Transportation Safety Board of Canada

Bureau de la sécurité des transports du Canada

AVIATION INVESTIGATION REPORT

A98O0313

LOSS OF CONTROL / STALL

AIRVENTURES AVIATION
PIPER PA-23-250 AZTEC C-GZOV
TORONTO CITY CENTRE AIRPORT, ONTARIO
12 NOVEMBER 1998

Canada

Aviation Occurrence Report

Loss of Control / Stall

Airventures Aviation
Piper PA-23-250 Aztec C-GZOV
Toronto City Centre Airport, Ontario
12 November 1998

Report Number A98O0313

Summary

The pilot of the PA-23-250 aircraft, serial number 27-7854037, was returning to Toronto City Centre Airport from Centralia, Ontario. On final, the pilot determined that the aircraft was too high and fast to safely complete a landing, so he conducted a go-around. His second circuit pattern positioned him on final to the left of a DHC-7. He lowered the landing gear, extended full flaps, and slowed the aircraft to 90 knots[1] to sequence his aircraft behind the DHC-7; however, he was still too close. He applied full power, initiated a second go-around and, at the tower controller's suggestion, started a 360-degree turn to increase the spacing from his traffic. The landing gear and flaps were not retracted. During the left turn, the left engine (Lycoming IO-540-C4B5) quit and the propeller stopped turning. The pilot noted that the airspeed was low and that he was descending, so he maintained full power on the right engine and decided to ditch the aircraft. At approximately 1254 eastern standard time (EST), the aircraft descended into the Toronto harbour. The pilot, uninjured, exited the aircraft before it submerged and was rescued by members of the Toronto Police Marine Unit (TPMU).

Ce rapport est également disponible en français.

[1] All speeds are in knots indicated airspeed.

Other Factual Information

The pilot was certified and qualified for the flight in accordance with existing regulations. He had accumulated a total of 355 hours' flying time, approximately 40 hours on multi-engine aircraft, 35 of which were on Piper Aztecs. His last multi-engine aircraft flight was three months before the occurrence in the same aircraft. Records indicate that the aircraft was certified, equipped, and maintained in accordance with existing regulations.

The pilot reported that when he conducted his preflight inspection at Toronto City Centre Airport, he estimated that the inboard fuel tanks were approximately half full and the outboard fuel tanks appeared to be full. He did not fuel the aircraft before departing for either leg of the trip. When full, the aircraft's inboard tanks had a combined capacity of 260 litres of useable fuel, while the outboard tanks had a combined capacity of 411 litres of useable fuel. The pilot performed the engine run-ups, take-off, and flight to Centralia with the outboard tanks selected, and he stated that he logged 1.2 hours total for the flight. The return flight from Centralia was flown with the inboard tanks selected; the flying time was approximately one hour.

The pilot reported using a power setting of 24 inches of manifold pressure and 2 400 revolutions per minute for his cruise power setting throughout the flight to Centralia and the return. The Piper Aztec manual indicates that the combined fuel consumption at that power setting is approximately 115 litres per hour, under ideal conditions.

The critical engine for an aircraft is defined as the engine whose failure would most adversely affect the performance or handling qualities of an aircraft. For the Aztec, the critical engine is the left engine, because the right engine produces more asymmetrical thrust. The loss of the hydraulic system with the left engine failure further complicates operation of the aircraft, especially with the landing gear and flaps extended, because hydraulic power is not available to quickly retract the landing gear and wing flaps.

Minimum control airspeed (V_{mc}) is defined as the lowest indicated airspeed at which the aeroplane can always be flown safely after the failure of the critical engine. In the case of the PA-23-250 Aztec aircraft with the flaps retracted, V_{mc} is 70 knots at the maximum gross weight of 5 200 pounds. Stalling speed for the same aircraft is 61 knots with the landing gear and flaps extended and wings level; however, the stalling speed of an aircraft in a turn is increased in proportion to the angle of bank. For level turns using 30 and 45 degrees of bank, the stall speeds would be approximately 63 knots and 70 knots respectively. The Aztec is equipped with an audible stall warning horn to warn the pilot of an approaching stall. Before descending to the water, the pilot transmitted to the tower that he had experienced an engine failure and was ditching the aircraft. The aircraft's stall warning horn was heard in the background during the transmission.

At approximately 1254 EST[2], the aircraft struck the water. The impact was observed by the crew of the Toronto ferry "ONGIARA", who transmitted a MAYDAY call to the Coast Guard. The Prescott radio station received and responded to the call, and at 1256 it notified the Rescue Coordination Centre (RCC) at Canadian Forces Base Trenton of the occurrence.

---

[2] All times are EST (coordinated universal time minus five hours).

The controller on duty at the Toronto City Centre Airport was visually monitoring the approach of the Aztec, and he observed the aircraft's descent into the harbour. Prior to the aircraft striking the water, the controller began the emergency procedures response. The controller notified the TPMU dispatcher of the aircraft in the water via land line. Two rescue vessels from the TPMU were already in the water at the time of the occurrence.

The pilot of another aircraft, in the circuit and behind the occurrence aircraft, saw the descent into the harbour and circled overhead to give directions to rescue vessels. However, neither of the two TPMU vessels carried a very high frequency (VHF) radio capable of direct communications with the circling aircraft. The TPMU had two portable VHF radios on inventory at the time of the occurrence, but they were not on board the rescue vessels. When tested during the investigation, one unit worked only when it was in its cradle, and the other unit failed to provide communications with the Toronto City Centre Airport tower. Police personnel at the dispatcher's desk guided the vessels to the pilot's location by transmitting the directions of a witness who was staying at a waterfront hotel.

The aircraft was recovered from the water and examined by the TSB. No pre-impact mechanical discrepancies were identified with the engines or any of the aircraft's systems. Both fuel selectors were selected to the inboard tanks. The left wing tip fuel tank separated from the aircraft on impact, and the left fuel cells contained only water. The fuel system on the right side was not compromised, and the inboard tank contained approximately 150 millilitres of fuel, which was drained from the tank. The right outboard tank contained a considerable amount of fuel and, using the aircraft's cross-feed system, the fuel from the right outboard tank was fed to the left engine. The engine was started and ran for approximately 15 minutes before the fuel was exhausted.

Analysis

No pre-impact discrepancies were identified with any of the aircraft's controls or systems. The left engine quit during the left turn because of fuel exhaustion, and the propeller stopped turning because there was insufficient airspeed to keep it windmilling. Because the hydraulic pump is installed on the left engine, it was not operating after the engine stopped turning, and the pilot was unable to retract the landing gear and flaps. This contributed to the airspeed decreasing quickly. With the airspeed below V_{mc}, the power from the right engine steepened the aircraft's turn, and the aircraft stalled. There was insufficient altitude to recover from the stall before the aircraft struck the water.

The slow speed of the aircraft and the pilot's shoulder and lap restraints probably contributed to the survivability of the impact. The pilot was able to exit the aircraft and stay afloat until rescue vessels, guided by the land-based witness, reached him. The lack of direct communication between the rescue vessels and the circling aircraft had no detrimental effect on the rescue during this occurrence because of the proximity of the crash to a land-based observer.

Findings as to Causes and Contributing Factors

1. The aircraft's left engine stopped because of fuel exhaustion.

2. The aircraft stalled during the steep left turn following stoppage of the left engine, with insufficient altitude to recover.

Findings as to Risk

1. The pilot was wearing lap and shoulder restraints, which probably contributed to his survival.

2. Because of insufficient radio equipment, the personnel on board the rescue vessels were unable to communicate directly with Toronto City Centre tower or the pilot of the aircraft circling overhead the downed aircraft.

Other Findings

1. The pilot was certified and qualified to conduct the flight.

2. Records indicate that the aircraft was certified, equipped, and maintained in accordance with existing regulations.

3. There were no pre-impact discrepancies identified that would have caused the left engine to lose power.

Safety Action Taken

As a result of this occurrence, the TPMU repaired and updated its aviation VHF radio units and implemented a policy of dispatching vessels with the radio units on board, and an aviation VHF radio was installed at the dispatcher's desk. In addition, a uniform map grid system was developed by the TPMU and the Toronto City Centre control tower to establish a common reference system for locating persons and vessels on the water.

Transport Canada recently modified the flight test and training standards for the Private Pilot Licence. The flight test standard now includes the requirement to recover from a second advanced stall. Transport Canada is also encouraging flight schools and instructors to place greater emphasis on stall awareness, particularly in low altitude, low airspeed situations.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 13 July 2000.