

Investigation Report

The investigation was completed stating facts only, i.e. no analysis and conclusions.

Identification

Type of Occurrence: Accident

Date: 20 September 2020

Location: Kulmbach

Aircraft: Airplane

Manufacturer: Experimental amateur built

Type: Pitts S-1S

Injuries to persons: Pilot fatally injured

Damage: Aircraft destroyed

Other Damage: Crop damage

State File Number: BFU20-0816-CX

Abstract

During conduct of several aerobatic flight manoeuvres, the airplane entered an uncontrolled flight attitude and impacted the ground.

Factual Information

History of the Flight

On 20 September 2020 at 1536 hrs¹, the pilot took off with his Pitts S-1S from Kulmbach Airfield.

According to witnesses' statements and the video recordings provided, the pilot conducted several aerobatic flight manoeuvres. One witness stated that the airplane performed several rolls. Then he had been distracted for a short while. Once he looked back toward the airplane, he saw that, at about 1602 hrs, it crashed to the ground with a spinning motion without any engine sounds from an altitude of about 700 to 800 m. He could not see the impact.

During the impact, the pilot was fatally injured and the airplane destroyed.

Personnel Information

The 47-year-old pilot held an EU Private Pilot Licence (PPL(A)) initially issued on 5 December 2017. The following ratings were listed:

SEP (Single Engine Piston (land), PIC, valid until 31 December 2021

VFR night, no expiry date

He also held a pilot licence issued by the Federal Aviation Administration on 14 June 2019, which was based on his European licence and its rights were limited to the European licence.

He neither had an aerobatics rating nor the respective training.

His class 2 medical certificate without restrictions was valid until 2 May 2021.

According to his pilot log book, up until the day of the accident, he had a total flying experience of 94:30 hours on powered airplanes, of which about 38:20 hours were flown on type.

In addition, he held a licence for aerial sports equipment and had a respective flying experience of about 2,010 hours.

¹ All times local, unless otherwise stated.

Aircraft Information

The airplane Pitts S-1S is a single engine biplane with fixed landing gear in tailwheel configuration. Its fuselage consisted of steel tubes and the wings of wood. It was equipped with a piston engine and a fixed two-blade propeller. The amateur built was finished on 26 August 1993. At the day of the accident, it had a total operating time of 769 hours and 28 minutes.

Curtis Pitts had designed it for aerobatics.

The technical documentation included a hand-written and signed weighing report of 21 March 2007 but no further information as to its author.

According to the flight manual, maximum take-off mass was 522kg. At this mass, the allowable centre of gravity was between 165.2 and 167.9 cm. Plane of reference was 165.2 cm ahead of the leading edge of the lower wing.

According to the flight manual, the pilot seat was behind the centre of gravity. Based on the values from the flight manual, the weighing report and the results of the post-mortem examination, the BFU performed a mass and center of gravity calculation:

- Empty weight 379.09 kg (lever arm 152.50 cm), based on assumption calculated remaining fuel at the time of the accident 27,35 l, 19,69 kg (lever arm 151.38 cm), pilot including emergency parachute 116.00 kg (lever arm 232.41 cm), baggage behind the pilot 0.00 kg (lever arm 288.19 cm).
- This resulted in a total mass of 514,78 kg (total moment 87.751,76, moment = mass x lever arm) and a centre of gravity of 170.46 cm.

According to the flight manual, the fuel tank had a maximum capacity of 75.5 l. During normal operation, 72 l are usable. The flight manual recommended to not conduct low altitude aerobatics, if the fill quantity is less than a quarter.

According to the statement of an experienced aerobatics pilot, fuel consumption of the Pitts S-1S is about one litre per minute during aerobatics. If the fill quantity is less than a quarter, the engine may fail.

The identification plate of the engine (O-360) did not match the installed engine (IO-360). The BFU was not provided with documentation of a possible refitting.

The aircraft was registered in to the USA.

The airplane was equipped with a FLARM.

Meteorological Information

According to witnesses, at the time of the accident, visual meteorological conditions with visibilities of more than 10 km and no cloud prevailed at Kulmbach Airport. These weather conditions were confirmed by the video recordings.

Radio Communications

According to the statement of the responsible air navigation service provider, the pilot was never in any contact with an air traffic control unit. An aerobatic area was not activated.

Radio communications were not recorded. According to the statement of the Flugleiter (A person required by German regulation at uncontrolled aerodromes to provide aerodrome information service to pilots), there was no radio communication after take-off.

Aerodrome Information

Kulmbach Airfield (EDQK) is located north of Kulmbach. Aerodrome elevation is 506 m AMSL.

It had one asphalt runway with a length of 719 m and a width of 30 m with the orientation 085°/265° (09/27).

Flight Recorder

The radar equipment of the responsible air navigation service provider recorded the flight path. This data was available for evaluation purposes. From 1342:58 UTC (1542:58 hrs) on, the recorded data did not include any altitude.

There was no memory card in the FLARM of the aircraft.

Accident Site and Findings on the Aircraft

The accident site was located on a meadow about 5.4 km north of the runway of Kulmbach Airfield. The area of the accident site and the vicinity was flat and suitable for an emergency landing.

The accident site showed a compact wreckage area. The impact traces show that the airplane had crashed to the ground with a pitch angle of about 70 to 80°. The face of the airspeed indicator showed a mark at about 150 mph.

The deceased pilot sat in the cockpit with the seat belts fastened.

Since the fuel tanks had burst open on impact, it was not possible to determine the fuel quantity at the time of the accident. There was no fuel in the fuel flow divider. The supply pipe of the fuel flow divider did not contain any fuel either. According to the fuel receipt, 37,21 l fuel were refuelled at Kulmbach Airfield prior to departure. In order to calculate the approximate fuel quantity at the time of the accident, the last entries in the pilot log book and the aircraft log book and the tank receipts provided were used. A full tank was assumed for the refuelling of 21 June 2020. This refuelling was followed by three more. Taking into consideration the consumption according to the flight manual and the respective flight profile, the remaining fuel at the time of the accident was 27,35 l.

Due to the accident, the function of the mechanical and electrical fuel pumps could not be determined.

The two Slick magnetos of the series 4250 and 4300 functioned properly.

The spark plugs showed a fawn brown (normal) combustions pattern.

The propeller blades were bent backwards and showed no spiral twisting (Fig. 1).

All controls connections were proper and their function traceable. According to witnesses' statements the pilot had replaced the battery; it was safe in its mounting.



Fig. 1: Wreckage after salvation

Source: BFU

Medical and Pathological Information

According to the statement of the police, the post-mortem examination of the pilot did not reveal any indications as to relevant pre-existing conditions. The pilot's death was caused by multiple trauma due to the accident.

Fire

There was no fire.

Survival Aspects

The emergency parachute was not used.

Additional Information

According to FCL.800, pilots shall conduct aerobatics only if they hold an aerobatics licence in the respective aircraft category. To acquire an aerobatics licence a corresponding training at an ATO or DTO is required. This training includes theoretical and practical training in aerobatics of at least 5 hours or 20 flights.

Each aircraft has to be operated within the allowable limits of the operating range.

Investigator in charge:	Pfefferl
Assistance:	Blau
Field investigation:	Huber, Leupold
Braunschweig,	31 August 2022

This investigation was conducted in accordance with the regulation (EU) No. 996/2010 of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation and the Federal German Law relating to the investigation of accidents and incidents associated with the operation of civil aircraft (*Flugunfall-Untersuchungs-Gesetz - FIUUG*) of 26 August 1998.

The sole objective of the investigation is to prevent future accidents and incidents. The investigation does not seek to ascertain blame or apportion legal liability for any claims that may arise.

This document is a translation of the German Investigation Report. Although every effort was made for the translation to be accurate, in the event of any discrepancies the original German document is the authentic version.

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