Transportation Safety Board of Canada

Bureau de la sécurité des transports du Canada

AVIATION INVESTIGATION REPORT
A06O0231

COLLISION WITH TERRAIN

PITTS S1S (AMATEUR-BUILT) C-FZSF
MELANCTHON, ONTARIO
04 SEPTEMBER 2006

Canada

Aviation Investigation Report

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Summary

The pilot of the amateur-built Pitts S1S aerobatic biplane (registration C-FZSF, serial number 500607-97) was on a local flight from his private grass airstrip in Melancthon, Ontario, when the aircraft struck the ground following a low-level roll. The impact and post-crash fire destroyed the aircraft. The pilot, the only person on board, received fatal injuries. The accident happened at 1959 eastern daylight time during twilight hours.

Ce rapport est également disponible en français.

Other Factual Information

The pilot held a valid airline transport pilot licence. Since learning to fly in 1973, he had accumulated in excess of 22 000 hours flying in all areas of the world on numerous aircraft types, including the Douglas DC-3, the de Havilland DHC-7 and DHC-8, and the Gulfstream G2, G3, and G4. He was currently employed as chief pilot for a large company, and held current type ratings on 19 different aircraft types.

The pilot had received formal aerobatic training in a Zlin aircraft. Following this training, he purchased a Smith Miniplane, which he used for aerobatic practice. In October 1999, he purchased the Pitts S1S. This Pitts S1S was an amateur-built, single-seat, aerobatic biplane, which had been built in Saskatoon, Saskatchewan, and first flown on 19 April 1997. When purchased, the aircraft had a total time of 137 hours. Since that time, the pilot had flown approximately 160 hours in the Pitts S1S. The majority of the flights were for aerobatic practice, and lasted less than one hour. At the time of the accident, there were no outstanding maintenance snags and there was no history of repeating maintenance issues. Transport Canada had issued the pilot a letter of authorization for conducting aerobatic flight below 2000 feet above ground level (agl). There are no competency requirements for this approval.

On the evening of the occurrence, the pilot decided to fly a circuit before tying the aircraft down for the night. At the same time, the pilot of another aircraft, a Piper J-3 Cub, was preparing to fly back to his own airstrip. Each pilot was aware of the other. The Pitts pilot departed to the southwest at approximately 1955 eastern daylight time.[1] Shortly after the Pitts took off, the Cub pilot departed to the southwest, turned to the east, and climbed to 500 feet agl. The Pitts pilot then caught up to the Cub and turned in front of it, in a steeply banked turn and at a slightly higher altitude. The Pitts completed two 360-degree turns around the Cub and then entered a roll. Almost immediately after the roll was completed, the Pitts struck the ground in a flat field. The pilots did not discuss this activity before taking off.

The accident site was approximately one mile from the pilot's airstrip. On impact, the aircraft was travelling in an easterly direction in a wings-level, nose-low attitude. Although the exact pitch attitude could not be determined, the aircraft was pitched nose down such that the propeller was the first part of the aircraft to contact the ground.

A post-mortem examination showed that the pilot died as a result of trauma sustained at impact and did not reveal any pre-existing medical conditions that would have contributed to the accident.

There were no identifiable anomalies in the flight control system, aircraft structure, engine (Lycoming IO-360-B1D), or propeller that would have affected the pilot's ability to control the aircraft. All failures in the elevator control system and other aircraft parts and systems were determined to be impact-related, and there was no indication of anything jamming the controls. It was determined that the aircraft was flying at a speed between 120 and 140 mph when it struck the ground. Engine rpm at impact was 2150.

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

Weather conditions at the time were as follows: calm wind, visibility 15 statute miles, a broken to overcast cloud layer at approximately 1000 feet agl, and the horizon to the west was clear. Sunset was at 1946, and official night, by definition ½ hour after sunset, was at 2016.

The human eye adapts to changing light conditions. However, it is slow to adapt from bright light to low-light conditions. From one extreme to the other can take an adaptation of up to 45 minutes.[2] Each time the eye is exposed to the bright light, the process of dark adaptation has to begin again.

Analysis

The pilot had extensive flight experience and had flown the Pitts S1S for 160 hours over the previous seven years. He was also experienced at flying low-level aerobatics. There was no indication that the roll was anything other than an intentional aerobatic manoeuvre. The fact that the aircraft struck the ground in a wings-level attitude immediately following the completion of a roll indicates that the pilot was probably controlling the aircraft throughout the manoeuvre, and that the rudder and aileron control systems were functional.

It could not be determined why the aircraft struck the ground. There were no identifiable problems with the aircraft, the pilot was fit for the intended flight, and the autopsy did not reveal any pre-existing medical conditions that would have contributed to the accident. As well, it was considered that weather did not play a part in the accident. The analysis will therefore focus on physiological aspects of this flight.

The setting sun to the west was bright and would tend to illuminate the countryside in that direction. It was significantly darker to the east, which would make the horizon more difficult to distinguish in that direction.

The pilot departed to the west and completed at least one turn to the east and two 360-degree turns before beginning the roll manoeuvre on an easterly heading. Each time the pilot turned past the setting sun, his eyes would be subjected to the bright light of the sun, and each time he headed in an easterly direction, he would be looking at a relatively dark horizon. Each time the pilot's eyes were exposed to the bright light, the process of dark adaptation would have to begin again. Since there is no way to determine where the pilot was looking as he turned toward the setting sun, the amount of dark adaptation required cannot be quantified. However, each time the aircraft turned from west to east, the eastern horizon would be more difficult to pick up.

Two factors that likely contributed to the accident were the light conditions and the low altitude at which the roll manoeuvre was initiated. The low light conditions would have made it more difficult for the pilot to identify the exact attitude of the aircraft in a dynamic manoeuvre such as a roll. The horizon to the east was darker than the horizon to the north or south. Thus, while it would be relatively easy to identify that the wings were level, it would be more difficult to

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[2] Richard O. Reinhart, *Fit to Fly, A Pilot's Guide to Health & Safety*, Blue Ridge Summit, PA, TAB Books, 1993.

identify whether the nose was in a level-flight attitude. The low altitude is significant because it minimized the amount of time that the pilot had to recognize and correct any errors as he completed the roll. It is probable that the pilot did not recognize that the aircraft was descending and flew it into the ground.

The following TSB Engineering Laboratory report was completed:

LP 008/2007 – GPS and Instruments Analysis.

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

Findings as to Causes and Contributing Factors

1. As the pilot was completing a roll at low altitude, the aircraft descended. It is probable that the pilot did not recognize that the aircraft was descending and flew it into the ground.

2. The varying light conditions during manoeuvring could have made it difficult for the pilot to detect that the aircraft was descending.

Finding as to Risk

1. The pilot of the Pitts aircraft flew in close proximity to another aircraft without having discussed his plans with the other pilot.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 27 November 2007.