, the GPS stopped recording the aircraft's track at an altitude of 4739 feet and at a heading of 138° M. At the same moment, the radar stopped receiving the transponder signals, and the aircraft's echo (secondary and primary) disappeared from the screen. The last recorded position was less than 200 metres from the crash site (see Figure 1).

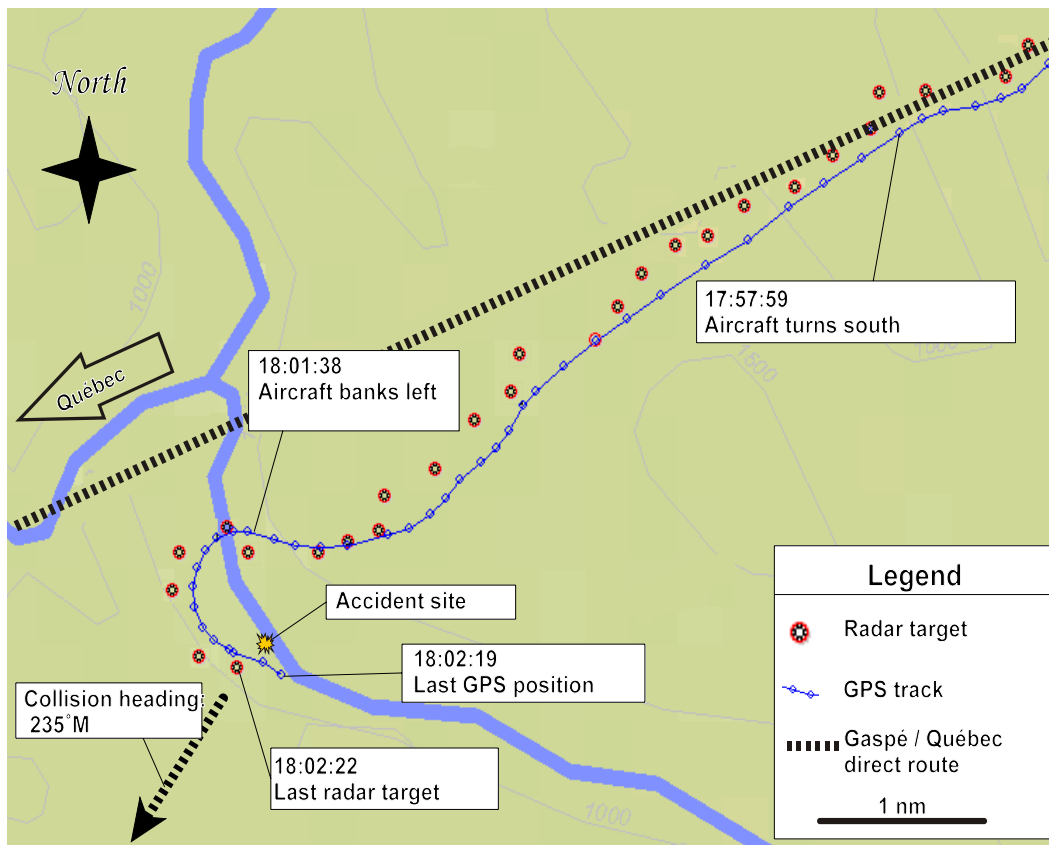


Figure 1. Radar and GPS data for the last four minutes of flight

An examination of the wreckage, systems, and all components recovered showed no deficiencies that could have hindered control of the aircraft, nor were there any failures or malfunctions before impact. The anemometer needle slap mark on the gauge face indicates that the aircraft struck the ground at 150 knots, a speed that was in the caution range (126 knots to 160 knots). There was no in-flight or post-impact fire.

The components of the aircraft's electrical system and the aircraft instruments that were in good enough condition to be examined were analysed. The bulbs from three of the annunciator lights (vacuum system, alternator, and engine oil pressure) were also analysed. The lights illuminate to signal an abnormality or when pressed for a functional check (an electrical wire connecting the bulb to the relevant system is grounded). Although the annunciator lights for the vacuum system and engine oil pressure were on before impact, the investigation determined that the associated systems were functioning normally. The indicator lights probably lit up at the start of the series of impacts during deformation of the fuselage.

An analysis of the seat belts showed that the pilot's lap belt was fastened, but his shoulder belt was not. The front passenger's lap belt tore and broke the floor structure on the left and right sides where it was anchored. The belt buckle was found unfastened, and no functional damage or abnormality was detected. The shoulder harness was found unfastened from the seat belt. It could not be determined whether the passenger's seat belt had been fastened.

The ELT (Narco Avionics, model ELT 10, serial number 32772) was found on its mounting plate attached to the tail structure. The switch was in the ARM position so that it could activate automatically in case of a crash. The antenna cable was torn from its housing. A raised part of the housing near the switch and the reset button were broken. The impact forces were sufficiently strong to activate the ELT; however during the aircraft's break-up, the ELT housing was damaged. Debris likely struck the reset button, interrupting transmission of the emergency signal just as the ELT activated. Because the ELT was exposed to the weather, the switch corroded and closed the circuit, causing a distress signal to be transmitted 11 months after the accident.

According to a study done by researchers at the University of Illinois, pilots with no IFR training can expect to live about 178 seconds, or 2 seconds short of 3 minutes, after losing visual contact with the ground in bad weather.

Analysis

Although the pilot in the left seat was fully responsible for the flight, both pilots must have been in agreement when planning the trip and itinerary. It is thus reasonable to believe that the decisions concerning the flight were made jointly.

Both pilots had planned to take off from Saint-Hubert on Saturday and return from Gaspé the next day. The weather information collected on Friday, the day before leaving, and on Saturday morning, indicated that they could anticipate poor conditions for visual flight on Sunday. The fact that the pilot had informed the FSS specialist of his intention to fly back the same day indicates that he felt that the forecast for the next day might compromise the return flight. For unknown reasons, the pilots decided to spend the night in Gaspé. Although they were aware that poor weather conditions were forecast, they did not seem to consider waiting for the conditions to improve, and left Gaspé as initially planned.

The investigation could not determine whether the pilot was pressured to undertake the flight. Paradoxically, neither the warnings about poor weather conditions forecast along the route, nor an initial departure that ended in their return, nor even a warning from the school not to risk the weather, dissuaded the pilot from returning to Saint-Hubert on Sunday as initially planned.

At 1500, the pilot had decided to postpone the return flight until the next day. The reasons why the pilot changed his plans 30 minutes later, filed a flight plan, and left for Québec are unknown. However, the following factors could have affected his decision:

- good conditions above Gaspé and during the previous flight
- poor forecasts for VFR flight the next day that could cause an additional delay
- desire to attempt the flight with an option of returning in case of bad weather

Even if VFR night flight was allowable, the area being flown over and the weather conditions taken together, likely did not allow the pilot to identify landmarks and to navigate by map. As a result, although he could fly at night, it is unlikely that the pilot would have taken off without being sure that he could reach his destination if he could not see any visual landmarks. It is possible that having a GPS on board influenced the pilot's decision to take off with the risk of encountering marginal conditions at best.

The pilot's intention to fly above the cloud layer showed poor knowledge of the regulations and risks associated with this type of flight regime. It can also be concluded that the pilot intended to use the GPS as the primary means of navigation if it became necessary.

After taking off in good VFR conditions, the aircraft probably encountered the IMC conditions reported in the weather forecast. Because it was night, it was probably difficult to see the poor conditions before entering them. No aerodynamic effects due to airframe icing during the flight were found. The aircraft was slowed by impacts with the trees in the final moments. Consequently, the aircraft speed at the time of the impact was higher than the reading on the anemometer (150 knots). In summary, the aircraft crashed after entering a descending turn during which its speed increased to nearly the never exceed speed.

The pilot may have started a spiral recovery just before the collision because the angle of descent was greater than the aircraft's nose-up angle. A nose-down attitude and increase in speed are characteristic of a spiral. According to the evidence, the descending turn ended in a collision with the ground because the pilot did not have the visibility needed to see the terrain. Despite the loss of visibility, the aircraft instruments should have allowed the pilot to maintain a normal attitude and follow a heading. The investigation could not establish the extent of the pilot-passenger's participation in the flight. Nevertheless, it can be concluded that the instrument flight experience of both pilots was not sufficient to avoid spatial disorientation and the resulting spiral.

The following TSB Engineering Branch Reports were completed:

- LP 024/2003 - Examination of Safety Belts*
- LP 118/2002 - Instruments and ELT Examination*
- LP 116/2002 - Exhaust Stack Analysis Temperature Determination*

Findings as to Causes and Contributing Factors

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

Other Findings

1. The emergency locator transmitter (ELT) did not transmit an emergency signal, probably because debris struck the reset button, interrupting transmission. This could have had serious consequences had there been any survivors.
2. Having a global positioning system (GPS) on board possibly affected the pilot's decision to take off even though poor visual flight rules (VFR) conditions were forecast along the route.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 18 October 2004.