

**ACCIDENT**

<b>Aircraft Type and Registration:</b>	Socata TBM 700N <sup>1</sup> , M-VNTR	
<b>No &amp; Type of Engines:</b>	1 Pratt & Whitney Canada PT6A-66D	
<b>Year of Manufacture:</b>	2015 (Serial no: 1097)	
<b>Date &amp; Time (UTC):</b>	15 October 2016 at 0732 hrs	
<b>Location:</b>	Fairoaks Airport, Surrey	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - 1	Passengers - 1
<b>Injuries:</b>	Crew - 1 (Major)	Passengers - 1 (Minor)
<b>Nature of Damage:</b>	Extensive	
<b>Commander's Licence:</b>	Private Pilot's Licence	
<b>Commander's Age:</b>	79 years	
<b>Commander's Flying Experience:</b>	5,272 hours (of which 1,585 were on type) Last 90 days - 18 hours Last 28 days - 5 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot, telephone interviews with the pilot and passenger, Air Traffic Control reports, witness interviews, accident site photographs and aircraft examination	

**Synopsis**

The pilot lost control of the aircraft during a turn onto the final approach at Fairoaks Airport. The final turn had been commenced from a relatively close downwind leg, requiring a higher angle of bank than usual to complete. In the latter stages of the turn, with flaps at the takeoff setting, the bank angle was increased and there was a sudden and rapid departure from controlled flight that was consistent with a stall. The occupants were able to recover to an approximately level aircraft attitude but were unable to arrest the descent rate which ensued. The aircraft struck the ground and slid for a distance, sustaining extensive damage and causing injuries to both occupants.

**History of the flight**

The accident occurred as the aircraft was preparing to land at Fairoaks Airport at the end of a private flight from Ronaldsway Airport on the Isle of Man. On board were the aircraft commander and a passenger who occupied the front right seat.

As the aircraft neared Fairoaks, the pilot listened to the Farnborough ATIS broadcast, which reported a visibility of 4,000 m in mist. He and the passenger discussed the visibility,

**Footnote**

<sup>1</sup> Marketed as the TBM 900.

and agreed that they would proceed to Fairoaks while retaining the option to divert to Farnborough Airport (9 nm to the south-west) if a landing was not possible.

The visibility at Fairoaks was recorded as 4,500 m, with 'few' clouds at 4,000 ft and a surface wind of 3 kt from 240°. Runway 24 was in use with a left-hand circuit. The circuit height, based on the Fairoaks QNH was 1,100 ft (the elevation of Fairoaks Airport is 80 ft amsl). Runway 24 is a hard runway, 813 m long and 27 m wide.

The pilot identified the airfield visually, although there was low lying mist in the area. In order to maintain visual contact with the landing area he joined the circuit and flew a downwind leg that was closer to the runway than usual. He recalled carrying out the pre-landing checks while downwind, including lowering the landing gear and extending the flaps to the TAKEOFF position<sup>2</sup>. Based on a final approach with flaps at the LANDING setting, the pilot planned for an initial approach speed of 90 kt, reducing to a final approach speed of 80 kt.

The pilot recalled the aircraft being slightly low as it turned from the downwind leg onto its final approach track. He believed he had selected flaps to the LANDING position, and recalled seeing the airspeed just below 90 kt, which prompted him to increase power slightly. The aircraft flew through the extended runway centreline and the pilot increased the bank angle to regain it.

The pilot's next recollection was of being in a right bank and seeing only sky ahead. He pushed forward on the control column and attempted to correct the bank with aileron. The aircraft then rolled quickly in the opposite direction and he again applied a correction. He became aware of being in an approximately wings-level attitude and seeing the ground approaching rapidly. He responded by pulling back hard on the control column, but was unable to prevent the aircraft striking the ground. He did not recall hearing a stall warning, or any other audio warning, before the loss of control occurred.

The aircraft struck flat ground and slid for about 85 m before coming to rest against a treeline, about 500 m from Runway 24 and approximately on the extended centreline. The propeller was destroyed in the accident sequence and the landing gear legs detached, causing damage to the wings which included a ruptured fuel tank. In the latter stages of the slide the aircraft yawed right, coming to rest heading approximately in the direction from which it had come.

The pilot and passenger remained conscious but had both suffered injury. The passenger saw flames from the region of the engine and warned the pilot that they needed to evacuate. He went to the rear of the cabin, opened the main door and left the aircraft. The pilot initially attempted to open his side door, but his right arm was injured and he was unable to open the door with only his left. He therefore followed the passenger out of the rear door.

### Rescue activities

The accident was witnessed from the control tower by the Fairoaks FISO and also by some of the airport fire and rescue crew. The standby response vehicle was quickly deployed to

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#### Footnote

<sup>2</sup> The flaps were selectable to three positions: UP, TAKEOFF and LANDING.

the accident site, which was beyond the airfield boundary. The two occupants were guided to safety and given first aid. There was no fire (the flames seen by the passenger were believed to have come from the engine exhaust and did not persist or spread), but a foam blanket was laid as a precaution. The civil emergency services arrived soon afterwards and the two occupants were taken to hospital.

### **Passenger's account**

The passenger was a current commercial pilot, experienced on light general aviation types, and had flown other TBM variants. He confirmed the pilot's account that the downwind leg was flown closer to the runway than usual and thought the aircraft would not be able to turn tightly enough to avoid flying through the extended runway centreline.

The pilot maintained a steep angle of bank while turning, but the aircraft flew through the centreline as the passenger had expected. He recalled hearing an audio warning tone, but did not know if it was a stall warning. He checked the airspeed, which was between 80 kt and 90 kt, and the landing gear indications, which were correct. He was about to draw the pilot's attention to the audio warning when the bank angle increased significantly.

The passenger took the controls and applied full right aileron while pushing the power lever fully forward. He also pushed the control column forward, believing that the aircraft had stalled. He was aware that the pilot was also making control inputs at this time, and he thought it possible that opposing inputs may have been made.

### **Witness information**

Witnesses to the accident included three members of staff on duty at the airport. All three, who were used to observing normal aircraft operations, described the aircraft as being lower and much closer to the runway than usual. The aircraft's significantly different appearance prompted one of the witnesses to draw his colleague's attention to it before the accident occurred. The aircraft was described as turning with a high angle of bank when it rapidly rolled further left. It then rolled and yawed to the right. The nose dropped and the aircraft descended rapidly, although it was evident to one of the witnesses that the aircraft's attitude levelled in the final stages.

### **Aircraft flap system examination**

It was reported that the aircraft's flap control lever was found set to the 'UP' position, which was supported by photographic evidence from the accident site. The pilot thought he had selected landing flap while turning final. The passenger, who could not recall the flap selection, thought it possible he had knocked the lever forward to the 'UP' position while getting out of his seat.

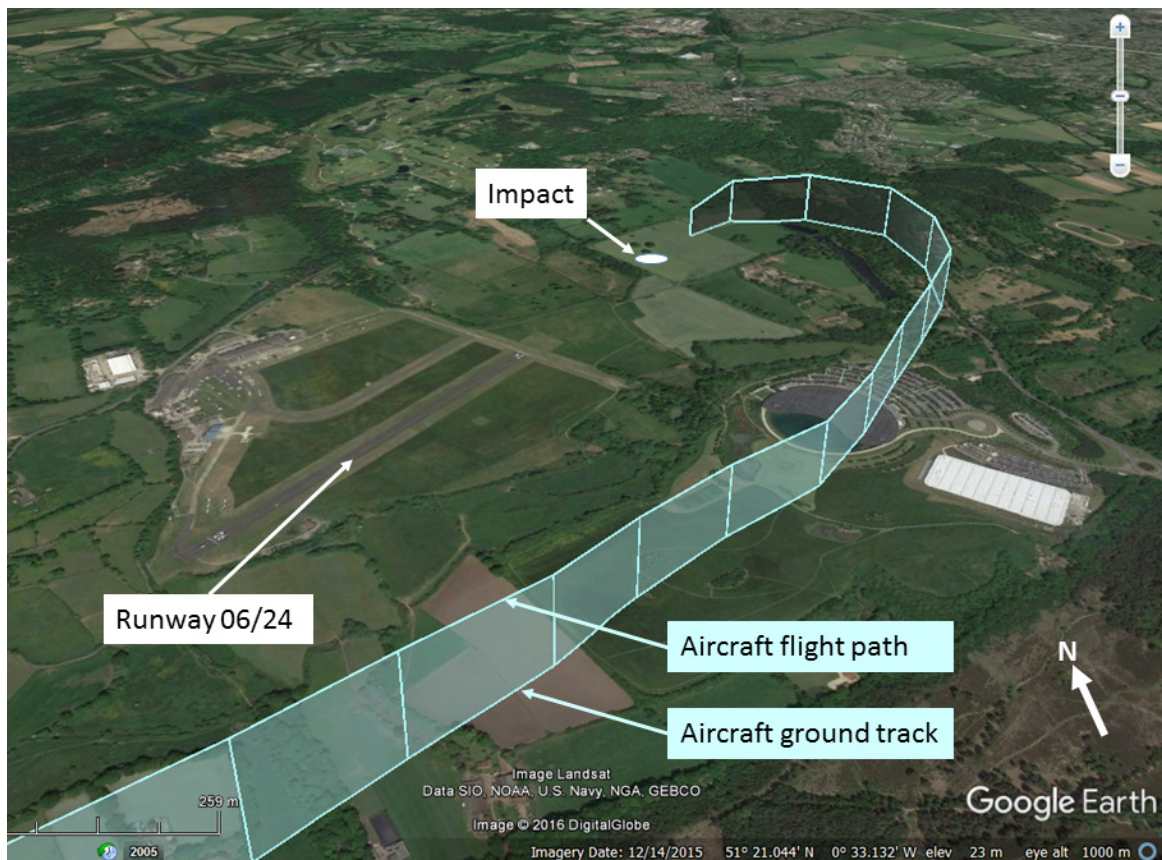
There was considerable disruption of the wing trailing edges and flap assemblies, although visual inspection suggested that the flaps had been at a setting between 'UP' and 'LANDING'. A technical examination revealed that the flaps had been set at the 'TAKEOFF' position at the time of the accident.

## Recorded information

The aircraft was fitted with an avionics suite capable of recording flight parameters on a miniaturised memory card, fitted in the front of the multi-function flight display and accessible in the cockpit. The memory card was not present in the aircraft as inspected after the accident. The aircraft was not fitted with a flight data recorder, nor was one required. Recorded radar data was available from radar heads at Heathrow, Pease Pottage and Bovingdon. The following information is based on the Heathrow data, which is shown in pictorial form at Figure 1.

Initially the aircraft tracked directly towards the airfield until, at a range of about 4,000 m, it deviated to the right to join a downwind leg for Runway 24. The aircraft descended as it did so, and passed abeam the Runway 24 threshold at a height of 400 to 500 ft agl. The height then remained constant until approaching the point of the accident.

The aircraft was 650 m displaced from the runway threshold as it passed abeam it. It maintained approximately straight flight for a further 15 seconds before starting a left turn. There were a further 5 radar returns, at 4 second intervals. The first two returns showed a turn rate of approximately 5°/second for the first part of the turn, which doubled to about 10°/second in the second part of the turn and immediately before the accident.



**Figure 1**  
Aircraft flight path (Heathrow radar data)

## Aircraft performance information

Information supplied by the pilot indicated that the aircraft mass was 2,706 kg at the time of the accident; the maximum landing mass was 3,186 kg.

The Pilot's Operating Handbook for the aircraft type listed stall speeds for various configurations, masses and angles of bank. By interpolation, stall speeds for an aircraft mass of 2,706 kg were calculated and are given in Table 1. The figures are applicable to flight with the landing gear down, flaps at the TAKEOFF and LANDING positions, and power at flight idle.

Aircraft Mass (kg) 2,706 kg	Angle of Bank			
	0°	30°	45°	60°
	Stall speed (KIAS)			
TAKEOFF flap	68	73	81	96
LANDING flap	59	63	70	83

**Table 1**

Aircraft stall speed: Gear down, flight idle

A continuous turn at 90 kt from a downwind heading onto the final approach track would have required a continuous bank angle of 35°. The aircraft's actual bank angle during the first and second parts of the finals turn were calculated from heading changes and apparent radius of turn, both derived from the radar data. The average angle of bank early in the turn was between 18-20°, which increased to about 40° as the turn progressed.

## Analysis

There were no indications that the aircraft had been subject to any defects or malfunctions that may have contributed to the accident. Reports from the two occupants, eye witness accounts and radar data all confirm that the aircraft commenced its final turn from a position closer to the runway than usual. This would have required a sustained moderate angle of bank through about 180° of turn.

The radar data indicates that the turn onto the final approach was initially flown with less angle of bank than required. The pilot therefore either lost visual contact with the runway or did not fully appreciate the turn requirements. An explanation for the latter might be that the low height on the downwind leg combined with the relatively poor visibility to produce a runway visual aspect that gave a false impression that the aircraft spacing was not abnormal.

As the finals turn progressed, there was a need to increase the angle of bank to a relatively high value. With the flaps remaining at the TAKEOFF setting, and maintaining level flight, this placed the aircraft close to its stalling speed. Any increase in angle of bank or 'g' loading (as may have occurred when it became evident that the aircraft would fly through the extended centreline) risked a stall.

The available evidence indicates that the aircraft stalled during the turn onto the final approach. Recovery actions taken by the occupants appear to have been partially successful, but there was evidently insufficient height in which to effect a full recovery.