AVIATION OCCURRENCE REPORT

LOSS OF CONTROL - COLLISION WITH TERRAIN

PIPER PA-34-220T SENECA III C-GTOG
TESLIN, YUKON
18 AUGUST 1995

REPORT NUMBER A95W0153

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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Summary

The pilot and three passengers departed Teslin, Yukon, at approximately 1635 Pacific daylight time (PDT) on an instrument flight rules (IFR) flight to Ponoka, Alberta. The contractor/ pilot had arrived in Teslin to pick up two company employees. The third passenger was invited by the employees to accompany them on the aircraft.

The aircraft lifted off runway 26 (5,000 feet long) after a take-off roll of about 3,000 feet, and climbed to approximately 100 feet above ground level (agl) in the next 4,200 feet. The aircraft then entered a steep left turn and descended to the ground in a nose-down attitude. A witness described the aircraft as being low, going really slowly for a twin engine, and wavering from side to side before banking and nose-diving to the ground. Two other witnesses described the take-off run as being long, and said that the aircraft looked mushy and the wings were rocking after lift-off. Several individuals arrived at the scene within seconds and found no survivors. Aircraft damage and ground scars revealed that the aircraft contacted the ground in a vertical, nose-down attitude on a reciprocal heading to the take-off runway.

Ce rapport est également disponible en français.

[1] All times are PDT (Coordinated Universal Time minus seven hours) unless otherwise noted.

Other Factual Information

The pilot held a private licence with a Class I instrument rating, and was qualified for the flight in accordance with existing regulations. He received his private pilot licence (PPL) in 1981, and had approximately 1,780 hours total flying time, of which 1,067 hours was on the Seneca III.

The Atmospheric Environment Service weather record for Teslin at 1500 shows broken cloud bases estimated at 4,600 feet, visibility 30 miles, temperature 17 degrees Celsius, and the wind from 350 degrees magnetic at 4 knots. During the period, towering cumulus buildups were reported to the northeast and southwest of the airport. Near the cumulus buildups, the wind velocity was variable at five knots or less.

The aircraft was certified and equipped in accordance with existing regulations. The maximum allowable take-off weight for the Seneca III is 4,750 pounds. The forward and aft centre of gravity (C of G) limits are 90.6 and 94.6 inches aft of datum respectively. The personal baggage and tools were weighed and, after an allowance for wet clothing, the take-off weight of the aircraft was calculated to be approximately 5,150 pounds, 400 pounds (8 per cent) over the maximum allowable take-off weight. While the load distribution within the aircraft could not be determined with certainty, the C of G was likely near the aft limit. No witnesses were found who observed the aircraft being loaded or boarded.

During the on-site wreckage examination, it was discovered that the key lock on the forward baggage door was in the UNLOCKED position, there was no key in the lock, and the latch was in the UNLATCHED position. The key was later found in the pilot's pocket. Disassembly of the key and lock revealed that the key and tumblers were worn sufficiently to allow the key to be removed in any position.

Further examination of the forward baggage door lock-and-latch assembly provided evidence that was consistent with the door being open prior to impact. There was no apparent damage to the pins, the guide bushings in the door, or the latch plates in the door frame. A significant bend in the forward push rod, connecting the drawbolt to the latch mechanism, was consistent with the pins not being engaged on impact. Damage to the hinge on the top of the door indicates that the door was open when struck on the leading edge, as evidenced by a diagonal crease on the lower front corner. The hinge was partially pulled away from the structure at the front, and the door was trapped in the open position.

The aircraft controls and systems were examined on site to the degree possible, and, other than the forward baggage door lock being in the UNLOCKED position and the key missing, no other abnormalities were found. The landing gear selector was in the DOWN position, and the landing gear was down and locked.

Disassembly of both engines did not reveal any defects that would have prevented the engines from producing power. Damage to the blades on both propellers was consistent with what is found when power is being produced during impact with the terrain.

The forward baggage door is located on the left side of the nose, is hinged at the top, and opens upward. The door latching and locking mechanism consists of a recessed door latch handle and a key lock. The door is secured in the CLOSED position by rotating the spring-loaded latch handle 90 degrees clockwise, to the horizontal position, which extends two pins into the door frame. The key lock is then rotated 90 degrees clockwise to the LOCKED position, and the key removed from the lock.

Federal Aviation Administration (FAA) Airworthiness Directive (AD) 88-04-05, issued 16 February 1988, requires a one-time compliance with Piper Service Bulletin (SB) No. 872, which mandates an inspection of the forward baggage door for positive latching and locking. Piper SB 872 states the following:

> **NOTE:** The key should turn through a ninety degree arc between fully locked and fully unlocked. If the key can be removed from the lock at any point other than fully locked, the lock and key must be replaced.

An entry in the aircraft log-books indicates that SB 872 and AD 87-04-05 were complied with in May 1988. There was no requirement in the SB or AD for periodic inspections.

The *Piper Aircraft Maintenance Manual*, Section D, "Cabin Group," outlines the inspection procedures for 100-, 500-, and 1,000-hour inspections. The first item listed in the group reads as follows:

> Inspect the cabin entrance doors, cargo, and baggage doors for damage and operation. Check condition and security of locks, latches, and hinges. (Refer to Service Bulletins No. 633 and 872, latest revisions).

An entry on the Piper 100-hour Inspection Report for C-GTOG indicates that this inspection was completed on 05 July 1995.

The Seneca was first manufactured in 1972. Aircraft manufactured between 1972 and 1983 did not have a Baggage Door Ajar Light as standard or optional equipment. Such a light was incorporated in Senecas built after 1983. C-GTOG was manufactured in 1981 and therefore did not have a Baggage Door Ajar Light installation.

The possibility exists that aircraft pitch and/or directional control could have been affected by aerodynamic forces created by the open baggage door; however, the magnitude of these forces could not be determined. The sudden opening of the door would have been an unexpected and visually distracting event, accompanied by a change in noise levels and flight control feedback, possible airframe vibrations, and increased drag.

A review of TSB accident data from 1977 to 1993 showed 33 accidents involving small aircraft, resulting in 10 fatalities, in which a cabin, baggage, or other compartment door opened during flight. Six of the 33 accidents involved the opening of a baggage door. In June 1993, the TSB issued five Aviation Safety Recommendations to

Transport Canada (TC) concerning in-flight opening of doors (recommendations A93-06 to A93-10).

Witnesses observed the pilot and one of the two company employees/passengers arguing prior to departure. The pilot was a building contractor, and had been contracted to build the Teslin arena. Construction of the arena was behind schedule, and four of his employees had gone to Whitehorse for the day.

Post-mortem and toxicological tests conducted on the pilot and the front-seat passenger were negative for alcohol, drugs, and carboxyhemoglobin. The toxicology report on one of the employees revealed a blood alcohol concentration of 37 millimoles per litre (mmol/l) or 0.17 per cent. The second employee had a blood alcohol concentration of .09 per cent.

Analysis

A combination of factors probably contributed to the loss of control shortly after take-off. The pilot's reported distressed emotional state from the argument with the employee and from being behind schedule on his work projects may have distracted the pilot during the pre-flight and during flight. However, it could not be determined to what extent the pilot's emotional state affected him.

Because the aircraft was over the maximum certified take-off weight, the performance degradation would have resulted in a longer than normal take-off roll, a reduced climb rate, and an increased stall speed. It is likely that the pilot had not selected the landing gear up after take-off because he was distracted by the open baggage door. The open baggage door, the overweight condition, and the extended landing gear decreased the aircraft's performance and probably resulted in the aircraft being flown at a lower than normal airspeed.

When the baggage door opened, it was an unexpected and distracting event, and it probably distracted the pilot's attention from his primary task of maintaining control of the aircraft. The pilot may have elected to maintain a low airspeed to reduce the chance of the door being torn away from the aircraft. It is concluded that the pilot allowed the airspeed to decrease to the point where the aircraft stalled, and because of the low altitude, the pilot was unable to recover in time to prevent the crash.

The following TSB Engineering Branch reports were completed:

LP 130/95 - Forward Baggage Door Examination, and
LP 131/95 - Instrument Examination.

Findings

1. The pilot was certified and qualified for the flight in accordance with existing regulations.

2. At take-off, the aircraft was approximately eight per cent over the maximum allowable take-off weight.

3. Examination of the engines and propellers indicated that power was being produced by both engines on impact.

4. The forward baggage door was open at impact; it was not locked and likely not latched properly prior to take-off.

5. The key and tumblers in the baggage door key lock were worn, and the key could be removed in the UNLOCKED position.

6. SB 872 and AD 87-04-05 do not require periodic repetitive inspections of the forward baggage door latching mechanism.

7. The *Piper Aircraft Maintenance Manual* requires an inspection and operational check of cabin entrance doors and baggage doors, including security of locks, latches, and hinges, every 100, 500, and 1,000 hours.

8. The pilot did not raise the landing gear after take-off.

9. The distraction(s) created by the open door likely contributed to the loss of airspeed and aerodynamic stall.

Causes and Contributing Factors

The aircraft stalled at an altitude from which the pilot was unable to recover. Contributing to the occurrence were the opening of the forward baggage door, the overweight condition of the aircraft, the extended landing gear, and the worn key lock on the forward baggage door.

Safety Action

Action Taken

Inspection of Baggage Door Key Lock

As a result of this accident, the TSB forwarded a Safety Advisory to Transport Canada concerning inspections of the key lock. Transport Canada has indicated that work is in progress to either amend AD 88-04-05 to require repetitive inspection of the key lock, or revise the maintenance schedule so that the forward baggage door key lock is function checked at each 100-hour or annual inspection.

In-Flight Opening of Doors

In response to previous Board recommendations concerning the in-flight opening of doors, Transport Canada addressed the subject in pilot training manuals, pilot and maintenance newsletters, and in flight-instructor refresher courses. Also, crew action in the event of a door opening in flight was added to the items that commercial pilots might be assessed on during proficiency checks.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson Benoît Bouchard, and members Maurice Harquail and W.A. Tadros, authorized the release of this report on 09 October 1996.