LIMITED OCCURRENCE INVESTIGATION REPORT – FINAL

Reference Number	CA18/3/2/1503						
Classification	Serious Incident	**Date**	15 September 2025	**Time**	0620Z		
Type of Operation	Training (Part 141)						
Location							
Place of Departure	Herminie Farm, near Hartswater, Northern Cape Province	Place of Intended Landing	Herminie Farm, near Hartswater, Northern Cape Province				
Place of Occurrence	On a field in Hermine Farm near Hartswater, Northern Cape Province						
GPS Co-ordinates	Latitude	27°47'48.58" S	Longitude	024°56'49.40" E	Elevation	4 228 feet	
Aircraft Information							
Registration	ZU-FSF						
Make; Model; S/N	Shadow Lite, Jabiru J430 (Serial Number: 825)						
Damage to Aircraft	Minor	Total Aircraft Hours	644.4				
Pilot-in-command							
Licence Type	Student Pilot Licence (SPL)	Gender	Female	Age	42		
Licence Valid	Yes	Total Hours	24.5	Total Hours on Type	24.5		
Total Hours 30 Days	14.1	Total Flying on Type Past 90 Days	24.5				
People On-board	1 + 0	**Injuries**	0	**Fatalities**	0	**Other (on ground)**	0

What Happened

On Monday morning, 15 September 2025, a student pilot (SP) on-board a Jabiru J430 aircraft with registration ZU-FSF took off from Herminie Farm near Hartswater in Northern Cape province with the intention to land back at the same farm. The flight was conducted under visual meteorological conditions (VMC) by day and under the provisions of Part 141 of the Civil Aviation Regulations (CAR) 2011 as amended.

Before the SP undertook the solo flight, she flew four circuits with a flight instructor. After landing the aircraft and the flight instructor had disembarked, she continued with her solo circuit training. The first circuit was uneventful. During the second circuit, she decided to conduct a go-around as she was not satisfied with the approach. Whilst at a height of approximately 1 000ft above ground level, she heard an unfamiliar noise emanating from the engine. Shortly thereafter, the engine failed. She tried to restart the engine but was not successful. As a result, she performed a forced landing on a field in a farm.

The aircraft sustained damage to the left main gear strut and the left-wing tip which struck the ground. The pilot was not injured.

The serious incident occurred during daylight at Global Positioning System (GPS) co-ordinates determined to be 27°47'48.58" South 024°56'49.40" East, at an elevation of 4 228 ft.

Figure 1: An aerial view of the serious incident site in relation to the take-off farm. (Source: Google Earth)

Figure 2: The aircraft in its final position at the serious incident site. (Source: Pilot)

Engine Teardown Inspection

The engine, a Jabiru 3300A with Serial Number 33A2485, had accumulated 644.4 hours since new. The engine was removed from the airframe and was sent to the aircraft manufacturer in George where a teardown inspection was conducted.

No external damage was visible to the engine assembly. The engine could not be turned by hand, and the crankshaft movement was limited to approximately 30°; this indicated possible internal damage.

The removal of the cylinder heads revealed a critical issue with cylinder Number 5:

1. The piston from cylinder Number 5 was destroyed, with some debris scattered throughout the engine as observed in the oil sump and oil filter that were cut open.
2. The Number 5 cylinder head displayed damage associated with debris from the broken piston.
3. The exhaust valve was found bent.
4. The connecting rod (Conrod) of cylinder Number 5 was bent, with the gudgeon pin still attached.
5. Witness marks of the Number 5 piston were evident on the trust face of the barrel which were caused by the dislodged circlip.

6. One circlip was found amongst the debris in the barrel. The said circlip was bent to the degree that the circumference was reduced in size.
7. The other circlip that had dislodged had become unrecognisable in the debris.

Figure 3: The damage that was sustained by piston Number 5.

Figure 4: The bent exhaust valve.

Figure 5: The bent conrod inside the barrel.

Figure 6: The bent conrod with gudgeon pin.

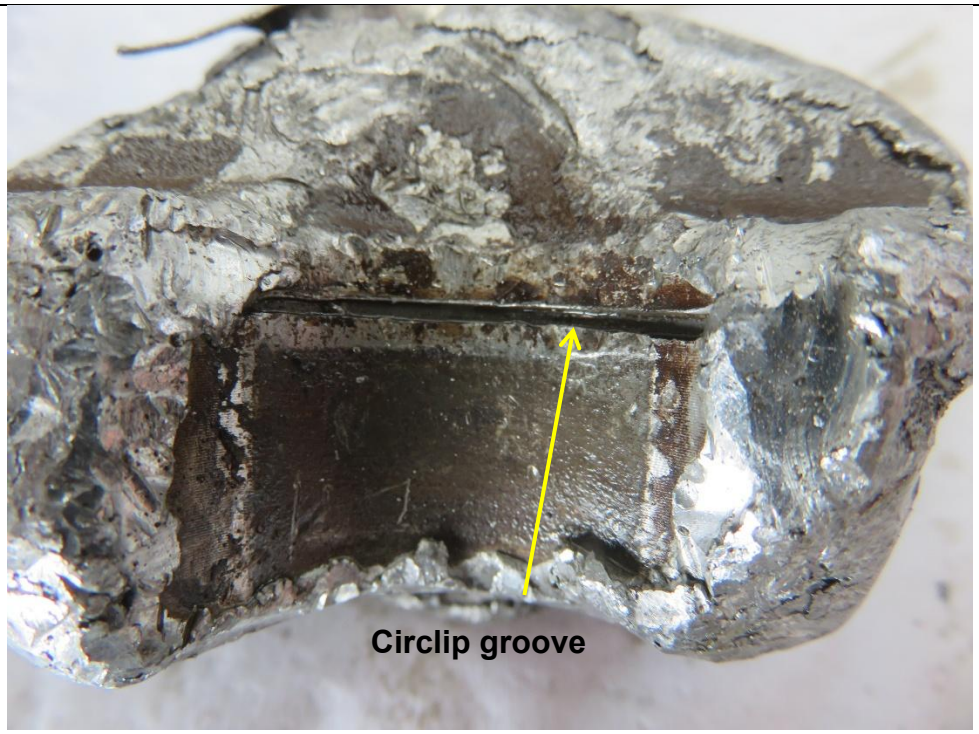

Figure 7: The damaged piston. The yellow arrow shows the damage groove of the circlip that was dislodged.

The circlip groove in Figure 7 is rough (unsmooth) and smaller in size compared to a standard circlip groove. The investigator assessed that the circlip might have dislodged from one of the sides first, as it appeared damaged compared to the one in Figure 8.

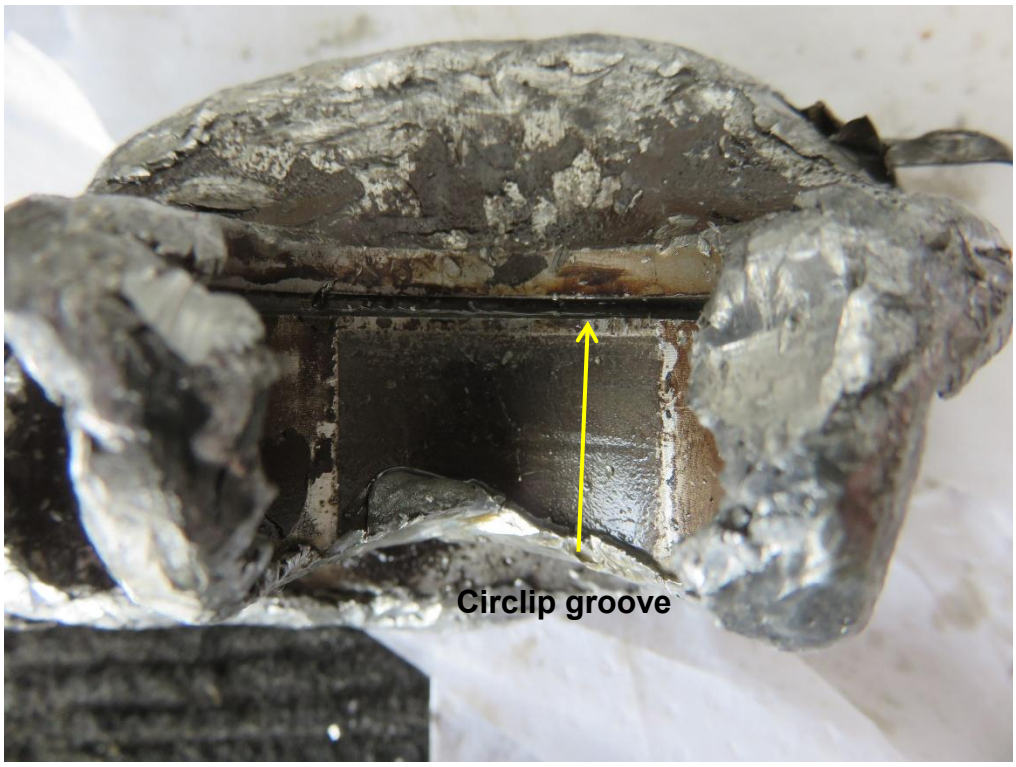

Figure 8: The damaged piston. The yellow arrow shows the undamaged groove of the circlip.

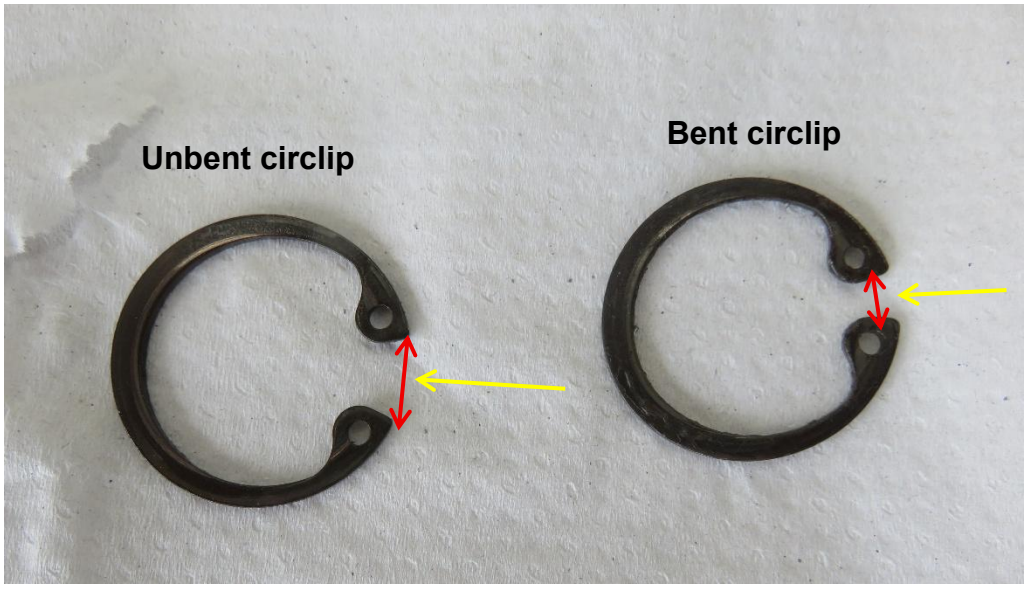

Figure 9: The bent circlip vs an original size circlip.

Gudgeon Pin Circlips (Source: Jabiru Service Letter-JSL 023-1)

"There is a correct and incorrect method of installing gudgeon pin circlips in Jabiru engines. If the circlip is not installed with the correct orientation or is not quite seated properly, the chance of a circlip becoming unseated is increased. If the circlip becomes unseated, the result is engine failure."

A circlip can dislodge due to improper installation. This could cause the gudgeon (wrist) pin to move axially which would lead to catastrophic engine failure. Contributing factors include incorrect orientation, insufficient compression during installation, worn piston grooves or a bent connecting rod which could hammer the circlip out of its groove.

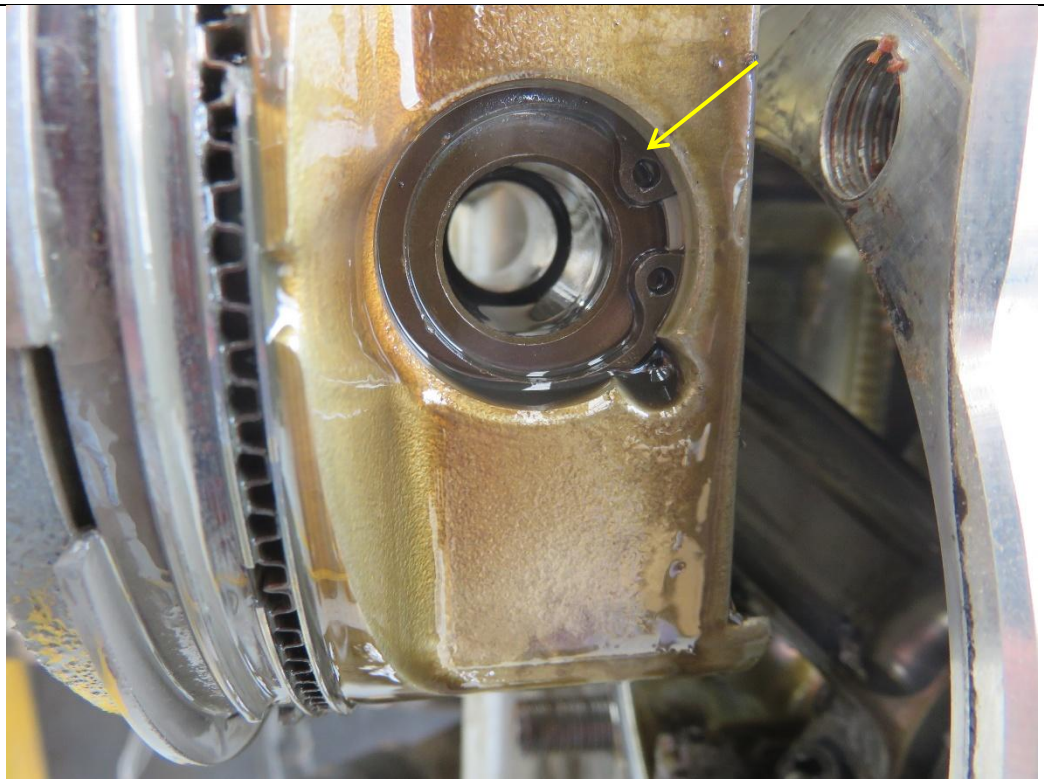

Figure 10: An example of an installed circlip from another piston on the same engine.

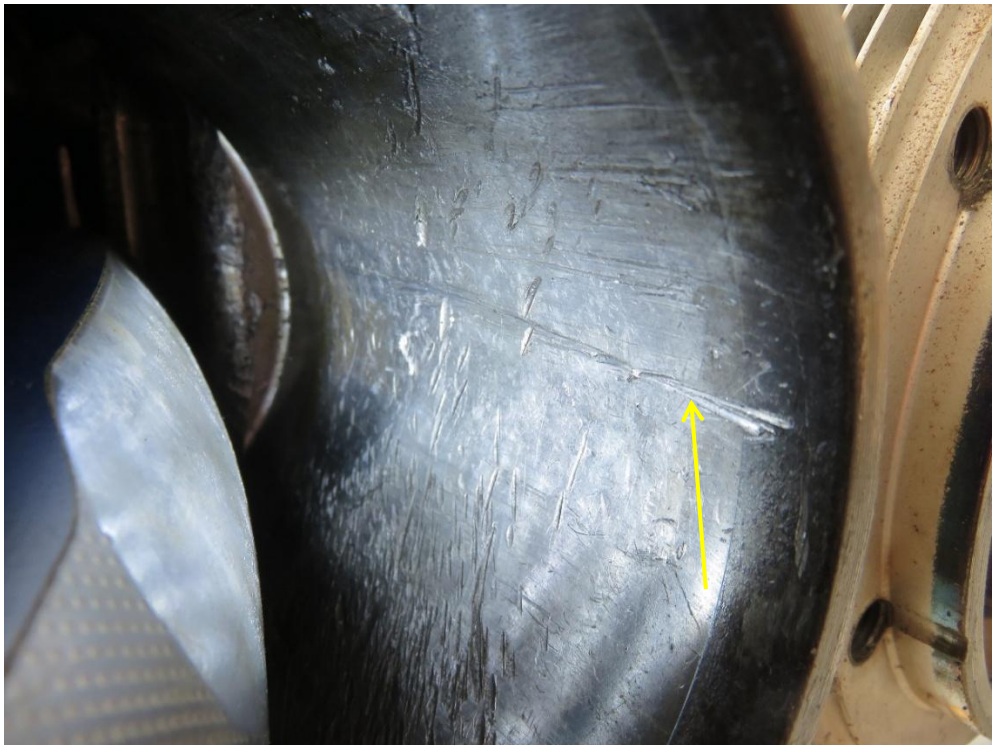

Figure 11: Witness marks on the trust face of the barrel.

Meteorological Information

The following meteorological aerodrome report (METAR) was issued by the South African Weather Service (SAWS) for Kimberley Aerodrome (FAKM) on 15 September 2025 at 0600Z. The serious incident site is 60 nautical miles (nm) to the south of FAKM.

FAKM 150600Z 36003KT CAVOK 17/M04 Q1020 NOSIG=

Wind Direction	360˚	Wind Speed	3kt	Visibility	9999
Temperature	17˚C	Cloud Cover	CAVOK	Cloud Base	Nil
Dew Point	-4˚C	QNH	1020hPa		

Findings

1. Pilot information

1.1 The student pilot (SP) had a Student Pilot Licence (SPL) that was initially issued by the Regulator (SACAA) on 27 February 2025. She had flown a total of 24.5 hours on the aircraft type.

1.2 The SP had a Class 2 aviation medical certificate that was issued on 5 February 2025 with an expiry date of 4 February 2027.

2. Aircraft

2.1 The aircraft was manufactured in 2012 and had no prior history of being involved in a serious incident or accident. The engine had not yet reached its time between overhaul (TBO) limits. It was the same engine that was fitted to the airframe at the time of manufacture. There was no noticeable work that was performed on the engine during its service life.

2.2 The last maintenance inspection of the aircraft was conducted and certified on 10 July 2025 at 637.1 airframe hours. The aircraft had flown a further 7.3 hours after the inspection.

2.3 The aircraft Certificate of Registration (C of R) was issued to the present owner on 6 September 2024.

2.4 The aircraft had a valid Authority-to-Fly (ATF) Certificate that was issued by the Regulator on 13 June 2019. It was renewed on 10 April 2025 with an expiry date of 30 June 2026. The aircraft was airworthy when it was dispatched for the flight.

2.5 The aircraft Certificate of Release to Service (CRS) was issued on 10 July 2025 by an aircraft maintenance organisation (AMO). The CRS was valid until 30 June 2026 or at 662.1 airframe hours, whichever comes first.

3. Approved Training Organisation (ATO)

3.1 The ATO was issued an Approved Training Organisation Certificate by the Regulator (SACAA) on 17 August 2022 with an expiry date of 31 July 2027.

4. Meteorological Information

4.1 Fine weather conditions prevailed at the time of the flight. The weather had no bearing on this serious incident.

Probable Cause(s)

One of the circlips holding the gudgeon pin in position on the Number 5 piston dislodged or failed which led to an uneven load distribution and the subsequent piston failure. As a result, the engine failed, followed by an unsuccessful forced landing.

Contributing Factor(s)

None.

Safety Action(s)

None.

Safety Message and/or Safety Recommendation/s

None.

About this Report

The decision to conduct a limited investigation is based on factors including whether the cause is known and the evidence supporting the cause is clear, the level of safety benefit likely to be obtained from an investigation and that will determine the scope of the investigation. For this occurrence, a limited investigation has been conducted, and the Accident and Incident Investigations Division (AIID) has relied on the information submitted by the affected person/s and organisation/s to compile this limited report. The report has been compiled using information supplied in the initial notification, as well as from follow-up desk top enquiries to bring awareness of potential safety issues to the industry in respect of this occurrence, as well as possible safety action/s that the industry might want to consider in preventing a recurrence of a similar occurrence.

All times given in this report are Co-ordinated Universal Time (UTC) and will be denoted by (Z). South African Standard Time is UTC plus 2 hours.

Purpose

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (CAR) 2011 and ICAO Annex 13, this report was compiled in the interest of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and not to apportion blame or liability.

Disclaimer

This report is issued by:

Accident and Incident Investigations Division
South African Civil Aviation Authority
Republic of South Africa