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Australian Transport Safety Bureau

Engine power loss involving a SOCATA TB-10, VH-YTT

Parafield Airport, South Australia, 26 November 2013

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Addendum

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Engine power loss involving a SOCATA TB-10, VH-YTT

What happened

SOCATA TB-10 aircraft, VH-YTT

Source: Ryan Hothersall

At about 2015 Central Summer Time (CSuT) on 26 November 2013, a SOCATA TB-10 aircraft, registered VH-YTT, departed runway 21R at Parafield Airport, South Australia, for solo night circuits in visual meteorological conditions. After 1 hour of flying circuits the student pilot conducted a touch and go landing prior to a final full stop circuit. At about 200 feet above the ground (AGL) after take-off the student noticed a vibration with a loss of power from the engine. The student lowered the nose of the aircraft to regain airspeed. The engine power increased and the student raised the nose of the aircraft to the climb attitude. Severe vibration returned at about 400 feet AGL and the engine power reduced again, the nose of the aircraft lowered. The student looked ahead and down and was unable to see a clear block of dark ground. The student reported that the aircraft was over a heavily built up area. The aircraft engine was still producing some power, although level flight could not be maintained. The student initiated a gradual turn to the right until the large dark area of Parafield airport could be seen. The student navigated toward the airport. At about 2120, just passing over the airport fence the student broadcast on the CTAF that the engine had failed. There were about three other aircraft in the Parafield circuit. The student could see the white lights of the duty runway 21R/03L and the green lights of Bravo taxiway. The aircraft was at about 50 feet AGL and with partial engine power navigated toward the duty runway. The student broadcast on the CTAF at about 2121 the intention to land on the active runway. There were no other aircraft on final or landing on runway 21R. The engine power was cutting in and out as the aircraft touched down on runway 03L at about a 30 degree angle, the aircraft remained on the runway, rolled through and turned off onto taxiway B5 where the engine lost all power and the aircraft stopped on the taxiway. The student broadcast on the CTAF that the aircraft was clear of the runway. The student pilot was uninjured and the aircraft was not damaged.

Student pilot comment

The student reported that the engine run up prior to commencing circuits was all normal and there were no issues with any of the previous circuits. A take-off safety brief was conducted before take-off, including an engine failure or fire;

- prior to take-off,
- after takeoff with remaining runway,
- after take-off with no remaining runway and
- at night.

The student reported that when the engine initially lost power, a safe landing location could not be found ahead in the time available. The training received did not include turning back.

The student reported hearing the stall warning horn sounding at various stages of the flight. The student was aware that the other aircraft in the circuit were manoeuvring clear of YTT.

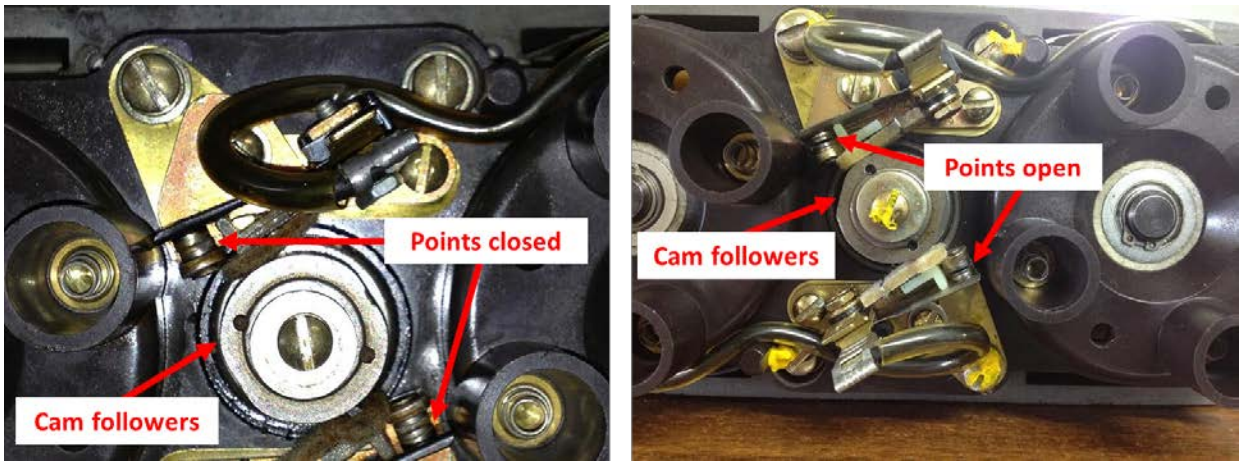
Operator investigation

The operator's investigation determined that the aircraft had tracked upwind about 1,000 meters and was approaching Mawson Lakes, which is a densely populated residential area with very few options for a safe landing, so the student decided to turn back towards the airport, avoiding a forced landing at night in a densely populated area.

The student flew back to the runway at an angle of about 30 degrees while remaining clear of obstacles, and touched down about 980 meters along runway 03L, stopping in the remaining 470 meters. The flying school duty night supervisor was heard broadcasting on the CTAF instructing all other circuit traffic not to land and to continue circling.

An examination was conducted of the aircraft engine and the magneto cam followers were found damaged, resulting in the left and right magneto breaker points being failed closed (Figure 1). The operator found that the magneto cap was not grounded and suspected faulty magneto capacitors, resulting in the aircraft engine power loss and subsequent failure. The operator reported that the magneto was installed on the new engine by the manufacturer and at the time of the incident the engine had operated for 283 hours.

Figure 1: YTT magneto with points failed closed **New magneto showing the points open**



Source: Aircraft operator

Safety action

Whether or not the ATSB identifies safety issues in the course of an investigation, relevant organisations may proactively initiate safety action in order to reduce their safety risk. The ATSB has been advised of the following proactive safety action in response to this occurrence.

Aircraft operator

As a result of this occurrence, the aircraft operator has advised the ATSB that they are taking the following safety actions:

- The program of maintenance for the TB10 aircraft will include a visual inspection of the magneto 'cam followers' at more regular intervals.
- The TOSB "Take-off Safety Brief" should not only consider an engine failure, but also possible actions if a partial power loss is experienced.
- Two other TB10 aircraft with new engines had similar components; these aircraft were subsequently removed from service and the magnetos were replaced. There was no evidence to suggest that the components removed from either of these aircraft had a similar defect or problem.

Safety message

Partial engine power loss is when the engine provides less power than commanded by the pilot, but more power than idle thrust. This kind of power loss is more complex than a complete failure, and it can be much harder to stay ahead of the aircraft. The pilot is thrust into a situation where the engine is still providing some power; however, the power may be unreliable and the reliability may be difficult to assess. As a result, pilots are uncertain about the capabilities of their aircraft, and what their options are-a situation that has led to loss of aircraft control at heights close to the ground, and fatal outcomes. And because it's not a substantial part of flight training, pilots tend not to think about it beforehand. Compared to the scenario of total power loss after take-off, they don't think about how they would react in such a scenario. As a result, when it does happen, it can turn into disaster very easily.

Partial power loss occurrences have a very broad range of characteristics by nature. The most effective risk control method for managing these occurrences may be significantly different between pilots of varying experience and training, aircraft models and the environmental conditions.

The ATSB booklet *Avoidable Accidents No. 3 - Managing partial power loss after take-off in single-engine aircraft* (available at www.atsb.gov.au/publications/2010/avoidable-3-ar-2010-055.aspx) aims to increase awareness among flying instructors and pilots of the issues relating to partial power loss after takeoff in single-engine aircraft. Accident investigations have shown that a significant number of occurrences result in fatalities or serious injury due to the aircraft stalling and subsequent loss of control resulting in a collision with the ground or water.

Historically, the simulated total loss of power and subsequent practice forced landing has been the core of a pilot's emergency training. The data has shown that during and after take-off, a partial power loss is three times more likely in today's light single-engine aircraft than a complete engine failure.

While acknowledging the difficulty of attempting to train pilots for a partial power loss event which has an almost infinite variability of residual power and reliability, analysis of the occurrences supports the need to raise greater awareness of the hazards associated with partial power loss and to better train pilots for this eventuality.

The booklet highlights the importance of:

- pre-flight decision making and planning for emergencies and abnormal situations for the particular aerodrome
- conducting a thorough pre-flight and engine ground run to reduce the risk of a partial power loss occurring
- taking positive action and maintaining aircraft control either when turning back to the aerodrome or conducting a forced landing until on the ground, while being aware of flare energy and aircraft stall speeds.

General details

Occurrence details

Date and time:	26 November 2013 – 2121 CSuT	
Occurrence category:	Incident	
Primary occurrence type:	Engine power loss	
Location:	Parafield Airport, South Australia	
	Latitude: 34° 47.78'S	Longitude: 138° 38.12' E

Aircraft details

Manufacturer and model:	SOCATA.- Groupe Aerospatiale TB-10	
Registration:	VH-YTT	
Serial number:	1602	
Type of operation:	Flying training - Solo	
Persons on board:	Crew – 1	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

About the ATSB

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The ATSB is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; and fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

About this report

Decisions regarding whether to conduct an investigation, and the scope of an investigation, are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, a limited-scope, fact-gathering investigation was conducted in order to produce a short summary report, and allow for greater industry awareness of potential safety issues and possible safety actions.