Transportation Safety Board of Canada

Bureau de la sécurité des transports du Canada

AVIATION INVESTIGATION REPORT

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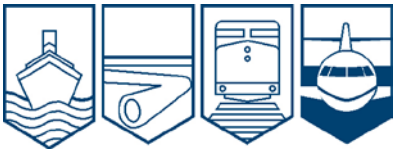

LOSS OF CONTROL/STALL

ATLANTIC AVIATION ACADEMY INC.

PIPER PA-28 CHEROKEE WARRIOR II C-GQHE

SYDNEY, NOVA SCOTIA

06 MAY 2000

Canada

Aviation Investigation Report

Loss of Control / Stall

Atlantic Aviation Academy Inc.
Piper PA-28 Cherokee Warrior II C-GQHE
Sydney, Nova Scotia
06 May 2000

Report Number A00A0071

Summary

The Piper PA-28-161 Cherokee Warrior II, serial number 28-7716119, was departing runway 01 at the Sydney, Nova Scotia, airport on a local pleasure flight with the pilot and three passengers on board. The take-off roll was started near the threshold of runway 01, and the aircraft became airborne approximately 500 feet from the departure end of the 6000-foot runway. Shortly after take-off, the aircraft aerodynamically stalled. The aircraft struck the ground at 1342 Atlantic daylight time, 2000 feet beyond the departure end of the runway, 125 feet to the right of the extended centreline. The pilot was fatally injured, and the three passengers received minor injuries.

Ce rapport est également disponible en français.

Other Factual Information

History of the Flight

On the day of the accident flight, the pilot contacted the Atlantic Aviation Academy Inc. and made arrangements to rent an aircraft. An instructor at the Academy took C-GQHE out of the hangar, started the engine, and taxied to the fuel pump area, where he carried out an engine run-up. All engine parameters were within the normal range. The instructor then refuelled the aircraft to full tanks.

When the pilot arrived at the airport with his friends, he completed the paperwork for the aircraft rental, including the weight and balance calculation and the passenger manifest. He carried out a preflight inspection, which included checking the fuel tank sumps, then boarded the aircraft with his three passengers. When he was ready to taxi, the pilot contacted the Sydney Flight Service Station and was advised that runway 01 was the preferred runway. He taxied the aircraft from the Academy ramp, backtracked close to the button of runway 01, turned the aircraft, and started the take-off roll as the aircraft came out of the turn. The taxi distance was approximately 7250 feet and took approximately six minutes to complete. While taxiing, the pilot unfastened his seat belt and shoulder harness to adjust his seat; they were never refastened.

Very early in the take-off roll, the aircraft occupants and people outside observed that the aircraft acceleration was abnormally slow. The pilot forced the aircraft into the air near the departure end of the runway, and the stall warning horn sounded shortly after take-off. The aircraft climbed to an estimated altitude of 50 to 100 feet before entering a steep, right-wing-low attitude, followed briefly by wings-level flight, then a steep, nose-down, left-wing-low attitude from which the pilot did not recover. The accident occurred at 1342 Atlantic daylight time.[1]

Personnel Information

The pilot attained his initial flying experience in the Air Cadet glider flight training program and was issued a Transport Canada (TC) glider pilot licence on 24 September 1998. The following year, he was enrolled in the Air Cadet powered aircraft program and attained his TC-issued private pilot licence on 19 August 1999. On 02 October 1999, he received an aircraft-type check on the Cherokee Warrior at the Atlantic Aviation Academy Inc. Following this check, the pilot rented the aircraft for local pleasure flights on 09 and 10 October 1999. The pilot's next flight was on 23 March 2000, during which he received a recurrency check on the Warrior. He did not fly again until the accident flight. At the time of the accident, the pilot had accumulated a total of 65.3 hours' flying time, of which 2.9 hours were on the Warrior.

Aircraft Information

The aircraft documentation indicates that the aircraft was maintained in accordance with existing regulations and approved procedures. The aircraft weight and centre of gravity were within prescribed limits, with a take-off weight of 2302 pounds, 23 pounds under the maximum allowable weight.

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[1] All times are Atlantic daylight time (Coordinated Universal Time minus three hours).

The fuel source was tested. The fuel was of the proper grade and quality and contained no contamination.

According to calculation using the "Normal Short Field Ground Roll Distance—No Obstacle" chart found in the performance section of the *Pilot Operating Handbook* (POH), a take-off ground roll of 675 feet would be required to attain take-off speed under the existing conditions. This figure is based on full engine power being set before brake release. In this occurrence, engine power was set after the take-off roll had started, and charts were not available in the POH on-board the aircraft to calculate ground roll distance for this take-off method. Pilots familiar with this aircraft estimated that the ground roll from a rolling start should not have been more than 2000 feet.

Meteorological Information

The recorded weather observations at Sydney Airport on 06 May 2000 were as follows:

> 1300: surface wind 010 degrees true at 16 knots, visibility 15 statute miles, few clouds at 3000 feet above ground level (agl), temperature 4.8 degrees Celsius, dewpoint minus 1.8 degrees, altimeter setting 30.03.
>
> 1400: surface wind 360 degrees true at 17 knots, visibility 15 statute miles, few clouds at 3000 feet agl, temperature 5.2 degrees, dewpoint minus 1.3 degrees, altimeter 30.04.

The surface wind at the start of the take-off roll was 030 degrees at 16 knots.

According to section AIR 2.3 of Transport Canada's *A.I.P. Canada*, the reported temperature and the dewpoint were conducive to serious carburettor icing at any engine power setting. Carburettor ice is a phenomenon by which ice forms in a carburettor's venturi area. As the ice develops, there is a gradual reduction in engine power.

Wreckage and Impact Information

The aircraft struck trees, which were approximately 40 feet high, in a nose-down, left-wing-low attitude. The aircraft then travelled 75 feet through the trees before striking the ground, nose first. It spun around through 200 degrees and travelled backwards 15 feet before coming to rest on a heading of 140 degrees magnetic. The left wing separated from the fuselage, and the right wing partially separated as the aircraft travelled rearward. The engine was displaced upward and to the right. The cockpit and cabin area was basically intact, except for the rearward displacement of the instrument panel on the passenger side and some distortion of the rudder pedals and the floor. There was very little compromise to the occupants' space.

The flight controls, engine controls, and fuel system were examined for integrity. The only discrepancies found were that the carburettor heat control lever was found in the "on" position, and the butterfly valve in the carburettor heat box was found in the mid-travel range. The carburettor and the carburettor heat box had separated from the engine and were displaced forward during the impact sequence. This separation would pull the butterfly valve from the full "on" position to the mid-travel range.

The Normal Procedures section of the POH contains instructions on the correct operation of the carburettor heat control:

- Carburettor heat should be checked before take-off during the ground-check (run-up) portion of the checklist to ensure correct operation and to clear any ice, which may have formed during taxi.

- Prolonged ground operation of carburettor heat should be avoided as the intake air is unfiltered.

- Before take-off, the carburettor heat control should be in the "off" position.

The engine was recovered and transported to an engine overhaul facility, where it was test-run. During the test with a loaned carburettor, the engine produced full-rated power. The carburettor installed at the time of the accident was disassembled and inspected; no anomalies were found.

The ignition switch, airspeed indicator, and engine tachometer were removed from the aircraft and forwarded to the TSB Engineering Branch. Testing showed that the ignition switch was serviceable at the time of impact. Microscopic examination of the dial face and sector gear on the airspeed indicator and of the dial face and drag cup on the tachometer did not reveal any witness marks that could position the pointers of the respective instruments at the time of impact.

Survival Aspects

The three passengers, who were all wearing their seat belts and shoulder harnesses, exited the aircraft unassisted. They extracted the pilot from the aircraft and attended to his injuries until the emergency response personnel arrived. The pilot received multiple traumatic injuries, primarily involving the head and the chest. These injuries were consistent with unrestrained body contact with aircraft components during the impact sequence.

As part of the airport emergency response plan, an autodialler was installed in the tower cab. The autodialler dials an alarm company that, in turn, contacts the airport firefighters, the local volunteer firefighters, the police, and the ambulance services. The flight service station specialist activated the autodialler when the aircraft disappeared from his view, and emergency response personnel were on site approximately eight minutes later.

The aircraft was equipped with a Narco Avionics emergency locator transmitter, model ELT-10, which activated on impact. The signal was received by the flight service station.

Analysis

No discrepancies were found with either the aircraft or the engine that would explain why the aircraft failed to accelerate; however, the temperature and the dewpoint were such that serious carburettor icing could occur at any power setting. Therefore, it is probable that ice built up in the carburettor during the long taxi from the Academy ramp to position on runway 01. This condition would have resulted in a power loss, which might have been apparent to the pilot before taking-off, had he stopped the aircraft, applied the brakes, and set full power before commencing the take-off run. Since the pilot performed a rolling take-off, it might not have been obvious that the engine was not producing full power until after the aircraft had travelled some way down the runway. The pilot probably applied carburettor heat then in an attempt to attain more power. The carburettor heat system is more effective as an anti-icing device than as a de-icing device. Depending on the amount of ice

built up in the carburettor, it could take a considerable amount of time to clear all the ice and regain full engine power.

It is not known why the pilot did not abort the take-off as soon as it became apparent that the aircraft was not accelerating normally. The following conditions may have affected his decision making: it was the pilot's first flight in six weeks, he had limited flying experience, and he was expecting engine power to increase after applying carburettor heat.

Although the occupants were all subjected to similar deceleration forces during the impact sequence, the passengers received only minor injuries; the pilot was fatally injured. Differences in physiology between the four individuals and differences in impact forces at the four seat positions make it difficult to compare the injuries suffered by the four individuals. However, the passengers' use of the available seat belts and shoulder harnesses likely prevented more serious injuries. Based on the general knowledge that seat belts and shoulder harnesses prevent injuries, the pilot's injuries would have likely been less severe had he been using his seat belt and shoulder harness.

The following TSB Engineering Laboratory Report was completed:

LP 60/00—Instrument Examination.

This report is available upon request from the Transportation Safety Board of Canada.

Findings as to Causes and Contributing Factors

1. Conditions conducive to serious carburettor icing at any engine power setting were present. These conditions almost certainly prevented the aircraft from accelerating normally and from attaining safe flying speed.

2. The take-off was not aborted when it became evident that the aircraft was not accelerating normally. The aircraft was forced into the air at or near the aerodynamic stall speed; the aircraft stalled, and control was lost.

Other Finding

1. The pilot was not wearing his available seat belt and shoulder harness; this contributed directly to the severity of his injuries.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 09 May 2001.