SOUTH AFRICAN CIVIL AVIATION AUTHORITY

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

LIMITED OCCURRENCE INVESTIGATION REPORT – FINAL

Reference Number	CA18/3/2/1445						
Classification	Serious Incident	**Date**	12 April 2024		**Time**	0905Z	
Type of Operation	Training (Part 141)						
Location							
Place of Departure	Port Alfred Aerodrome (FAPA), Eastern Cape Province	Place of Intended Landing	Port Alfred Aerodrome (FAPA), Eastern Cape Province				
Place of Occurrence	Approximately 2 nautical miles (nm) west of Hamburg, Eastern Cape Province						
GPS Co-ordinates	Latitude	33°16' 39.00"S	Longitude	27°25’46.4"E	Elevation	1 379.2ft	
Aircraft Information							
Registration	ZS-SYF						
Make; Model; S/N	Piper Aircraft; PA-28R-201 (Serial Number: 2837016)						
Damage to Aircraft	Minor	Total Aircraft Hours	19 676.9				
Pilot-in-command							
Licence Type	Commercial Pilot Licence (CPL) Aeroplane	Gender	Male	Age	23		
Licence Valid	Yes	Total Hours	887.8	Total Hours on Type	26.2		
Total Hours 30 Days	4.4	Total Flying on Type Past 90 Days	12.4				
People On-board	2+1	**Injuries**	0	**Fatalities**	0	**Other (on ground)**	0

What Happened

On Friday morning, 12 April 2024, a flight instructor and two student pilots (one flying and the other observing) on-board a Piper 28R-201 aircraft with registration ZS-SYF took off on a training flight from Port Alfred Aerodrome (FAPA) in the Eastern Cape province with the intention to conduct touch-and-go landing exercises at East London Airport (FAEL) and, thereafter, return to FAPA. 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.

The instructor reported that the en route segments of the flight to FAEL and the touch-and-go landing exercises were uneventful. However, en route back to FAPA, approximately 2 nautical miles (nm) east of Hamburg whilst flying at an altitude of 1900 feet (ft), they noticed a propeller overspeed indication which was followed by loss of oil pressure and an increase in oil temperature. Moreover, the engine power/RPM (revolutions per minute) reduced and, thus, the aircraft was unable to maintain altitude. The instructor identified an open field and executed an emergency landing. During the landing roll, the right-side wing tip impacted an anthill. The aircraft sustained minor damage to the right-side wing tip and the navigation lights. All three occupants were not injured.

Post-incident inspection of the engine that was conducted by the operator revealed that the right-side magneto (Slick model) dislodged from the studs (mounts on the engine accessory housing) which resulted in oil loss/leakage and the subsequent loss of engine power.

The Piper Aircraft Pilot's Operating Handbook (POH) states that in the case of "*loss of oil pressure, land as soon as possible and then investigate the cause"*. The crew followed the POH and landed safely.

Post-accident Hypothesis by the Aircraft Maintenance Organisation (AMO)
Right-side magneto top attaching stud attaching hardware vibrated loose and caused magneto to be forced out of mounting flange and became detached from engine accessory housing. This caused an excessive engine oil leak, and engine sump reserve soon depleted. This also caused the constant speed unit (CSU) propeller control to fail, and the propeller and engine speed could no longer be controlled or maintained; also, this caused inadequate lubrication to engine internals.

Figure 1: Damage after impact with an anthill during landing. (Source: Operator)

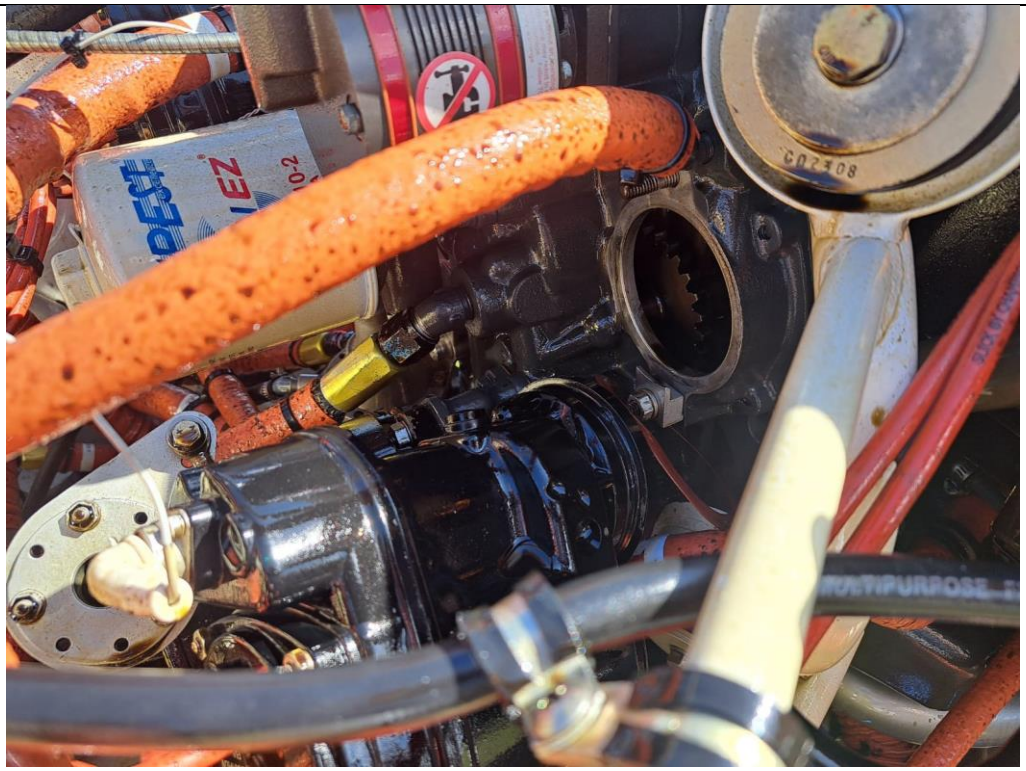

Figure 2: The right-side magneto that separated from the engine and caused oil leakage. (Source: Operator)

READ THIS MAGNETO INSTALLATION GUIDE BEFORE INSTALLING MAGNETO TO ENGINE

Timing Pin Inserted Correctly LEFT ROTATION MAGNETO

7. Follow engine manufacturer instructions to set up engine to advance timing position on cylinder number 1.
8. Place gasket between magneto and engine and install magneto onto engine. Install magneto mounting clamps loosely to hold magneto in place but allow for movement of magneto to time to engine.
9. Remove Timing Pin from magneto when magneto when magneto is loosely installed on engine.
10. Adjust contact points to open at engine timing position. Tighten magneto mounting clamp nuts to 190 to 220 in. lbs.
11. Connect ignition P-Leads to magneto capacitor and ground magnetos using the ignition switch.
12. Install ignition harness to magneto.
13. Test run engine in accordance with engine manufacturer instructions.
14. Make appropriate logbook entries to document magneto installation.

Figure 3: Magneto installation instruction. (Source: https://www.qaa.com/blog/magneto-installation-guide)

Findings

1. Personnel Information

1.1 The instructor had a Commercial Pilot Licence (CPL) that was initially issued on 17 April 2021. The instructor had flown a total of 887.8 hours of which 29.2 hours were on the aircraft type. The aircraft type was endorsed on his licence.

1.2 The instructor was issued a Class 1 aviation medical certificate on 30 January 2024 with an expiry date of 31 January 2025. The instructor was required to wear corrective lenses when flying an aircraft.

1.3 The student pilot had a Private Pilot Licence (PPL) that was initially issued on 25 July 2023 with an expiry date of 31 July 2024. The student pilot had flown a total of 94.5 hours of which 19.7 hours were on the aircraft type. The aircraft type was endorsed on his licence.

1.4 The student pilot was issued a Class 2 aviation medical certificate on 25 January 2023 with an expiry date of 31 January 2028. The student pilot was required to wear corrective lenses when flying an aircraft.

2. Aircraft Information

2.1 The last 50-hour mandatory periodic inspection (MPI) that was conducted on the aircraft before the serious incident flight was certified on 4 February 2024 at 19 648.0 airframe hours. The serious incident occurred at 19 676.9 total flight hours. The aircraft had accrued 28.9 hours since the last MPI.

2.2 The aircraft had a valid Certificate of Airworthiness (C of A) that was initially issued by the Regulator (SACAA) on 27 October 2017. The latest C of A was issued on 18 July 2023 with an expiry date of 31 October 2024. The aircraft was airworthy when it was dispatched for the flight.

2.3 The aircraft's Certificate of Registration (C of R) was issued to the present owner on 26 July 2012.

2.4 The aircraft was issued a Certificate of Release to Service (CRS) on 15 November 2023 with an expiry date of 14 November 2024 or at 19 696 airframe hours, whichever occurs first.

2.5 The AMO which performed the inspection had a valid approval certificate that was issued on 4 October 2023 with an expiry date of 30 September 2024. The aircraft maintenance engineer (AME) who certified the inspection had a valid AME Licence that was issued on 21 January 2024 with an expiry date of 21 August 2024. The AME had an aircraft type rating endorsed on his licence.

2.6 Scrutiny into the aircraft's maintenance records revealed that on 15 November 2023, a used engine was fitted to the incident aircraft. The engine was last overhauled on 18 July 2023 at 9 061 hours. The engine had accumulated 83.8 additional hours at the time of the incident.

2.7 According to Champion Aerospace, the time between overhaul (TBO) for Slick magnetos is 500 hours, and the two magnetos fitted to the engine were last overhauled on the following dates:

- Magneto SN: F12EA235R Certificate of Release 29 September 2021 (dislodged magneto)
- Magneto SN: F20KA109R Certificate of Release 30 November 2020

2.8 After the review of the flight folio, the investigator found that on Page 4685, dated 7 March 2023, a defect entry was entered which stated, *"rough running engine on climb out"*. The rectification to this issue was that the engineers conducted a ground-run and found the parameters to be satisfactory.

2.9 On Page 4686, dated 12 March 2023, a defect entry was entered which stated, "*climb performance well below Pilot's Operating Handbook specifications (minimum 500 feet per minute)".* The rectification for this issue was the fitment of a serviceable propeller but a leak in cylinder number 4 was suspected. A new gasket was fitted to the cylinder number 4. The affected (right side) magneto timing was checked, and it was found to be out of limit. It was removed and timing was reset; the engine performance was found satisfactory thereafter.

2.10 It is likely that during the right-side magneto installation, the top nut that secures the magneto to the engine accessory housing was not tightened or torqued properly. The threaded area on the top attaching stud showed damage associated with severe vibration. The bottom nut was properly torqued, hence, it remained in place.

Probable Cause(s)

The right-side magneto was not properly torqued which resulted in its separation from the engine housing in-flight, as well as excessive loss of oil and reduced power. This was followed by a successful forced landing.

Contributing Factor(s)

Magneto that was not properly fitted or torqued.

Safety Action(s)

None.

Safety Message and/or Safety Recommendation/s

Safety message: AMOs should always make sure that the AMEs adhere to manufacturer instructions. AMOs should also supervise the AMEs.

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