SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Section/division **Accident and Incident Investigations Division** Form Number: CA 12-57

LIMITED OCCURRENCE INVESTIGATION REPORT – FINAL

Reference Number	CA18/3/2/1480						
Classification	Serious Incident	**Date**	23 May 2025		**Time**	1301Z	
Type of Operation	Training (Part 141)						
Location							
Place of Departure	George Airport (FAGG), Western Cape Province	Place of Intended Landing	Port Alfred Airport (FAPA), Eastern Cape Province				
Place of Occurrence	On a field, 6 nautical miles (nm) south-west of Port Alfred Airport **(**FAPA), Eastern Cape Province						
GPS Co-ordinates	Latitude	33°35′36.52″ S	Longitude	026°45′46.85″ E	Elevation	423 feet	
Aircraft Information							
Registration	ZS-FGU						
Make; Model; S/N	Piper; PA-28-140 Cherokee (Serial Number: 28-24070)						
Damage to Aircraft	Minor	Total Aircraft Hours	9 444.4				
Pilot-in-command							
Licence Type	Student Pilot Licence Integrated Course (SPLIC)	Gender	Male	Age	30		
Licence Valid	Yes	Total Hours	136.4	Total Hours on Type	21.2		
Total Hours 30 Days	4.6	Total Flying on Type Past 90 Days	15.0				
People On-board	1+0	**Injuries**	0	**Fatalities**	0	**Other (on the ground)**	0

What Happened

On Friday afternoon, 23 May 2025, a student pilot (SP) on-board a Piper PA-28-140 aircraft with registration ZS-FGU took off on an hour-building flight from Port Alfred Airport (FAPA) in Eastern Cape province to George Airport (FAGG) in Western Cape province with the intention to return to FAPA. The student pilot was approved for the Student Pilot Licence Integrated Course (SPLIC). Visual meteorological conditions (VMC) by day prevailed at the time of the flight which was conducted under the provisions of Part 141 of the Civil Aviation Regulations (CAR) 2011 as amended.

The SP stated that the outbound flight to FAGG progressed smoothly. After completing a routine post-flight inspection at FAGG, the SP noticed that the engine oil level was below four quarts after checking the dipstick. An aircraft maintenance engineer (AME) at the airport also visually inspected the engine oil and, subsequently, gave the SP six cans of AeroShell W100 oil to top up the oil.

Initially, one quart (946 millilitres) of oil was added after which a dipstick reading indicated four quarts oil level (see Figure 2) (One can equates to 1 quart of oil). Thereafter, the aircraft was taxied to the General Aviation area where the engine was inspected for oil leaks; none was found. Another quart of oil was added which brought the dipstick oil level reading to approximately five quarts. The SP

was content to proceed with the flight. Before departure, all engine parameters were within the normal operating range (in the green arc).

Whilst abeam Plettenberg Bay, the SP noticed that the oil pressure had decayed slightly to between 50 and 60 pounds per square inch (psi); however, the oil temperature remained stable and within limits. During the flight, the SP maintained communication with the aircraft maintenance organisation (AMO) based at FAPA via a cellular phone. After being informed of the situation, the AMO advised the SP to continue with the flight to their facility at FAPA.

Figure 1: Oil temperature and pressure gauges in the Piper PA-28 series.
(Source: Pilot's Operating Handbook)

Figure 2: An engine oil dipstick shows oils level marked in quarts. (Source: POH)

Upon entering Chief Dawid Stuurman International Airport (FAPE) Special Rules Area (SRA) and whilst abeam Jeffreys Bay, the oil pressure had decayed to between 20 and 30 pounds per square inch (psi), which is in the yellow arc; the oil temperature remained in the green arc. Upon noticing abnormal engine noise and vibration, the SP referred to the Pilot's Operating Handbook (POH) and concluded that the indications were potentially a result of a gauge malfunction. Approximately 8 nautical miles (nm) south-west of Nanaga, the oil pressure decayed to nearly zero; however, the oil temperature still remained within the green arc and there were no other abnormal engine indications. The SP proceeded to prepare for a straight-in approach to land on Runway 10R at FAPA.

However, the engine ran rough approximately 3 miles north-east of Kenton-on-Sea, followed by a vibration and power loss. The SP then declared a MAYDAY on frequency 122.0-Megahertz (MHz) and provided his position and intentions before he attempted to restart the engine, which was unsuccessful. At this stage, there was smoke and a burning smell in the aircraft. The SP executed a forced landing on a field. The aircraft sustained minor damage; the SP was not injured during the serious incident.

The serious incident occurred during daylight at Global Positioning System (GPS) co-ordinates determined to be 33°35′10.3″ South 026°47′58.92″ East, at an elevation of 423 feet (ft).

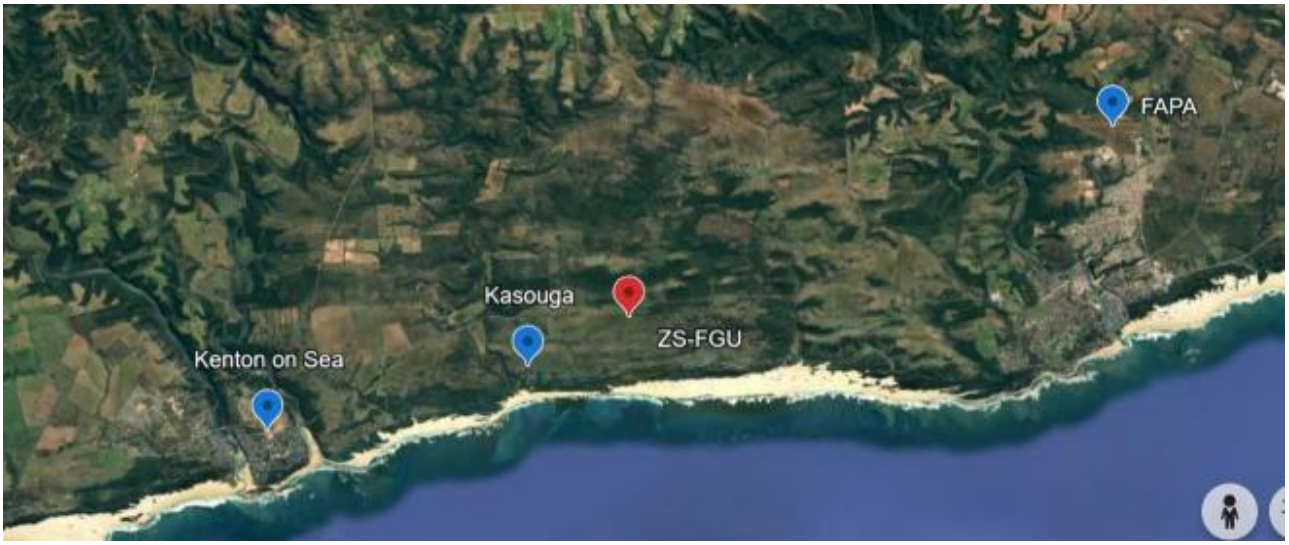

Figure 3: The red pin points to the serious incident. (Source: Google Earth)

Figure 4: The aircraft at the serious incident site. (Source: Pilot)

Recovery

After the serious incident, the AMO deployed a ground recovery team to recover the aircraft to their facility at FAPA for further inspection and maintenance.

- On Monday, 26 May 2025, a detailed inspection of the aircraft was conducted. Both wings leading edges were damaged (see Figures 5 and 6).

Figures 5 and 6: Damaged to the right and left wings, respectively. (Source: Pilot)

The following information is an extract from the Piper PA28-140 Pilot's Operating Handbook, Section III:

Pre-Flight Inspection

d. check oil level, 8 quarts maximum (ensure dipstick is properly seated)

Oil Requirements

The capacity of the 0-320 series engine is 8 quarts, and the minimum safe operation is 2 quarts.

The following information is an extract from the Pilot's Operating Handbook, Section 4, Emergency Procedures, Page 4-5:

Loss Oil Pressure

Loss of oil pressure may be either partially or complete. A partial loss of oil pressure usually indicates a malfunction in the oil pressure regulating system, and a landing should be made as soon as possible to investigate the cause and prevent engine damage.

A complete loss of oil pressure indication may signify oil exhaustion or may be the result of a faulty gauge. In either case, proceed toward the nearest airport, and be prepared for a forced landing. If the problem is not a pressure gauge malfunction, the engine may stop suddenly. Maintain altitude until such time as a dead stick landing can be accomplished. Do not change power settings unnecessary, as this may hasten complete power loss.

Depending on the circumstances, it may be advisable to make an off-airport landing while power is still available, particularly if other indications of actual oil pressure loss, such as sudden increase in temperatures, or oil smoke, are apparent and airport is not close.

If engine stoppage occurs, proceed to POWER OFF LANDING.

The engine, a Lycoming O-320-E2A with serial No. L-15582-27A, was removed from the airframe at the AMO facility and subjected to an engine teardown inspection.

The following are the findings of the teardown inspection:

- *Upon initial inspection, the connecting rod (conrod) of Cylinder 1 was found to have punctured the crank case.*
- *External impact marks were observed above the pushrod tubes of Cylinder 4.*
- *Following a complete engine teardown, it was determined that Conrod 4 journal showed clear signs of oil starvation and appeared to have failed first, forcefully striking the engine block and creating a hole into the sump.*
- *Conrod 1 likely failed subsequently, adding to the mechanical damage.*
- *The oil pump was removed and opened, revealing a significant quantity of metal filings that had entered the pump cavity.*
- *The contamination restricted the supply of oil to the engine*.

Figure 7: The engine before teardown inspection. (Source: Pilot)


Figures 8 and 9: Connecting rods 1 and 2 (conrods). (Source: AMO)


Figures 10 and 11: Connecting rods 3 and 4 (conrods). (Source: AMO)

Contributing Factors

- *Suspected insufficient oil quantity at initial departure from Port Alfred.*
- *In-flight metal filings (from Cylinder 4) i.e. contamination and, ultimately, progressive oil pump failure led to critical drop in oil pressure.*
- *No external oil leaks were observed, confirming consumption.*
- *Gradual pressure decline was not severe enough initially to trigger emergency actions, but cumulative damage occurred.*
- *The oil pump seizure from metal contamination likely marked the point of no recovery.*

Conclusion

The engine failure was caused by progressive oil starvation, compounded by an inoperative oil pump due to metallic debris contamination. Evidence from the teardown inspection indicated that Conrod

4 failed first, breaching the engine oil sump. Conrod 1 failed subsequently, contributing further to the catastrophic engine damage.
The oil pump, found ceased and packed with metal filings, was unable to maintain adequate oil flow, leading to rapid deterioration of internal engine components. Although engineers in George (FAGG) assisted with pre-flight checks and detected no external oil leaks, the root cause appeared to be related to an initial oil underfill—either due to underfilling or underreporting of oil levels—followed by oil consumption during flight.
It is evident that only two of the six cans of oil were used for topping up oil based on the partially used oil box recovered from the aircraft. Notably, the oil pump was found to be mechanically serviceable after the removal of debris, with no inherent damage identified.

The PA-28-140 Cherokee Pilot Operating Handbook specifies that *the capacity of the O-320 series engine is 8 quarts, with a minimum safe operating quantity of 2 quarts.*
The engine oil level—maximum 8 quarts—must be verified during the pre-flight inspection.

Maximum Allowable Oil Consumption (per Lycoming)
1 quart per hour.

The flight departed at 1100Z and a forced landing was conducted at 1301Z. The total airborne time of the aircraft was approximately 2 hours.

After the aircraft was recovered, six oil cans were found on-board, with only two cans used. This, therefore, suggested that only partial oil top up was conducted prior to the flight. If the engine oil level was significantly below capacity before topping up, the addition of two quarts may have been insufficient for the duration of the flight based on the oil consumption, contributing to the progressive oil starvation and the eventual engine failure. The engine failure was the result of the progressive oil starvation, compounded by an inoperative oil pump due to metallic debris. The presence of metallic debris led to the oil pump stoppage, which resulted in complete loss of oil circulation.

Findings

Pilot

1. The student pilot (SP) had a Student Pilot Licence Integrated Course (SPLIC) that was issued on 5 October 2013 by the Regulator (SACAA). The SP was approved for an Integrated Pilot Training Course. His latest SPLIC validation was conducted on 11 August 2024 with an expiry date of 10 August 2025. The aircraft type was endorsed on the SP's licence. The SP had a Class 2 aviation medical certificate that was issued on 28 September 2023 with an expiry

date of 28 September 2028. The SP was medically fit, properly qualified and authorised to operate the aircraft.

2. The SP was aware that the engine was consuming above average oil. However, during the post-flight inspection prior to departure from FAGG, the SP failed to add oil to bring the level to eight quarts, which was the adequate amount required for safe engine operation.

3. The SP did not divert to any alternate aerodromes en route despite being available. The SP continued with the flight to FAPA after the AME, with whom he was communicating, advised him to do so.

Maintenance

4. The aircraft maintenance organisation (AMO) responsible for maintaining the aircraft was issued an AMO Certificate on 18 October 2024 with an expiry date of 30 September 2025.

Aircraft

5. The aircraft's Certificate of Registration (C of R) was issued to the current owner on 23 July 2018.

6. The aircraft Certificate of Airworthiness (C of A) was initially issued on 3 December 2018. The latest C of A was reissued on 3 December 2024 with an expiry date of 31 December 2025. The aircraft was airworthy when it was dispatched for the flight.

7. The last maintenance inspection of the aircraft was conducted and certified on 22 May 2025 at 9 439 airframe hours. The aircraft was flown a further 5.4 hours since the last inspection.

8. The aircraft was issued a Certificate of Release to Service (CRS) on 22 May 2025 at 9 439 airframe hours with an expiry date of 21 May 2026 or at 9 539 airframe hours, whichever occurs first.

9. The engine may have been operated with below-minimum oil levels from the start of the flight. This condition could have directly contributed to oil starvation and the subsequent engine failure.

10. The engine oil dipstick has a maximum level of eight quarts (see Figure 2).

11. Two quarts of engine oil were added before the SP departed from FAGG.

12. Due to progressive oil starvation, a catastrophic engine failure followed.

13. The occurrence involved a progressive oil pressure loss that did not correlate with a rise in oil temperature, delaying confirmation of engine failure.

Probable Cause

The student pilot executed a forced landing on a field after the engine failed in-flight.

Contributing Factors

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 an 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