PRELIMINARY ACCIDENT REPORT

Accident and Incident Investigations Division

Accident
- Preliminary Report -
AIID Ref No: CA18/2/3/10167

Figure 1: The Piper PA-28R-200 Cherokee Arrow II, registered ZS-WAP. (Source: jetphotos.com)

Description:

On Wednesday morning, 1 June 2022, a flight instructor and a student pilot on-board a PA-28R-200 Cherokee Arrow II aircraft with registration ZS-WAP took off from Cape Town International Airport (FACT) in the Western Cape province, to Stellenbosch Aerodrome (FASH) in the same province. The intention of the flight was for the student pilot to conduct touch-and-go landings before returning to FACT. The flight to FASH was uneventful. The aircraft touched down safely on Runway 19 and took off again. Whilst on the climb at approximately 300 feet (ft) above ground level (AGL), the engine spluttered and the manifold pressure (MP) decreased to 25 inches. Thereafter, the flight instructor took over control of the aircraft and tried to troubleshoot the anomaly, but without success. The aircraft continued to lose height and the flight instructor decided to perform a forced landing on the R44 road, about 2.65 nautical miles (nm) south of FASH. The aircraft was destroyed during the accident sequence, and both occupants were injured.

Occurrence Details

Reference Number	**:** CA18/2/3/10167
Occurrence Category	**:** Category 1
Type of Operation	**:** Training (Part 141)
Name of Operator	**:** 4 Aviators
Aircraft Registration	**:** ZS-WAP
Aircraft Make and Model	**:** Piper PA-28R-200
Nationality	**:** South African
Place	**:** R44 road in Firgrove, Stellenbosch, Western Cape Province
Date and Time	**:** 1 June 2022 at 0935Z
Injuries	**:** 1 minor,1 serious
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) of the South African Civil Aviation Authority (SACAA) was notified of the occurrence involving a PA-28R-200 Cherokee Arrow II, which occurred at Stellenbosch, Western Cape Province, on 1 June 2022 at 0935Z. The occurrence was classified as an accident according to the CAR 2011 Part 12 and ICAO STD Annex 13 definitions.

The AIID has appointed an investigator-in-charge who dispatched to the accident site to conduct a full investigation. Notifications were sent to the State of Registry/Operator/Design/Manufacturer in accordance with CAR 2011 Part 12 and ICAO Annex 13 Chapter 4. The AIID will lead the investigation and issue the final report of this accident in accordance with the CAR 2011 Part 12 and ICAO Annex 13.

The information contained in this preliminary report is derived from the information gathered during the on-going investigation into the occurrence. Later, an interim or final report may contain altered information in case new evidence is found during the on-going investigation that requires changes to the information depicted in this report.

The AIID reports are made available to the public at:
http://www.caa.co.za/Pages/Accidents%20and%20Incidents/Aircraft-accident-reports.aspx

Notes:

1. *Whenever the following words are mentioned in this report, they shall mean the following:*
   Accident — this investigated accident
   Aircraft — the PA-28R-200 Cherokee Arrow II involved in this accident
   Investigation — the investigation into the circumstances of this accident
   Pilot — the pilot involved in this accident
   Report — this accident report

2. *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
AME	Aircraft Maintenance Engineer
AMO	Aircraft Maintenance Organisation
C of A	Certificate of Airworthiness
CAR	Civil Aviation Regulations
CRMA	Certificate Relating to Maintenance
CRS	Certificate of Release to Service
CVR	Cockpit Voice Recorder
FACT	Cape Town International Aerodrome
FASH	Stellenbosch Aerodrome
ft	Feet
GPS	Global Positioning System
I.A.W	In Accordance With
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
KIAS	Indicated Air Speed
Kts	Knots
METAR	Meteorological Aerodrome Report
MP	Manifold Pressure
NM	Nautical Mile
PF	Pilot Flying
PM	Pilot Monitoring
POH	Pilot's Operating Handbook
PPL	Private Pilot Licence
QNH	Barometric Pressure Adjusted to Sea level
RWY	Runway
S	South
SACAR	South African Civil Aviation Regulations
SAWS	South African Weather Service
UTC	Co-ordinated Universal Time
Z	Zulu (Term for Universal Co-ordinated Time - Zero Hours Greenwich)

1. FACTUAL INFORMATION

1.1. History of Flight

1.1.1. On Wednesday morning, 1 June 2022, a flight instructor and a student pilot on-board a PA-28R-200 Cherokee Arrow II aircraft with registration ZS-WAP took off from Cape Town International Airport (FACT) in the Western Cape Province, to Stellenbosch Aerodrome (FASH) in the same province. The intention of the flight was to conduct touch-and-go landings before returning to FACT. The flight was conducted under visual flight rules (VFR) by day and under the provisions of Part 141 of the Civil Aviation Regulations (CAR) 2011 as amended.

1.1.2. The flight instructor reported that before departure at FACT, a pre-flight inspection was conducted on the aircraft and no anomalies were found. Also, there were no defects recorded in the flight folio. The aircraft was refuelled with Avgas 100LL, reaching its full capacity of 189 litres (L) or 50 United States (US) gallons. After the engine was started, the student pilot taxied the aircraft to the threshold of Runway 01 where he carried out engine run-up checks; all the engine indications were within limits. At 0805Z, the crew communicated their intention to FACT ground controller and the aircraft was cleared for take-off. The aircraft climbed to 1500 feet (ft) above ground level (AGL) and routed to FASH, which was approximately 28 nautical miles (nm) from FACT.

1.1.3. Upon reaching FASH, the aircraft descended to 1300ft AGL to join the circuit pattern for Runway 19. The first approach was unsafe as the aircraft's speed was faster than required. Also, another aircraft was ahead of them, making a full-stop landing on Runway 19. Therefore, the pair opted to conduct a go-around in which the student pilot flew a wider circuit. Thereafter, the student pilot completed a successful touch-and-go landing on Runway 19. During the climb at approximately 300ft AGL for the next circuit of a touch-and-go landing, the engine spluttered, followed by a decrease in revolutions per minute (rpm). The instructor checked the engine indications and noticed a rise in fuel flow which was abnormal.

1.1.4. The instructor then took over the control of the aircraft and commenced with the fault-finding procedure by recycling power and mixture levers, switching on the electric fuel pump, changing tanks and checking magnetos. There was no change in the aircraft's engine performance, except when full power was applied, which caused the engine to splutter.

1.1.5. The instructor decided to perform a forced landing but could not identify a suitable field as the aircraft was flying very low. He then assessed the R44 road ahead of him and committed to land on it as this was the only available area to land the aircraft. The traffic

on the road made way for the aircraft except for one car that had stopped on the left lane. Whilst the instructor was trying to avoid colliding with the stationary car, the left wing of the aircraft hit the road sign pole and the aircraft yawed to the left and immediately pitched down, causing the aircraft to land with the nose first. The aircraft skidded for approximately 30 metres (m) before it came to a stop facing the opposite direction from which it had approached.

1.1.6 The accident occurred during daylight at Global Positioning System (GPS) co-ordinates determined to be 34°01'29.23" South 18°49'12.39" East.

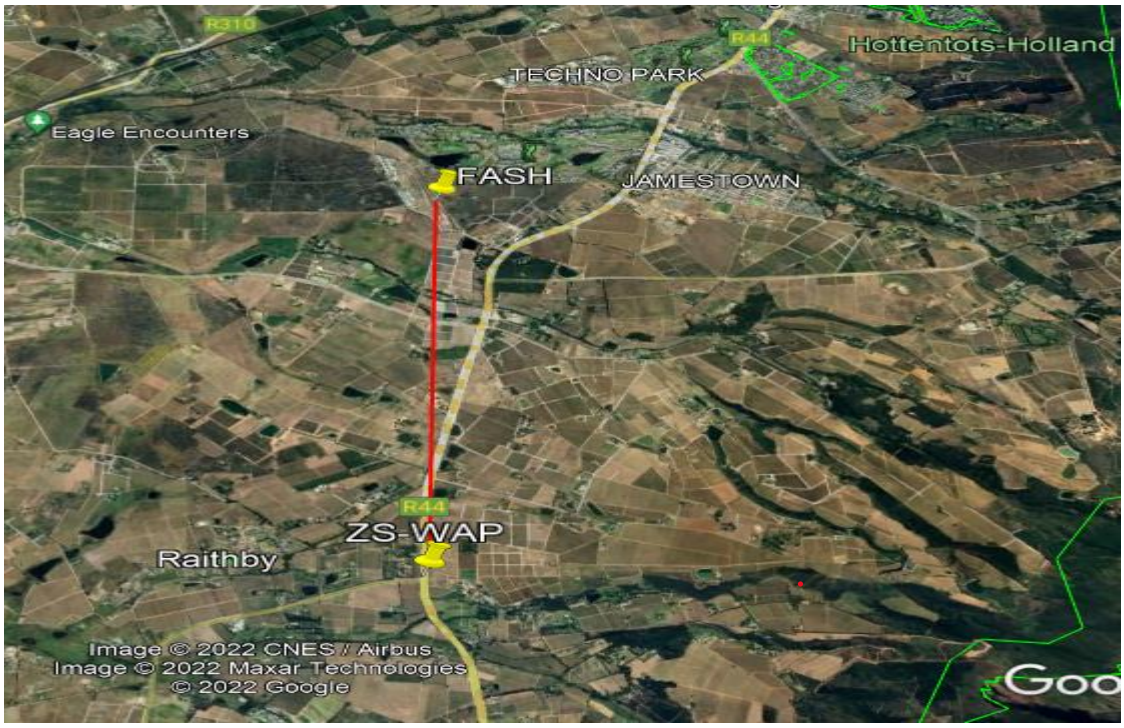

Figure 2: The approximate flight path of the ZS-WAP aircraft. (Source: Google Earth)

1.2. Injuries to Persons

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

Note: Other means people on the ground.

1.3. **Damage to Aircraft**

1.3.1. The aircraft was destroyed during the accident sequence.

Figure 3: The aircraft at the accident site.

1.4. **Other Damage**

1.4.1. The aircraft impacted the road sign pole with its left wing.

Figure 4: The severed road sign pole.

1.5. Personnel Information

Instructor (Pilot Monitoring)

Nationality	South African	Gender	Male	Age	25
Licence Type	Commercial Pilot Licence (CPL)				
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	Flight Instructor Grade II and Night Flight				
Medical Expiry Date	31 December 2022				
Restrictions	Corrective Lenses				
Previous Accidents	None				

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

Flying Experience:

Total Hours	1486.3
Total Past 24 Hours	3.1
Total Past 7 Days	10.0
Total Past 90 Days	153.9
Total on Type Past 90 Days	40.0
Total on Type	494

1.5.1 The instructor was initially issued a Commercial Pilot Licence (CPL) on 11 October 2016. His last validation was completed on 26 January 2021 with an expiry date of 3 January 2023. A PA-28R-200 aircraft type rating was endorsed on his licence. His Class 1 medical certificate was issued on 2 December 2021 with an expiry date of 31 December 2022 with a restriction to wear suitable corrective lenses.

Student Pilot (Pilot Flying)

Nationality	South African	Gender	Male	Age	21
Licence Type	Private Pilot Licence (PPL) Aeroplane				
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	None				
Medical Expiry Date	31 July 2022				
Restrictions	None				
Previous Accidents	None				

Flying Experience:

Total Hours	123.8
Total Past 24 Hours	1.5
Total Past 7 Days	3.7
Total Past 90 Days	41.2
Total on Type Past 90 Days	15.0
Total on Type	15.0

1.5.2 The student pilot was issued a Private Pilot Licence (PPL) on 22 February 2022 with an expiry date of 28 February 2023. His Class 1 medical certificate was issued on 17 July 2021 with an expiry date of 31 July 2022 with no restrictions.

Aircraft Maintenance Engineer (AME)

Nationality	South African	Gender	Male	Age	38
Licence Type	Aircraft Maintenance Engineer				
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	Piper PA-28-140, Piper PA-28-180, Piper PA-28-200, Piper PA-28-235				
Restrictions	None				
Previous Accidents	None				

1.5.3 The aircraft maintenance engineer (AME) who signed out the last mandatory periodic inspection (MPI) and the Certificate of Release to Service (CRS) was initially issued an AME licence on 19 January 2021 by the Regulator (SACAA). His last validation was issued on 14 January 2022 with an expiry date of 18 January 2023. A PA-28R-200 aircraft type rating was endorsed on his licence.

1.6. **Aircraft Information**

1.6.1. A Piper PA-28R-200 is a four-seat, all-metal, low-wing aircraft that was manufactured in 1971. It is powered by a Lycoming IO-360-C1C piston engine, driving a three-bladed Hartzell variable-pitch propeller. The design is conventional with mechanical controls, retractable tricycle landing gear and a wingspan of 9.81 metres. It has a fuel capacity of 189 litres (50 US gallons). At the time of the accident, the ZS-WAP aircraft had accumulated 6112.57 airframe hours. The engine and propeller had accumulated 6112.57 hours and 6066.22 hours, respectively.

Airframe:

Manufacturer/Model	Piper Aircraft Corporation, PA-28R-200	
Serial Number	28R-7135090	
Year of Manufacture	1971	
Total Airframe Hours (At Time of Accident)	6112.57	
Last Inspection (Date & Hours)	19 May 2022	6107.92
Hours Since Last Inspection	4.6	
CRS Issue Date	9 May 2022	
C of A (Issue Date & Expiry Date)	15 March 2011	31 March 2023
C of R (Issue Date) (Present Owner)	9 February 2019	

Type of Fuel Used	Avgas 100LL
Operating Category	Training (Part 141)
Previous Accidents	None

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

1.6.2 According to available information, the aircraft was first registered to the current owner on 9 February 2019, and the aircraft was re-issued a Certificate of Release to Service (CRS) on 19 May 2022 which would lapse at 6207.92 airframe cycles or on 19 May 2023, whichever occurs first.

1.6.3 According to the technical logbook (TL) 36, the aircraft was test flown on 19 May 2022. The test pilot reported that the aircraft operated satisfactorily, and no defects were found.

Engine:

Manufacturer/Model	Lycoming 10-360-C1C
Serial Number	L853-51A
Part Number	10-360-C1C
Hours Since New	6112.57
Hours Since Overhaul	575.95

1.6.4 The PA-28R-200 is powered by a Lycoming 10-360-C1C four-cylinder, direct drive, horizontally opposed fuel-injected engine rated at 200 horsepower (HP). It has a starter, 60 amperes 12-volt alternator, shielded ignition, vacuum pump drive, fuel pump and a dry automotive type of injector air filter.

1.6.5 Maintenance records indicated that the most recent mandatory periodic inspection (MPI) was certified on 19 May 2022 at 6107.92 airframe hours and the engine accumulated the same number of hours.

1.6.6 The engine was last overhauled on 20 October 2017 at 5536.62 hours, and had accrued a total of 575.95 since it was overhauled. The next overhaul was due at 7 536.62 hours. According to the POH, the engine time between overhaul (TBO) is 2000 hours.

1.6.7 During the examination of the engine at the aircraft maintenance organisation's (AMO's) facility, the engine crankshaft was rotated by hand and it exhibited thumb compression on all four cylinders. Approximately 7 quarts of oil was found in the oil tank (see Figure 5), and the minimum safe quantity is 2 quarts, according to the POH.

1.6.8 The engine is scheduled to undergo further tests and inspection.

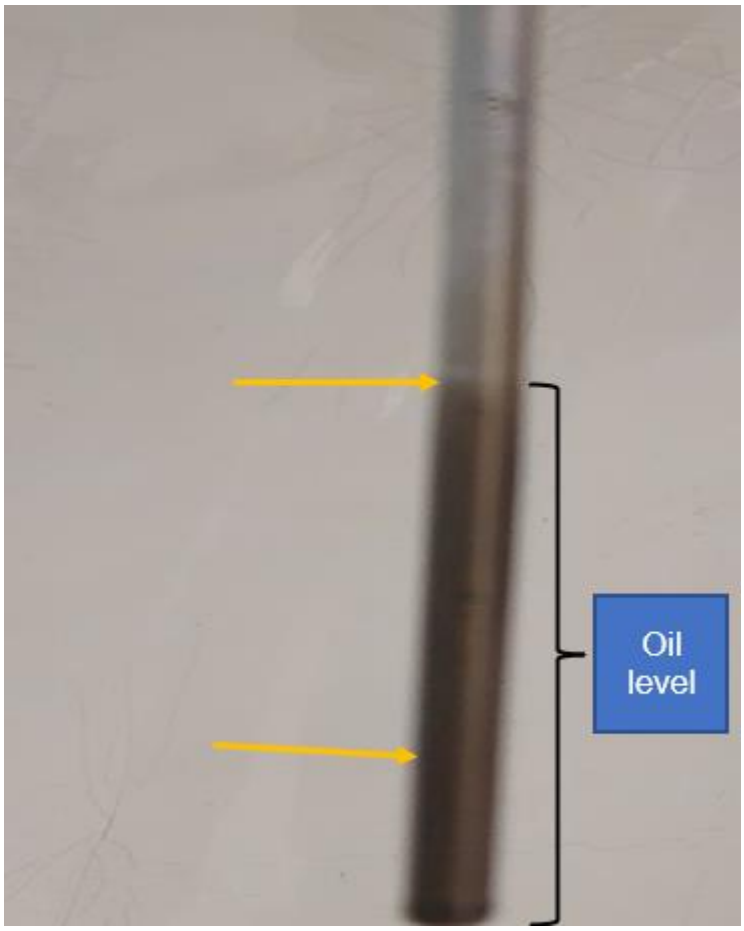

Figure 5: A dipstick showing sufficient oil level in the tanks. The top arrow shows 7 quarts and the bottom arrow indicates 2 quarts.

Propeller:

Manufacturer/Model	Hartzell,
Serial Number	CH9504
Part Number	F7666A
Hours Since New	6066,22
Hours Since Overhaul	TBO

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) on 1 June 2022 at 0930Z, recorded at FACT which is located 28nm from the accident site.

Wind Direction	040°	Wind Speed	05kt	Visibility	10km
Temperature	17°C	Cloud Cover	3 to 4 oktas	Cloud Base	3200ft
Dew Point	10°C	QNH	1030hPa		

1.8. **Aids to Navigation**

1.8.1. The aircraft was equipped with standard navigational equipment as approved by the Regulator. There were no records indicating that the navigation system was unserviceable prior to the accident.

1.9. **Communication**

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

1.10. **Aerodrome Information**

1.10.1. The accident occurred approximately 2.65nm from Stellenbosch Aerodrome.

Aerodrome Location	Stellenbosch
Aerodrome Status	Licensed
Aerodrome GPS coordinates	34°1'15" South, 18°49'30" East
Aerodrome Elevation	321 feet
Runway Headings	010°, 190°
Dimensions of Runway Used	820.8 x 30.5m
Heading of Runway Used	190°
Surface of Runway Used	Asphalt
Approach Facilities	N/A
Radio Frequency	119.3 MHz

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.

1.12. **Wreckage and Impact Information**

1.12.1. Examination of the accident scene revealed that upon touchdown, the aircraft skidded for approximately 30m (see Figure 7) before it came to rest in an upright position in the

middle (centre island) of four lanes of the tarred R44 road, facing the opposite direction from which it had approached. The right wing exhibited damage. The left wing sustained damage on the leading edge, which was ripped off towards the end of the wing tip. Fuel was also leaking in the leading edge. The landing gear was found damaged.

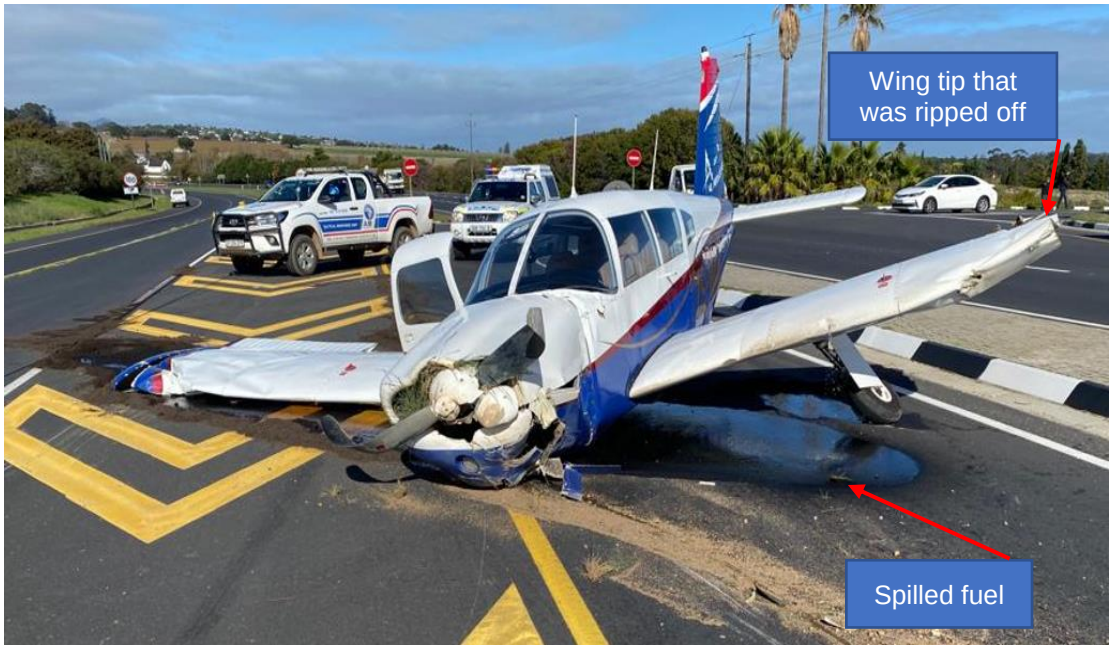

Figure 6: The aircraft at the accident site. (Source: Operator)

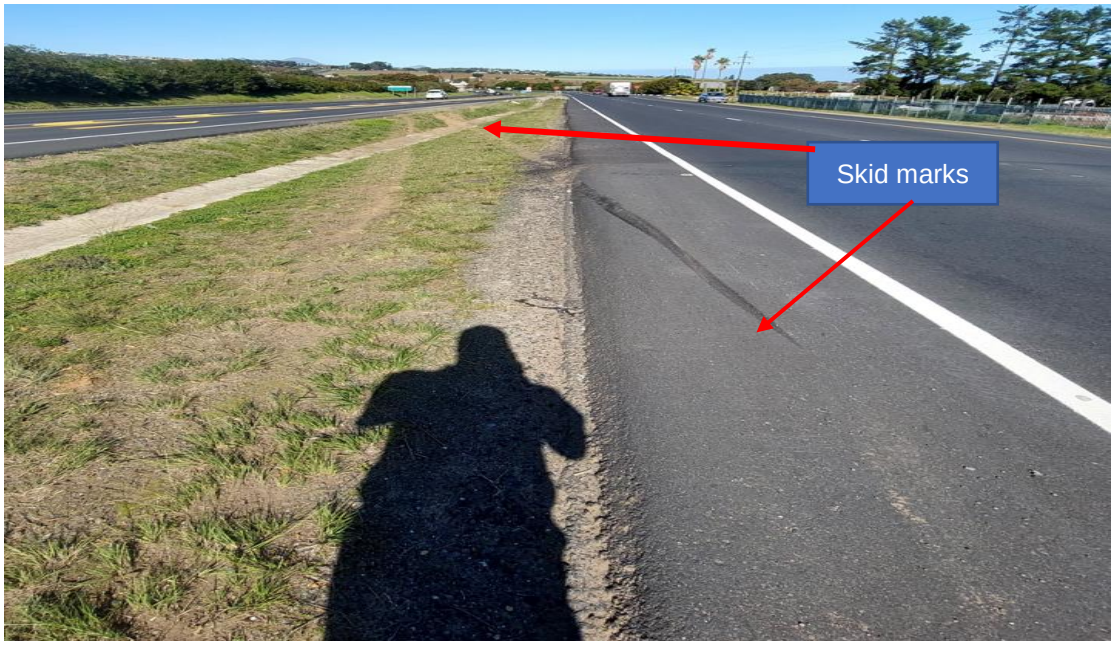

Figure 7: Skid marks on the R44 road and on the dirt centre island.

1.12.2. The aircraft was later examined at an AMO facility. The examination found that the engine and the nose section were displaced upward and aft of the aircraft. The gascolator did not contain fuel as it was damaged during impact.

Figure 8: Damaged gascolator.

1.12.3. During fuel drainage, the AMO used a portable fuel filter that removes (separates) water, dirt and debris from the fuel. The 120L (32 gallons) of fuel that was drained from the aircraft was clear and free of water or visible contamination.

Figure 9: The Portable Fuel Filter that was used by the AMO.

Figure 10: The 25-litre cannisters containing 120L of fuel that was drained.

1.13. **Medical and Pathological Information**

1.13.1. None.

1.14. **Fire**

1.14.1. There was no evidence of a pre- or post-impact fire.

1.15. Survival Aspects

1.15.1. The accident was considered survivable as no damage was caused to the cockpit and cabin structure of the aircraft.

Figure 11: Cabin structure of the accident aircraft.

1.16. Tests and Research

1.16.1. To be discussed in the final report.

1.17. Organisational and Management Information

1.17.1. The flight was conducted in accordance with the provisions of Part 141 (Training) of the CAR 2011 as amended.

1.17.2. The AMO which certified the last MPI prior to the accident flight was in possession of an AMO-approved certificate that was issued by the Regulator on 29 October 2021 with an expiry date of 31 October 2022.

1.17.3. The operator was in possession of an Approved Training Organisation (ATO) certificate which was issued by the Regulator on 1 April 2019 with an expiry date of 31 March 2024.

1.18. **Additional Information**

1.18.1. PA-28R-200 Pilot's Operating Handbook (POH) Section IV, Emergency Procedures:

TAKE-OFF

ENGINE POWER LOSS DURING TAKE-OFF

The proper action to be taken if loss of power occurs during take-off will depend on circumstances.

1. If sufficient runway remains for a normal landing, leave the gear down and land straight ahead.
2. If the area ahead is rough, or if it is necessary to clear obstructions, put gear selector switch in the "UP" position, and hold the gear lever in the override position.
3. If you have gained sufficient altitude to attempt a restart, proceed as follows:
   a. MAINTAIN SAFE AIRSPEED
   b. FUEL SELECTOR - SWITCH TO ANOTHER TANK CONTAINING FUEL
   c. ELECTRIC FUEL PUMP - CHECK ON
   d. MIXTURE - CHECK RICH
   e. ALTERNATE AIR - ON
   f. EMERGENCY GEAR LEVER - AS REQUIRED

NOTE

The landing gear will extend automatically when engine power fails at speeds below 110 MPH IAS. Glide distance with the gear extended is roughly halved; if conditions dictate, the gear can be retracted by holding the lever in the override up position.

NOTE

If engine failure was caused by fuel exhaustion, power will not be regained after tanks are switched until empty fuel lines are filled, which may require up to ten seconds.

If power is not regained, proceed with the POWER OFF LANDING procedure.

1.19. **Useful or Effective Investigation Techniques**

1.19.1. None.

2. FINDINGS

2.1. General

From the available evidence, the following preliminary findings 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 conclusions 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.

2.2. Findings

2.2.1. The instructor was initially issued a Commercial Pilot Licence (CPL) on 11 October 2016. His last validation was conducted on 26 January 2021 and the licence was reissued on the same day with an expiry date of 3 January 2023. A PA-28R-200 rating was endorsed on his licence. His Class 1 medical certificate was issued on 2 December 2021 with an expiry date of 31 December 2022 with a restriction to wear corrective lenses.

2.2.2. The student pilot was issued a Private Pilot Licence (PPL) on 22 February 2022 with an expiry date of 28 February 2023. His Class 1 medical certificate was issued on 17 July 2021 with an expiry date of 31 July 2022 with no waivers.

2.2.3. The AME who certified the last MPI and the Certificate of Release to Service (CRS) was initially issued an AME licence on 19 January 2021 by the Regulator. His last validation was conducted on 14 January 2022 and the licence was reissued on the same day with an expiry date of 18 January 2023. A PA-28R-200 aircraft type rating was endorsed on his licence.

2.2.4. The flight was conducted in accordance with the provisions of Part 141 of the South African Civil Aviation Regulations 2011 as amended.

2.2.5. The aircraft was first registered to the current owner on 9 February 2019. The aircraft was issued the Certificate of Airworthiness on 15 March 2011 with an expiry date of 31 March 2023. The aircraft was reissued a Certificate of Release to Service (CRS) on 19 May 2022 with an expiry date of 19 May 2023 or at 6207.92 airframe cycles, whichever occurs first.

2.2.6. The AMO which certified the last MPI prior to the accident flight was in possession of an AMO-approved certificate that was issued by the Regulator on 29 October 2021 with an expiry date of 31 October 2022.

2.2.7. The last MPI on the aircraft was carried out on 19 May 2022 at 6107.92 airframe hours. The aircraft had accumulated an additional 4.6 airframe hours since the last MPI.

2.2.8. The engine had accrued a total of 6107.92 hours at the last MPI.

2.2.9. The engine was last overhauled on 20 October 2017 at 5536.62 hours and had accrued a total of 575.95 since the last overhaul.

2.2.10. During the climb phase, the aircraft lost engine power and the instructor took control of the aircraft and carried out the fault-finding procedure in accordance with the POH, but with no success. He executed a forced landing on a tarred R44 road.

2.2.11. The engine is scheduled to undergo further tests and inspections.

2.2.12. Fine weather conditions prevailed at the time of the accident. The weather had no bearing on this accident.

3. ON-GOING INVESTIGATION

3.1. The AIID investigation is on-going and the investigator will be looking into other aspects of this occurrence which may or may not have safety implications.

This report is issued by:

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