



AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:		CA18/2/3/10569	
Aircraft Registration	ZU-MJM	Date of Accident	23 March 2025		Time of Accident	0745Z	
Type of Aircraft	Jabiru J430			Type of Operation	Private (Part 94)		
Pilot-in-command Licence Type	Private Pilot Licence (PPL)		Age	22	Licence Valid	No	
Pilot-in-command Flying Experience	Total Flying Hours			262.2	Hours on Type	158.9	
Last Point of Departure	R100 Nandoni Private Airstrip, Limpopo Province						
Next Point of Intended Landing	Louis Trichardt Aerodrome (FALO), Limpopo Province						
Damage to Aircraft	Destroyed						
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
On a field, approximately 1.2 nautical miles (nm) south-west of PR Mphephu Aerodrome (FATH) in Levubu area at GPS co-ordinates 23° 4'58.97" S 30°21'5.80" E							
Meteorological Information	Surface wind: light and variable; Visibility: 5000m; Temperature: 25°C; Dew: point: unknown; Clouds: BKN; Cloud base: 3000 ft; QNH: unknown						
Number of People on board	1+2	Number of People Injured	3	Number of People Killed	0	Other (On Ground)	0
Synopsis							
<p>On Sunday morning, 23 March 2025 at approximately 0735Z, a pilot and two passengers on-board a Jabiru J430 aircraft registered ZU-MJM were engaged in a private flight from R100 Nandoni private airstrip in Thohoyandou, Limpopo province, to Louis Trichardt Aerodrome (FALO) in the same province when the accident occurred. The aircraft took off from Runway (RWY) 14 and climbed to 2 000 feet (ft) above ground level (AGL). Whilst en route to FALO, cruising abeam PR Mphephu Aerodrome (FATH), the aircraft's engine ran rough. The pilot switched on the carburettor heat to avoid a possible carburettor icing and attempted to land the aircraft on RWY 10 at FATH but changed his plan when he noticed the trees before the runway threshold. Soon after, the engine stopped and the pilot attempted to restart the engine but without success. He then decided to conduct a forced landing on a field approximately 1.2 nautical miles (nm) south-west of FATH in Levubu residential area. The aircraft first contacted the ground with the right wing and the right main landing gear. The left-wing tip struck a tree, followed by the left horizontal stabiliser which also impacted the tree. The aircraft came to rest approximately 20 metres (m) from the first point of impact.</p> <p>The pilot freed the two passengers from their seat harnesses and pulled them out of the aircraft. The three occupants had sustained minor to serious injuries and were transported to different hospitals in the province. The aircraft was destroyed.</p> <p>Post-accident examination of the engine, which was undertaken by the aircraft maintenance organisation (AMO) and the University of Pretoria (UP), revealed that the exhaust valve had separated at the collet (valve keeper) area and this resulted in an engine stoppage.</p>							
Probable Cause/s and/or Contributory Factors							
Unsuccessful forced landing on a field near FATH following an engine stoppage which was caused by cylinder Number 6 exhaust valve that failed on the collet grooves area due to fatigue fracture which had progressed over time.							
SRP Date	10 March 2026			Publication Date	11 March 2026		

Occurrence Details

Reference Number	: CA18/2/3/10569
Occurrence Category	: Category 1 (Accident)
Type of Operation	: Private (Part 94)
Name of Operator	: Thabi's Funeral Services and Tombstones CC
Aircraft Registration	: ZU-MJM
Aircraft Make and Model	: Jabiru J430
Nationality	: South African
Place	: Levubu residential area, GPS 23° 4'58.97" S 30°21'5.80" E
Date and Time	: 23 March 2025 at 0745Z
Injuries	: 2 seriously injured; 1 minor injury
Damage	: Destroyed

Purpose of the Investigation

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (CAR) 2011, 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.

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.

Investigation Process

The Accident and Incident Investigations Division (AIID) was notified of the occurrence that happened on 23 March 2023 at 0745Z. The occurrence was classified as an accident according to the CAR 2011 Part 12 and the International Civil Aviation Organisation (ICAO) STD Annex 13 definitions. Notification was sent to the State of Registry in accordance with the CAR 2011 Part 12 and the ICAO Annex 13 Chapter 4. An investigator was dispatched to the accident site.

Notes:

- Whenever the following words are mentioned in this report, they shall mean the following:
Accident — this investigated accident
Aircraft — the Jabiru J430 involved in this accident
Investigation — the investigation into the circumstances of this accident
Pilot — the pilot involved in this accident
Report — this accident report*
- Photos and figures used in this report were taken from different sources and may have been adjusted from the original for the sole purpose of improving clarity of the report. Modifications to images used in this report were limited to cropping, magnification, file compression; or enhancement of colour, brightness, contrast; or addition of text boxes, arrows, or lines.*

Disclaimer

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Abbreviation	Description
°	Degrees
°C	Degrees Celsius
AGL	Above Ground Level
AIID	Accident and Incident Investigations Division
AP	Approved Person
ASI	Airspeed Indicator
ATC	Air Traffic Control
ATF	Authority-to-Fly
C of R	Certificate of Registration
CRS	Certificate of Release to Service
EDS	Energy-Dispersive X-ray Spectroscopy
FALO	Louis Trichardt Aerodrome
FATH	PR Mphephu (Thohoyandou)
ft	Feet
hPa	Hectopascal
kt	Knots
L	Litres
m	Metres
METAR	Meteorological Aerodrome Report
MLG	Main Landing Gear
nm	Nautical Miles
QNH	Altitude Above Mean Sea Level
RWY	Runway
SACAA	South African Civil Aviation Authority
SAWS	South African Weather Service
UP	University of Pretoria
UTC	Co-ordinated Universal Time
VMC	Visual Meteorological Conditions
Z	Zulu (Term for Universal Co-ordinated Time - Zero Hours Greenwich)

1. FACTUAL INFORMATION

1.1. History of Flight

- 1.1.1. On Sunday morning, 23 March 2025, a pilot and two passengers on-board a Jabiru J430 aircraft registered ZU-MJM were engaged in a private flight from R100 Nandoni private airstrip in Thohoyandou, Limpopo province, to Louis Trichardt Aerodrome (FALO) in the same province when the accident occurred. The flight was conducted under visual meteorological conditions (VMC) by day and under the provisions of Part 94 of the Civil Aviation Regulations (CAR) 2011 as amended.
- 1.1.2. The pilot stated that on 22 March 2025, he uplifted 84 litres (L) of Octane 95 Unleaded fuel in the tanks to make a total of 140L (full tanks). He flew the aircraft for about 1 hour on the same day. On 23 March 2025, he performed the pre-flight inspection of the aircraft with no anomalies noted. The pilot monitored the passengers as they boarded the aircraft and, later, conducted a short emergency briefing with them. Thereafter, he started the engine and completed the run-up checks before lining up on Runway (RWY) 14 R100 Nandoni private airstrip for take-off. The aircraft took off and climbed to 2 000 feet (ft) above ground level (AGL). Approximately 8 minutes into the flight whilst cruising abeam the PR Mphephu (Thohoyandou) Aerodrome (FATH), the engine ran rough and, subsequently, lost power. The pilot initiated a left turn to line up for RWY 10 at FATH; moreover, he switched on the carburettor heat to avoid a possible carburettor icing.
- 1.1.3. As the aircraft approach RWY 10, the pilot realised that the aircraft was descending faster than expected; additionally, there was a line of trees on the aircraft's approach path just before the threshold; the engine stopped a few moments later. The pilot attempted to restart it but was unsuccessful. He then deduced that it would be impossible to clear the trees with no power. He turned the aircraft to the right (back to the original path) and identified a field on his flight path in Levubu residential area. He selected the first stage flaps and, just before touching down on the identified field, he noticed a tree to his left and banked right to clear it. The aircraft first contacted the ground with the right wing and the right main landing gear (MLG). The left-wing tip struck a tree, followed by the left horizontal stabiliser which also impacted the tree. The aircraft came to rest approximately 20 metres (m) from the first point of impact.
- 1.1.4. After the aircraft had stopped, the pilot assisted the passengers by freeing them from their seat harnesses and pulled them out of the aircraft. The pilot and the passenger who was seated on the front right seat sustained serious injuries; the passenger seated in the back seat sustained minor injuries. The pilot used his mobile phone to call for help. According to the aircraft's clock, the accident occurred at 0745Z. The pilot was airlifted to a nearby hospital

and was later transferred to Polokwane Medi Clinic. The two passengers were transported by road to Polokwane Medi Clinic.

- 1.1.5. The accident occurred during daylight on a field in Levubu residential area, approximately 1.2 nautical miles (nm) south-west of FATH RWY 10 threshold and at Global Positioning System (GPS) co-ordinates determined to be 23° 4'58.97" South 30°21'5.80" East, at an elevation of 2077 feet (ft).

1.2. Injuries to Persons

Injuries	Pilot	Crew	Pass.	Total On-board	Other
Fatal	-	-	-	-	-
Serious	1	-	1	2	-
Minor	-	-	1	1	-
None	-	-	0	0	-
Total	1	-	2	3	-

Note: Other means people on the ground.

- 1.2.1. The pilot and the passenger who was seated on the right front seat sustained serious injuries; the passenger who was seated in the back seat sustained minor injuries.

1.3. Damage to Aircraft

- 1.3.1. The aircraft was destroyed.



Figure 1: The wreckage at the accident site.

1.4. Other Damage

1.4.1. None.

1.5. Personnel Information

Nationality	South African	Gender	Male	Age	22
Licence Type	Private Pilot Licence (PPL)				
Licence Valid	No	Type Endorsed	Yes		
Ratings	Night				
Medical Expiry Date	01 April 2026				
Restrictions	None				
Previous Accidents	Yes. 21 April 2024 (Ref: CA18/2/3/10446)				

Note: Previous accidents refer to past accidents the pilot was involved in, when relevant to this accident.

Flying Experience:

Total Hours	262.2
Total Past 24 Hours	1.0
Total Past 7 Days	1.0
Total Past 90 Days	6.0
Total on Type Past 90 Days	6.0
Total on Type	158.9

1.5.1. The pilot had a Private Pilot Licence (PPL) that was initially issued on 18 December 2021 with an expiry date of 31 December 2024. The licence was invalid at the time of the accident on 23 March 2025. The pilot had contravened Part 61.01.5 (1) of the CAR 2011.

1.5.2. The pilot's Class 2 medical certificate was issued on 1 April 2021 with an expiry date of 1 April 2026 with no restrictions.

1.6. Aircraft Information

1.6.1. Aircraft Description (Source: Pilot's Operating Handbook [POH])

The Jabiru J430 is a two-seat high-wing light aircraft of composite construction with a maximum all-up weight of 450 kilograms (kg). It is powered by a Jabiru 2200A engine with a directly driven, two-bladed, fixed-pitch wooden propeller. Pitch and roll control are from a centrally mounted control column, yaw control is from rudder pedals in both the left and right footwells. A lever mounted on the roof to the left of the pilot's seat operates the flaps. An engine throttle lever is provided for each pilot.

Airframe:

Manufacturer/Model	Shadow Lite CC/Jabiru J430	
Serial Number	513	
Year of Manufacture	2020	
Total Airframe Hours (At Time of Accident)	926.8	
Last Annual Inspection (Date & Hours)	31 July 2024	881.1
Airframe Hours Since Last Inspection	45.7	
CRS Issue Date	02 August 2024	
ATF (Issue Date & Expiry Date)	31 July 2024	30 July 2025
C of R (Issue Date) (Present Owner)	27 February 2024	
Operating Category	Unleaded Octane 95	
Type of Fuel Used	Part 94	
Previous Accidents	On 21 April 2024, the pilot aborted take-off due to a bug that had lodged in the pitot tube and, as a result, caused the airspeed readings to remain at zero. The pilot could not bring the aircraft to a safe stop on the remaining runway, and he decided to exit to the right to minimise damage (AIID file number is CA18/2/3/10446).	

Note: Previous accidents refer to past accidents the aircraft was involved in, when relevant to this accident.

Engine:

Manufacturer/Model	Jabiru Aircraft (Pty) Ltd / Jabiru 2200A
Serial Number	33A1746
Hours Since New	926.8
Hours Since Overhaul	Time Between Overhaul (TBO) interval is 1 000 hours

Propeller:

Manufacturer/Model	P-Prop / FEG8
Serial Number	N4255
Hours Since New	45.7
Hours Since Overhaul	On Condition

1.6.2. On 27 February 2024, there was a change of ownership to the current owner at 763.06 airframe hours.

1.6.3. On 21 April 2024, the aircraft had a propeller strike at 881 total airframe hours. A new propeller was installed, and an annual inspection was completed during the same period. A Certificate of Release to Service (CRS) was issued 2 August 2024.

1.6.4. The aircraft did not have unresolved defects recorded in the flight folio and had no outstanding airworthiness directives. The aircraft was airworthy when it was dispatched for the flight.

1.7. Meteorological Information

1.7.1. The weather information below was obtained from the Meteorological Aerodrome Report (METAR) that was issued by the South African Weather Service (SAWS) recorded on 23 March 2025 at 0715Z for Makhado Air Force Base, located 36.15nm from the accident site.

1.7.2. Based on the forecast, there was no clear indication that the weather conditions had contributed to the accident on 23 March 2025. However, it is important to note that there was limited data to analyse because of the data breach that SAWS experienced during the period when the accident occurred.

Wind Direction	Light and variable	Wind Speed	Light and variable	Visibility	5000m
Temperature	25°C	Cloud Cover	BKN	Cloud Base	3000
Dew Point	Unknown	QNH	Unknown		

1.8. Aids to Navigation

1.8.1. The aircraft was equipped with standard navigational equipment as approved by the Regulator (SACAA). There were no records indicating that the navigational equipment was unserviceable prior to the flight.

1.9. Communication

1.9.1. The aircraft was equipped with a standard communication system as approved by the Regulator (SACAA). There were no recorded defects with the communication system prior to the flight.

1.10. Aerodrome Information

Aerodrome Name	PR Mphephu Aerodrome (FATH)
Aerodrome Location	Thohoyandou, Limpopo Province
Aerodrome Status	Unlicenced
Aerodrome GPS co-ordinates	23° 4'40.33" South, 30°22'55.63" East
Aerodrome Elevation	2013ft

Runway Headings	10/28
Dimensions of Runway Used	46m X 4020mm
Heading of Runway Used	090°T
Surface of Runway Used	Tared
Approach Facilities	None
Radio Frequency	119.8-MHz

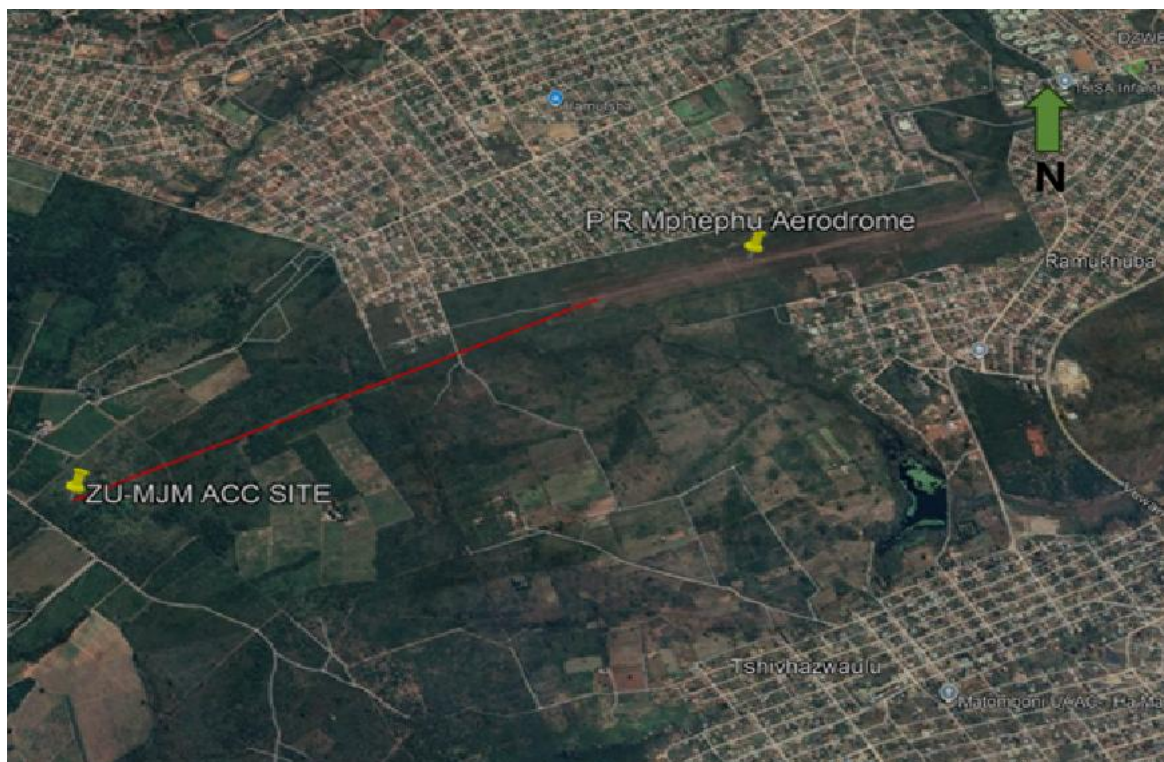


Figure 2: An aerial view of FATH and the accident site. (Source: Google Earth)

1.11. Flight Recorders

1.11.1. The aircraft was neither equipped with a flight data recorder (FDR) or a cockpit voice recorder (CVR), nor was it required by regulation to be fitted to the aircraft type.

1.12. Wreckage and Impact Information

1.12.1. After the engine had stopped, the pilot was unable to restart it and decided to land on RWY 10 at FATH which was to his left of the flight path. However, the trees before the threshold prompted him to seek another landing area because the aircraft had no power. The pilot located a field south-west of FATH, but the aircraft was descending faster than expected; therefore, he extended the flaps to first stage (10°) and maintained a gliding speed of 70 knots (kts). The accident occurred on an open (and unfavourable) terrain (covered with trees and tall grass).

1.12.2. The aircraft first contacted the ground with the right wing and the right main landing gear (MLG). The left-wing tip struck a tree, followed by the left horizontal stabiliser which also impacted the tree. These impacts caused extensive damage to the right side of the aircraft. The right wing separated at the root and was found ahead of the main fuselage. Fuel lines were damaged, resulting in fuel leakage.

1.12.3. The front and rear passenger doors, as well as the right main landing gear, were torn from the aircraft. The engine mounts failed, and the engine was found near the main fuselage. One wooden propeller blade had broken, with the separated piece found slightly forward of the main wreckage.

1.12.4. The cabin sustained serious damage. The windshield was shattered, the instrument panel was destroyed, and the floor was deformed after the collapse of the right main landing gear. The safety harnesses were not damaged. The pilot assisted the passengers to exit the aircraft and then called for help.



Figures 3 and 4: The damaged left-wing tip and instrument panel (left). The pulled back power lever (right).



Figure 5: The main fuselage after the accident. Inset picture shows the broken propeller.

1.13. Medical and Pathological Information

1.13.1. The front-seated occupants (pilot and one passenger) sustained serious injuries and required hospitalisation; the second passenger who was seated at the back seat sustained minor injuries and was discharged from the hospital on the same day of the accident. The front right passenger sustained more injuries to his upper torso and required an operation.

1.14. Fire

1.14.1. There was no post-impact fire.

1.15. Survival Aspects

1.15.1. The chances of survival were minimal as the cockpit area was extensively damaged. The occupants' chances of survival were improved by adhering to the safety standards of wearing safety harnesses.

1.16. Tests and Research

1.16.1. The aircraft was recovered to the aircraft maintenance organisation (AMO) facilities at Rhino Park Aerodrome. The investigating team was present when the aircraft maintenance engineer (AME) started the engine teardown on 2 April 2025. Initially, the AME removed all the engine attachments and turned the engine by hand, but it would not turn. The AME then removed the spark plugs for cylinder Number 6 and the cylinder cover after which he found the top of the two spark plugs damaged, as well as debris on the inside of the cylinder cover.

1.16.2. Cylinder Number 6 head was removed from the engine, and it was found that the exhaust valve was missing from its seating position. There were multiple dents on the cylinder inner surface that were caused by the exhaust valve head (Figure 8). The piston crown also sustained damage, and the valve stem punched a hole and disappeared into the exhaust system. A connection rod had separated from the piston but was still attached to the crankshaft. The exhaust valve had broken into three parts (lower stem still attached to the engine; middle stem was missing; and head which was inside the cylinder). The valve stem was later found inside the exhaust muffler box. The piston crown sustained damage during the accident sequence.

1.16.3. The AMO report is attached as Annexure 5.1 and it concluded that: *“Although we (AMO) are not specialised metallurgical qualified personnel, it is my opinion from that observation and type of damage that the Exhaust Valve from Cylinder # 6 failed just below the Valve Collet Grooves, leaving the Top Washer, Collets and Collet Groove part of the Valve to stay intact. This resulted in the Valve falling inside the Cylinder, causing damage to the Piston and the Valve Head to separate from the Valve Stem. It is my experience from previous Valve Failures where Valve Heads came adrift that the Valve Stem remained in the Valve Guide. This also resulted in damage to the Piston and Cylinder Head. It is not clear what the reason was for the Valve Stem to fail below the Collet Grooves.”*



Figures 6 and 7: The damaged spark plugs (left) and cylinder head with the missing exhaust valve.

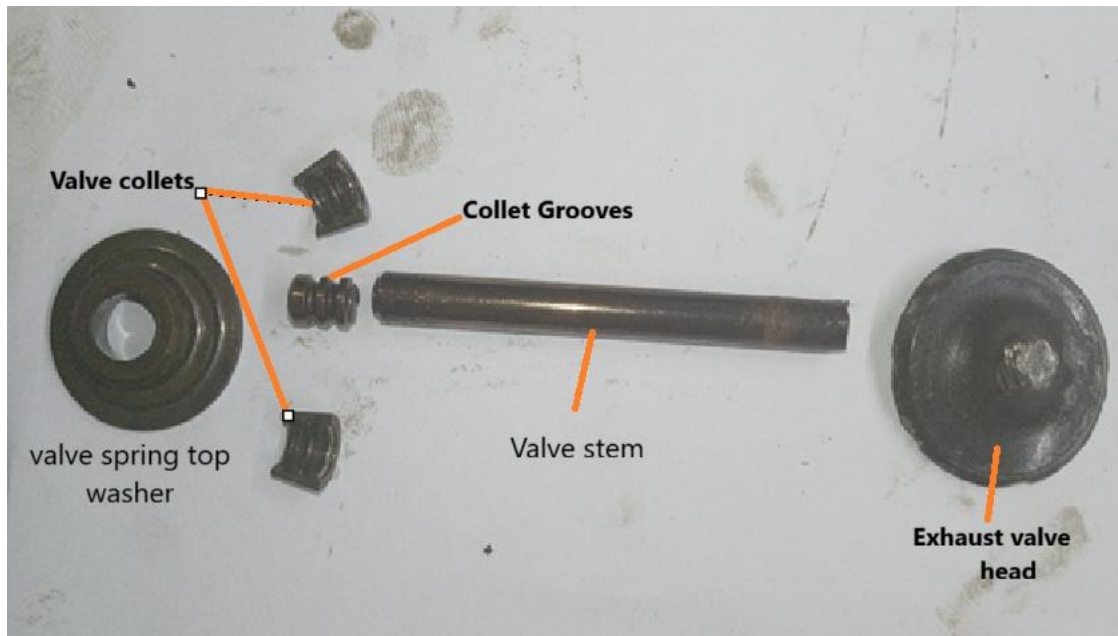


Figure 8: Exhaust valve broke into three parts. (Source: AMO)

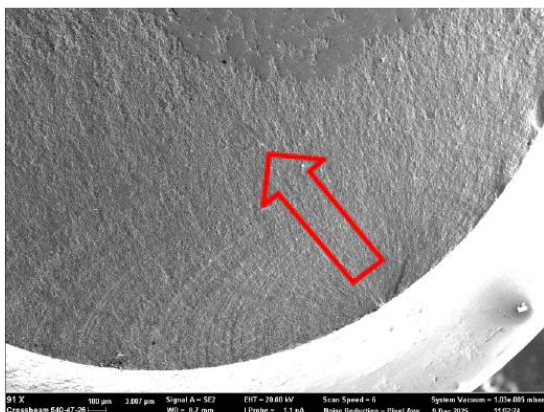


Figure 9: The damaged cylinder Number 6 connecting rod.

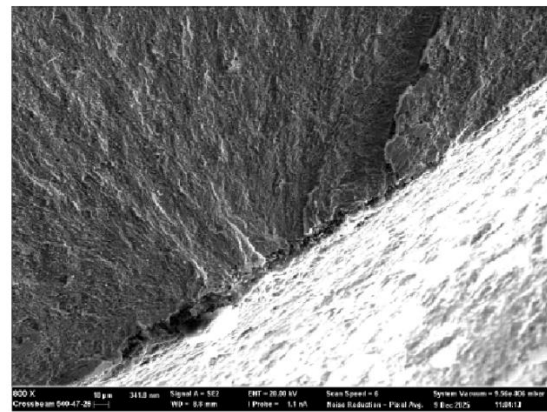
1.16.4 The AMO's opinion was not conclusive, and it prompted the investigators to request the Laboratory for Microscopy & Microanalysis at the University of Pretoria to analyse the damaged engine components. The detailed results were released on 5 January 2026 as Document Number FA-002-01-26 and had the following findings.

1.16.5 High-Magnification Inspection:

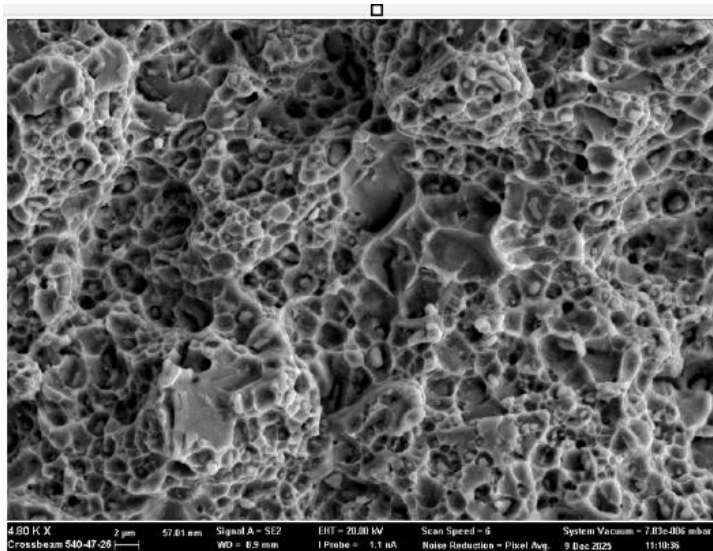
Although the fracture surfaces (carbon deposits) were somewhat damaged, the high magnification inspection revealed clear indications of fatigue striations at Fracture B (Fractograph 1), initiating within the collet radius and progressing inward (red arrow) until final fast rupture (Fractograph 4).



Fractograph 1: Fatigue beechmarks, Fracture B



Fractograph 2: Fatigue initiation point



Fractograph 4: Final Fast fracture surface

No clear indicators towards the cause for initiation could be detected at the initiation point (Fractograph 2). However, the presence of widespread corrosion pitting damage (Fractograph 5) suggests that the localised stress-raiser effect of a corrosion pit could have contributed to the initiation of the fatigue fracture.

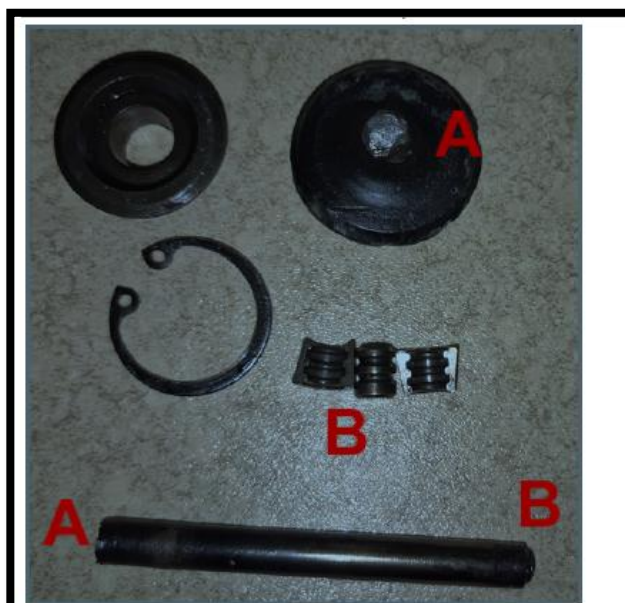


Photo 5: Fractured exhaust valve

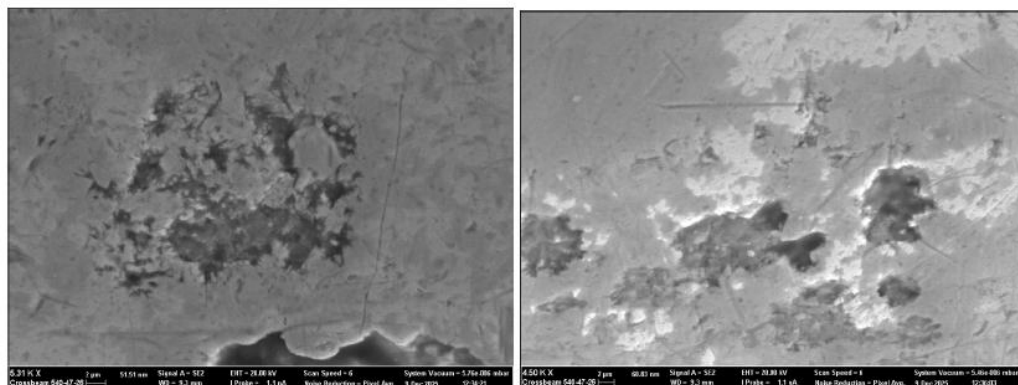


Photo 6: Fracture surface B, exhaust valve

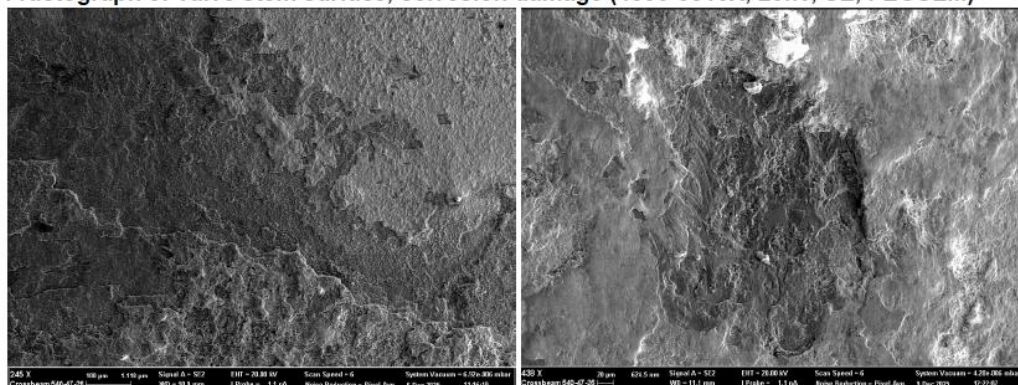
The valve stem surface revealed clear signs of foreign material build-up (Fractograph 6). The Energy-Dispersive X-ray Spectroscopy (EDS) analysis confirmed the origin to be fuel - and oil-related (EDS Result 2). This buildup of hard layers results in flaking and is attributed to prolonged exposure to high temperatures and to 100LL fuel. However, the possibility of these hard flakes at the valve stem/guide interface resulting in a 'stuck' valve cannot be ruled out.

1.16.6. Inspection Results:

- (a) The visual inspection revealed a fractured exhaust valve. The valve fractured at two locations.
- (b) The primary fracture initiated adjacent to the collet with the radius.
- (c) The primary fracture mode is fatigue, suggesting the fracture progressed over an undetermined period of operation until final fast rupture.
- (d) Although no clear surface stress raisers (nick marks, corrosion pitting, etc.) were noted, the noted corrosion pitting on the remainder of the valve stem surface suggested that it could have been a contributing factor.
- (e) The valve stem surface revealed extensive foreign material build-up, consistent with exposure to high temperatures and the use of 100LL fuel.



Fractograph 5: Valve stem surface, corrosion damage (4500-5310X, 20kV, SE, FEGSEM)



Fractograph 6: Valve stem surface, corrosion damage (245-438X, 20kV, SE, FEGSEM)

1.17. Organisational and Management Information

1.17.1. The AMO had a valid AMO Certificate that was issued on 31 August 2024 with an expiry date of 31 August 2025.

1.17.2. The approved person (AP) had a valid AP Certificate that was issued on 10 December 2024 with an expiry date of 9 December 2026. The AP had airframe and engine ratings qualifications for the aircraft type.

1.18. Additional Information

1.18.1. Maintenance of Competency and Skills Tests

Part 61.01.5 (1) Unless the holder of a pilot licence or rating maintains competency and recency by complying with the appropriate requirements prescribed in this Part or Part 62 and Part 91, as the case may be, the licence holder shall not exercise the privileges granted by the licence.

(2)(a) The holder of a pilot licence shall not exercise the privileges of that licence unless he or she has successfully passed an initial licence skills test, or a revalidation check in the same category of aircraft.

1.19. Useful or Effective Investigation Techniques

1.19.1. None.

2. ANALYSIS

2.1. General

From the available evidence, the following analysis was made with respect to this accident. This shall not be read as apportioning blame or liability to any organisation or individual.

2.2. Analysis

2.2.1. The pilot had a Private Pilot Licence (PPL) which expired on 31 December 2024. The pilot contravened Part 61.01.5 (1) of the CAR 2011.

2.2.2. The pilot's Class 2 medical certificate was issued on 1 April 2021 with an expiry date of 1 April 2026 with no restrictions.

2.2.3. The weather was fair at the time of the flight; it did not contribute to this accident.

2.2.4. The aircraft departed R100 Nandoni private strip and climbed to 2000 feet (ft) above ground level (AGL). The pilot and the two passengers were on their way to FALO to attend the first church service; whilst abeam PR Mphephu (Thohoyandou) Aerodrome (FATH), the engine ran rough and this prompted the pilot to switch the carburettor heat on and reduce power. He then realised that the aircraft could not reach FATH; the engine stopped and he decided to perform a forced landing on a field after selecting first stage flaps. The selected area to land had trees and the aircraft impacted one of them which led to the accident sequence. The aircraft was destroyed. The pilot and one of the passengers sustained serious injuries whilst the second passenger had minor injuries.

2.2.5. Engine Inspection

The aircraft was recovered to the AMO and, a week after, an engine teardown inspection was performed. There was no visible damage to the engine casing other than the propeller that was removed. The approved person (AP) turned the engine by hand, but it did not move, which meant that the damage inside was restricting movement. The first evidence of damage after opening the engine covers was cylinder Number 6. There was evidence of extensive damage to the cylinder parts. The Number 6 exhaust valve head and valve stem came apart from the cylinder head. The valve stem part between the valve head and collet grooves could not be found in the cylinder head, it was found later after cutting the exhaust muffler box. The AP concluded that the: *“exhaust valve from cylinder Number 6 failed just below the valve collet grooves, leaving the top washer, collets and collet groove part of the valve intact. This resulted in the valve falling inside the cylinder, causing damage to the piston and the valve head separated from the valve stem”*.

2.2.6. The same components were sent to the Laboratory for Microscopy & Microanalysis at the University of Pretoria (UP) for further analysis and the following were determined:

The valve fractured at two locations and the primary fracture (fatigue) initiated adjacent to the collet with the radius. The fracture progressed over an undetermined period of operation until final fast rupture. Corrosion pitting on the remainder of the valve stem surface was noted and it suggested that it could have been a contributing factor. The valve stem surface revealed extensive foreign material build-up, consistent with exposure to high temperatures and the use of 100LL fuel.

2.2.7. Conclusion

The AMO and the UP both determined that the valve broke first in the collet area; the UP report further stated that it was a fatigue fracture which progressed over time. The report stated that it could have started in one of the pitting corrosion areas noted on the valve stem. The valve stem surface revealed extensive foreign material build-up which was confirmed to

be Avgas 100LL (higher octane) and oil-related stains. This build-up of hard layers resulted in flaking and corrosion pit that contributed to the initiation of the fatigue fracture.

3. CONCLUSION

3.1. General

From the available evidence, the following findings, causes and contributing factors were made with respect to this accident. These shall not be read as apportioning blame or liability to any organisation or individual.

To serve the objective of this investigation, the following sections are included in the conclusion heading:

- **Findings** — are statements of all significant conditions, events, or circumstances in this accident. The findings are significant steps in this accident sequence, but they are not always causal or indicate deficiencies.
- **Causes** — are actions, omissions, events, conditions, or a combination thereof, which led to this accident.
- **Contributing factors** — are actions, omissions, events, conditions or a combination thereof, which, if eliminated, avoided or absent, would have reduced the probability of the accident occurring, or would have mitigated the severity of the consequences of the accident. The identification of contributing factors does not imply the assignment of fault or the determination of administrative, civil, or criminal liability.

3.2. Findings

3.2.1. The pilot had an invalid Private Pilot Licence (PPL). The PPL was initially issued on 18 December 2021 with an expiry date of 31 December 2024.

3.2.2. The pilot had a Class 2 aviation medical certificate that was issued on 1 April 2021 with an expiry date of 1 April 2026 with no restrictions.

3.2.3. The last maintenance inspection of the aircraft was conducted and certified on 2 August 2024 at 881.1 airframe hours by an approved aircraft maintenance organisation (AMO). The aircraft had accrued 45.7 hours since the said maintenance.

3.2.4. The aircraft was issued a Certificate of Release to Service (CRS) on 2 August 2024 with an expiry date of 30 July 2025 or at 981.1 airframe hours, whichever comes first.

3.2.5. The aircraft had sufficient fuel for the flight. There were no defects noted in the flight folio; however, due to the engine stoppage, the aircraft could not reach FALM which was to the left of the flight path. The pilot performed a forced landing on a field 1.25nm south-west of the aerodrome.

3.2.6. The weather was conducive for the flight at the time; the weather was not a contributing factor in this accident.

3.2.7. The AMO and the UP both concluded that the exhaust valve initially broke first at the collet area, the valve neck was next. The fatigue fracture was attributed to pitting corrosion caused by build-up of foreign material.

3.3. Probable Cause/s

3.3.1. Unsuccessful forced landing on a field near PR Mphephu Aerodrome (FATH) following an engine stoppage which was caused by cylinder Number 6 exhaust valve that failed on the collet grooves area due to fatigue fracture which had progressed over time.

3.4. Contributory Factor/s

3.4.1. None.

4. SAFETY RECOMMENDATIONS

4.1. General

The safety recommendations listed in this report are proposed according to paragraph 6.8 of Annex 13 to the Convention on International Civil Aviation and are based on the conclusions listed in heading 3 of this report. The AIID expects that all safety issues identified by the investigation are addressed by the receiving States and organisations.

4.2. Safety Recommendation/s

4.2.1. None.

5. APPENDICES

5.1. Appendix 1: ZS-MJM engine teardown report.

This report is issued by:

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

Appendix 1: ZS-MJM engine teardown report

Aircraft Jabiru J430 Registration ZU-MJM experience an Engine failure resulting in an emergency landing near Levubu.

The Aircraft was recovered to Rhino Park Airfield by road, where the Engine was removed to investigate the reason for the Engine failure. The Engine was dispatched to the Engine Overhaul shop of Jabiru Aviation Rhino Park AMO 1387.

Aircraft and Engine Information: -

Airframe Serial No.	513
Engine Serial No.	33A1746
Airframe Total Hrs.	926.8
Engine TTSN	926.8
Engine TSO	343.1

Schock load Inspection was conducted on 881.1 hrs. (HOBBS)

Above mentioned Engine was dismantled in the presence of CAA Inspector Mr. Robert Mvemve.

The following procedure were followed and observed: -

1. Engine was mounted on a workbench and the Cylinder Heads removed.
2. Upon removal of Cylinder Head No. 6, severe damage was visible to the Piston, Conrod and Cylinder Head.
3. Cylinder Head No. 6 Inlet Valve was still intact.
4. No. 6 Exhaust Valve Head and Valve Stem came apart from the Head.
5. No.6 Exhaust Valve Spring Top Washer and Valve Collets were still situated in the Cylinder Head below the Valve Rocker. The Valve Collets and End tip of the Exhaust Valve were still situated inside the Top Spring Washer. See photo "A".
6. Cylinder No. 6 Exhaust Valve Head came apart from Valve Stem just below the Head inside the Valve Head radius.
7. The Valve Stem part between the Valve Head and Collet Grooves could not be found in the Cylinder Head, Cylinder or inside the Engine Block / Oil Sump cavities.
8. Cylinder No. 6 Conrod completely distorted.
9. Piston Crown of No. 6 severely damaged with the Exhaust Valve Head compressed in the Piston Crown as well as a round hole through the Crown.
10. No. 6 Piston Skirt completely shattered.
11. Upon removal of the Crankshaft, no damage or seizure was evident on all the Big End and Main Journals.
12. In the follow-up surge for the Exhaust Valve Stem, the Stem was found inside the Exhaust Muffler Box.

We include pictures of the failed and damaged components for your assessment.

Conclusion:- Although we are not Specialised Metallurgical qualified personnel, it is "My Opinion " from the observation and type of damage, that the Exhaust Valve from Cylinder # 6 failed just below the Valve Collet Grooves, leaving the Top Washer, Collets and Collet Groove part of the Valve to stay intact. This resulted in the Valve to fall inside the Cylinder causing damage to the Piston and the Valve Head to separate from the Valve Stem.

It is my experience from previous Valve Failures where Valve Heads came adrift, that the Valve Stem remained in the Valve Guide. The also resulted to damages of the Piston and Cylinder Head.

It is not clear to us, what the reason was for the Valve Stem to fail below the Collet Grooves.