



Australian Government

Australian Transport Safety Bureau

Engine failure and forced landing involving Jabiru SP500, 19-5503

14 km N of Boonah (ALA), Queensland, 11 September 2016

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Addendum

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Engine failure and forced landing involving Jabiru SP500, 19-5503

What happened

On 11 September 2016, at about 1000 Eastern Standard Time (EST), a Jabiru SP500 aircraft registered 19-5503 (5503), departed Caboolture Airfield, Queensland (Qld), for a flight to Boonah Airfield, Qld. The pilot was the only person on board.

As the aircraft approached Boonah Airfield, the pilot observed large white crosses on the runway indicating the airfield was closed. The pilot elected to return to Caboolture and applied engine power to climb to cruise altitude.

At about 1055, the aircraft climbed to the north of Boonah. At a height of about 1,000 ft above ground level, the pilot noticed the engine RPM reducing and applied full throttle. At the same time, the pilot observed a low and fluctuating engine oil pressure indication. Within seconds, the engine failed and the propeller stopped rotating. The pilot broadcast a MAYDAY¹ call on the Amberley common traffic advisory frequency. Air traffic control staff at RAAF Base Amberley received the MAYDAY broadcast and initiated an emergency response.

The pilot identified a paddock to the north of their position as suitable for a forced landing. They manoeuvred the aircraft to conduct a forced landing into the paddock (Figure 1). The pilot ensured that turns made during the forced landing were not tight and of low bank angle to avoid an aerodynamic stall. Late in the ground roll, the nose wheel dug into the soft surface (Figure 2), the aircraft tipped onto its nose and the right wingtip struck the ground. The aircraft then stopped and settled onto its wheels. The pilot was not injured and the aircraft sustained minor damage.

Figure 1: 19-5503 after the forced landing



Source: Pilot

¹ MAYDAY: an internationally recognised radio call announcing a distress condition where an aircraft or its occupants are being threatened by serious and/or imminent danger and the flight crew require immediate assistance.

Figure 2: 19-5503 after the forced landing



Source: Pilot

Engineering details and examination

5503 is an owner built and maintained aircraft. The engine fitted to 5503 was manufactured in 2001.

A post incident examination of the engine found the engine oil pump drive had failed.

Due to the limited scope of this investigation a post incident engineering examination was not conducted. The cause of the oil pump drive failure was not determined.

Previous occurrences

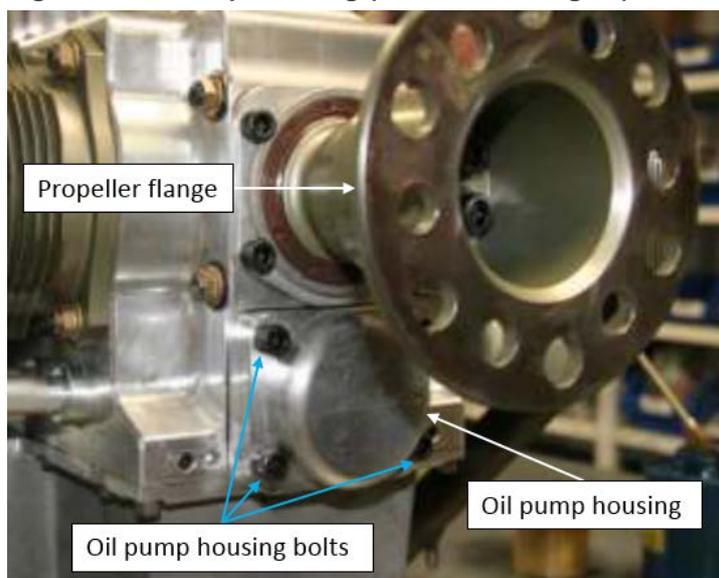
Jabiru advised that they are aware of one previous oil pump drive failure. In the previous occurrence the manufacturer found the engine maintainer had tightened the oil pump housing bolts (Figure 3) unevenly.

The Jabiru [engine overhaul manual](#) part 7.8.17 contains the following guidance on this part of the engine assembly:

Fit the outer pump housing over the gears and insert & hand tighten the retaining cap screws. Use Loctite 243 on the threads and ensure the Jabiru bird is oriented correctly.

While the housing is still loosely held to the engine, rotate the crankshaft through at least 2 full revolutions. This turns the cam and allows the oil pump to find its preferred position. The housing can now be tightened to the value given in Table 9.² Failure to turn the engine can result in the oil pump being offset from the cam axis – this applies side loads to the cam and can eventually crack it or break the tip off altogether.

² Table 9 of the Jabiru engine overhaul manual.

Figure 3: Oil Pump Housing (not incident engine)

Source: Jabiru

ATSB comment

In December 2014, the Civil Aviation Safety Authority (CASA) introduced instrument [294/14](#) imposing operation limitations on aircraft fitted with Jabiru engines. In July 2015, this instrument expired and was replaced by instrument [102/15](#).

In July 2016, instrument 102/15 expired. CASA then introduced instrument 65/16 – [Conditions and direction concerning certain aircraft fitted with engine manufactured by Jabiru Aircraft Pty Ltd.](#) removing restrictions on Jabiru engines which met criteria detailed within the instrument.

The engine fitted to the aircraft was a Generation 1³ engine. The pilot reported that the engine was maintained in accordance with Jabiru directions and complied with all Service Bulletins and Service Letters.

The ATSB determined that the operational restrictions imposed by instrument 65/16 did not apply to this aircraft.

Findings

These findings should not be read as apportioning blame or liability to any particular organisation or individual.

- The oil pump drive failed leading to engine failure and forced landing.
- The soft surface of the paddock used for the forced landing resulted in damage to the landing gear.

Safety message

This incident is a good example of the effect an in-flight engine failure at a low altitude has on the time available to manage that failure and identify a suitable forced landing area.

The ATSB booklet Avoidable Accidents No. 3 - [Managing partial power loss after take-off in single-engine aircraft](#) contains information that is also relevant to a complete engine power loss in flight.

³ A Jabiru 3300 engine in the manufacturer serial number range 33A0001 – 33A0960.

The booklet shows that you can prevent or significantly minimise the risk of damage following a partial or complete engine power loss by using the strategies below:

- 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:	11 September 2016 – 1055 EST	
Occurrence category:	Serious incident	
Primary occurrence type:	Engine failure of malfunction	
Location:	14 km N of Boonah (ALA), Queensland	
	Latitude: 27° 53.930' S	Longitude: 152° 42.100' E

Aircraft details

Manufacturer and model:	Jabiru Aircraft SP500	
Registration:	19-5503	
Serial number:	504	
Type of operation:	Private – Pleasure/Travel	
Persons on board:	Crew – 1	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Minor	

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 operations involving the travelling public.

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.