Transportation Safety Board of Canada

Bureau de la sécurité des transports du Canada

AVIATION INVESTIGATION REPORT
A01Q0034

LOSS OF CONTROL

AÉROPRO
PIPER PA31-350 C-GNIE
VAL D'OR, QUEBEC
20 FEBRUARY 2001

Canada

Aviation Investigation Report

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Summary

A Piper PA31-350, registration C-GNIE, serial number 31-7552047, was on a scheduled (APO 1023) instrument flight rules mail service flight between Rouyn Airport, Quebec, and Val-d'Or Airport, Quebec, at approximately 1845 . After checking for prevailing weather conditions at the destination airport, the pilot decided to make a visual approach on runway 36. The pilot reported by radio at two miles on final approach for runway 36 and then stated that he was going to begin his approach again after momentarily losing visual contact with the runway. This was the last radio contact with the aircraft. No emergency locator transmitter signal was received by the flight service station specialist. Emergency procedures were initiated, and searches were conducted. The aircraft was found by a search and rescue team about three hours after the crash. The aircraft was lying about two miles southeast of the end of runway 36; it was substantially damaged. The pilot suffered serious injuries.

Other Factual Information

Flight APO 1023 was conducted under a contract with the Dicom company. It entailed transporting mail in the morning from Saint-Hubert, Quebec, to Val-d'Or and then Rouyn and returning in the opposite direction in the evening. During the day, the pilot was able to rest at Rouyn in an apartment provided by the company. The pilot therefore had his regulation rest period at Rouyn before making the return flight from Rouyn to Val-d'Or and thence on to Saint-Hubert.

About one hour before the flight, the pilot requested weather conditions and forecasts at Val-d'Or. He intended to make the flight under visual flight rules (VFR), but weather conditions at Val-d'Or Airport would not permit. Weather observations for 1825 eastern standard time (EST)[1] reported instrument meteorological conditions (IMC): visibility one mile in snow and blowing snow, measured ceiling 1000 feet above ground level (agl) with broken clouds. When the pilot filed his flight plan, Val-d'Or forecasts were predicting an improvement in visibility north of the airport.

On departure from Rouyn, during an initial call, the pilot told the flight service station (FSS) specialist that he was going to make the flight to Val-d'Or VFR. The specialist reminded him that he had filed an instrument flight rules (IFR) flight plan, and that weather conditions were still IMC at destination. The pilot agreed to make the flight to Val-d'Or IFR. In flight, after being cleared for an IFR approach at Val-d'Or Airport, the pilot contacted the Val-d'Or FSS specialist and reported his position as 16 nautical miles (nm) west at 4900 feet in descent for a runway 18 contact approach. At that time, the FSS specialist transmitted him the latest weather conditions: winds 350 degrees at 11 knots, gusting to 16 knots, altimeter 29.73. The pilot then advised that he was not going to the very high frequency omnidirectional range (VOR), but was heading straight in on final for runway 18. He then confirmed to the FSS specialist that he would call back at 7 miles northeast. The specialist advised him that vehicles had cleared the runway, that winds were 340 degrees at 15 knots, gusting to 20 knots, and that weather conditions were now VFR.

The pilot cancelled his IFR flight plan and, realizing that winds favoured runway 36, advised that he was going to proceed on a runway 36 right-hand downwind leg. Three minutes later, the pilot reported that he had lost the runway from view for a fraction of a second and was going to begin again. He also reported that it was snowing harder south of the airport. Thirty seconds later, the aircraft's emergency locator transmitter (ELT) was transmitting a signal corresponding to the site of the impact with the ground. The accident occurred at 1900.

Night-time rescue proved very difficult because of adverse weather conditions and hard-going, snow-covered terrain. The site was accessible only across a snow-covered lake with the bottom layer consisting of melted snow. The first search and rescue aircraft arrived over the accident site at 2157, It was necessary to await the arrival of the helicopter at midnight to evacuate the injured pilot. The pilot suffered serious injuries and remained in a coma for approximately two weeks. Because of the aftereffects of the accident, the pilot was unable to remember the

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[1] All times are EST (Coordinated Universal Time (UTC) minus five hours) unless otherwise stated.

circumstances leading to the accident.

The aircraft was certified, equipped and maintained in accordance with existing regulations and approved procedures. There was no indication of any airframe failure or system malfunction during the flight or approach. The aircraft was equipped for IMC flight. The aircraft had no known deficiencies before the flight.

The pilot-in-command was certified but not qualified for the flight. He had a total of about 900 flying hours, including about 650 hours on multi-engine aircraft and 30 hours on type. He had accumulated about 270 instrument hours. He had just completed a week's training on the aircraft with a qualified pilot-in-command. He had not completed a pilot proficiency check (PPC) on the aircraft.

The following is an excerpt from the *Canadian Aviation Regulations* (CARs) concerning crew member qualifications:

> **703.88 (1)** Flight Crew Member Qualifications. Subject to subsections (6) and (7), no air operator shall permit a person to act and no person shall act as a flight crew member in an aircraft unless the person
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> (c) has successfully completed a pilot proficiency check or competency check for that type of aircraft, the validity period of which has not expired, in accordance with the Commercial Air Service Standards as follows:
> (amended 2000/02/01; previous version)
>
> (i) in the case of the pilot-in-command of a multi-engined aircraft or of a single-engined aeroplane that is operated in accordance with subsection 703.22(2), a pilot proficiency check for that type of aircraft.

Aéropro's activities are governed by CARs 702, Aerial Work, 703, Air Taxi Operations, and 704, Commuter Operations. The company provides services under an air operator certificate issued by the Minister of Transport pursuant to the *Aeronautics Act*.

Aéropro's headquarters is located in Québec, Quebec. The company owns subsidiary bases elsewhere in Canada. The activities associated with PA31-350 at Saint-Hubert had been set up to perform contract services on behalf of Dicom. The accident aircraft and personnel assigned to it were dedicated exclusively to these activities. PA31-350 was authorized to carry cargo in IFR, VFR and night VFR. The company president also serves as operations manager. Chief pilots and the maintenance coordinator report to the president. One of the chief pilots is responsible for aerial work (CAR 702) and air taxi operations (CAR 703) while the other is responsible for commuter operations (CAR 704). The chief pilot responsible for activities associated with CARs 702 and 703 is also the company's approved check pilot (ACP). The ACP program allows a commercial or private air operator to develop and apply a flight check program without depending on the availability of Transport Canada Civil Aviation inspectors. ACPs can be granted a delegation of authority allowing them to perform flight checks on behalf of the Minister. Aeropro's chief pilots looked after pilot training and operating procedures.

The chief pilot, after interpreting aviation regulations, determined that, for this flight (a cargo

flight), the assigned pilot did not require successful completion of a PPC. According to his interpretation of the aviation regulations, the carriage of cargo fell under aerial work activities (CAR 702), not activities related to air taxi operations (CAR 703). Transport Canada has confirmed that the carriage of cargo falls under activities related to air taxi operations (CAR 703).

The chief pilot had received two days' training offered by Transport Canada to familiarize himself with the new regulations. Transport Canada had offered this service to air carriers and gave them a one-year transition period to familiarize themselves with and understand the new regulations.

The aircraft's maintenance records indicated that it was certified and maintained in accordance with existing regulations and approved procedures. The aircraft was equipped for IMC flight and carried a global positioning system (GPS). The GPS was functioning and had been programmed for the flight leading to the accident.

Impact marks found on trees indicated that the aircraft was flying on a heading of 120 degrees with an approximate 60-degree right bank and a 45-degree angle of descent. Impact occurred first on the right wing, followed by the nose and the left wing. The impact was sufficiently violent to compress the nose as far as the instrument panel. The cabin was partly dislocated, and the left engine came off at impact. The aircraft bounced about 30 feet while turning and was found resting on a heading of 248 degrees magnetic. The landing gear selector was found in the up position. Flaps were at 15 degrees, and the aircraft was in overshoot configuration. Examination of the engines at the accident site showed that they were producing power at impact, and that damage was all attributable to the impact. The engines and propellers were nevertheless sent to the TSB Engineering Laboratory for examination. Dismantling the propellers confirmed that marks left by the impact corresponded to a fine pitch angle. Further, marks on the pinions caused by the impact were identical for both propellers, indicating that they were at the same pitch and engine speed at the time of the accident. Pitch corresponded to the power applied in a pull-up.

Several instruments were recovered and sent to the TSB Engineering Laboratory for examination. The results indicate that all instruments were functioning normally. The ELT antenna was torn off at impact, considerably reducing the signal range. An aircraft flying over the area picked up the faint ELT signal and advised the Val-d'Or FSS specialist. The signal was not audible in the FSS tower. All airport navigation systems required for the approach were serviceable on the day of the accident.

According to the *Aeronautical Information Publication* (*A.I.P. Canada*), when a pilot, having made a transition from IFR to VFR flight, loses all visual reference during an approach, it is recommended to follow the procedure in RAC 9.26 (Rules of the Air and Air Traffic Services):

> Missed Approach Procedure While Visually Manoeuvring in the Vicinity of the Aerodrome

> The pilot may have to conduct a missed approach after starting visual manoeuvres. There are no standard procedures in this situation. Thus, unless the pilot is familiar with the terrain, it is recommended that:
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> (a) a climb be initiated;
> (b) the aircraft be turned towards the centre of the acrodrome; and
> (c) the aircraft be established, as closely as possible, in the missed approach procedure published for the instrument approach procedure just completed.
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> With the runway in sight at circling the MDA (minimum descent altitude), the pilot should execute the missed approach if there is any doubt that the ceiling and visibility are inadequate for manoeuvring safely to the point of touchdown.

A false-climb illusion is one form of spatial disorientation. Such an illusion is likely to occur during acceleration, when pilots lose their visual references and rely on their inner ear rather than aircraft instruments. Because the inner ear cannot distinguish gravitational acceleration from horizontal acceleration, forward acceleration may give the same impression as backward tilt, in other words, a perception of a climbing aircraft. This illusion occurs in pilots using low- or high-performance aircraft. In low visibility, pilots may try to counteract this perception of climb by dropping the aircraft's nose until the dive counterbalances the apparent backward tilt caused by acceleration, often ending in impact with the ground. Further, if this false-climb illusion is reinforced by the presence of a false visible horizon (such as a shoreline or a string of lights with the ocean or unlit background terrain), a pilots' desire to push the stick may become difficult to control. Pilots with little instrument flight experience are more susceptible to spatial disorientation. Several factors, such as knowledge and experience, determine the pilots' susceptibility to spatial disorientation. Pilots with little instrument time are particularly susceptible to spatial disorientation when they are confronted with few external visual attitude references. Pilots wishing to protect themselves from spatial disorientation must free themselves from their natural vestibular reactions by training and practice. They must use input from their instruments to maintain spatial orientation.

An accident causing four deaths occurred on 13 April 1999 at Gaspé, Quebec, in similar flying conditions (TSB report No. A99Q0062). The pilot had instrument flight experience similar to the pilot involved in this accident. He had just been promoted to pilot-in-command on the aircraft. From the circumstances leading to the accident, it was concluded that the accident was a result of a loss of control during pull-up. A controlled-flight-into-terrain (CFIT) accident is an accident in which an aircraft is flown inadvertently into the terrain, water or an obstacle without any suspicion of the approaching tragedy on the part of the crew.

Analysis

The aircraft was certified and maintained in accordance with existing regulations. All aircraft systems were functioning normally. There was no indication found of any airframe failure or system malfunction during the flight. Examination of the engines did not reveal any

sign of failure. Both engines were producing power, and all damage was caused by the impact. Further, internal marks left by the impact confirm that the angle of the blades corresponded to fine pitch. All indicationse training required by Transport Canada, Aéropro did not ensure that the pilot-in-command complete the required Pilot Proficiency Check (PPC) and was adequately supervised and experienced to conduct a night IFR flight safely as pilot-in-command. When the pilot-in-command filed his flight plan, the weather conditions had improved at destination. During the descent to Val-d'Or Airport, a new weather sequence was transmitted to him indicating that weather conditions were VMC. The pilot immediately cancelled his IFR flight plan and chose to enter a right-hand downwind leg for runway 36. In making the transition to VFR, the pilot did not expect to encounter IMC and to overshoot in IMC.

On the day of the accident, environmental conditions and loss of visual ground references near Val-d'Or Airport were conducive to spatial disorientation. Given the prevailing weather conditions on final approach for runway 36, the runway was difficult to see.

It is conceivable that the pilot did not review the overshoot procedure and did not pull up towards the centre of the airport. During the overshoot, false-horizon and false-climb illusions were both possible. In reaction to a false-horizon illusion, pilots can be led not to act correctly on the flight controls. A false-climb illusion, for its part, can lead pilots to push on the stick and put the aircraft in a nose-down attitude. At low altitude, pilots have very little time to recognize an illusion and take corrective action. Information gathered at the accident site showed that the aircraft was flying on a heading of approximately 120 degrees magnetic in a 60-degree banked right turn when it struck the ground. The aircraft's angle of impact appears to be more consistent with the nose-down attitude associated with a false-climb illusion.

Only instrument flight training, experience and practice can provide pilots with the skills needed to recognize and counter the effects of spatial disorientation. The pilot of the accident aircraft was certified for the flight, but had little instrument flight experience. The pilot had not had the opportunity to fully acquire the skills to react immediately to spatial disorientation. It is likely that the pilot became disoriented and was unable to regain control; he thus flew the aircraft towards the ground after losing situational awareness.

TSB examines general safety trends and new safety issues. These issues include approach and landing accidents involving commercial passenger aircraft. Weather plays a role in virtually all the accidents of this type, mostly recorded under the CFIT category.

The following TSB Engineering Laboratory report was completed.

LP 019/2001 - Engine Teardown and Examination.

Findings as to Causes and Contributing Factors

1. The environmental conditions and loss of visual ground references near Val-d'Or Airport were conducive to spatial disorientation. Because of a lack of instrument flight experience, the pilot probably became disoriented during the overshoot and was unable to regain control of the situation.

2. During the approach, the pilot did not plan to and did not pull up towards the centre of the airport, thereby contributing to spatial disorientation.

3. Although the pilot-in-command received training required by Transport Canada, Aéropro did not ensure that the pilot-in-command completed the required Pilot Proficiency Check (PPC) and was adequately supervised and experienced to conduct a night IFR flight safely as pilot-in-command.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 14 August 2002.