SOUTH AFRICAN CIVIL AVIATION AUTHORITY

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

LIMITED OCCURRENCE INVESTIGATION REPORT – FINAL

Reference Number	CA18/3/2/1436						
Classification	Serious Incident	**Date**	11 January 2024		**Time**	1250Z	
Type of Operation	Training (Part 141)						
Location							
Place of Departure	Wonderboom Aerodrome (FAWB), Gauteng Province	Place of Intended Landing	Wonderboom Aerodrome (FAWB), Gauteng Province				
Place of Occurrence	General Flying Area 1, centre field sugar bean plantation, Wonderboom Aerodrome (FAWB)						
GPS Co-ordinates	Latitude	25º 26’ 43” S	Longitude	028º 14’ 47” E	Elevation	3 675 ft	
Aircraft Information							
Registration	ZS-EOZ						
Make; Model; S/N	Piper; PA-28-140 (Serial Number: 28-22041)						
Damage to Aircraft	Minor	Total Aircraft Hours	4196.6				
Pilot-in-command							
Licence Type	Commercial Pilot Licence (CPL)	Gender	Male	Age	25		
Licence Valid	Yes	Total Hours	313.1	Total Hours on Type	132.9		
Total Hours 30 Days	20.3	Total Flying on Type Past 90 Days	58.2				
People On-board	2 + 0	**Injuries**	0	**Fatalities**	0	**Other (on ground)**	0

What Happened

On Thursday, 11 January 2024, a student pilot and an instructor on-board a Piper PA28-140 aircraft with registration ZS-EOZ took off from Wonderboom Aerodrome (FAWB) to conduct simulated engine failure exercises at the general flying area 1 (GFA 1) centre field and, thereafter, return to FAWB. 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.

According to the instructor, the take-off to the GFA 1 centre field was uneventful. The crew conducted two successful engine failure simulations, climbing to 1500 (ft) feet above ground level (AGL) each time. During the third simulation whilst on a go-around and the initial climb phase, the aircraft did not gain height. Also, there was no warning on the instrument panel when the engine lost power. The instructor took over the flight controls and executed a forced landing on a sugar bean plantation. During the landing roll, the vertical stabiliser’s strobe light impacted an irrigation spray boom at the plantation before the aircraft came to a stop a few metres after touch down. There were no reported injuries during the incident; the aircraft sustained damage to the strobe light.

The engine was later started, and it operated normally, and all the engine parameters were in the green arcs. The aircraft was drained of fuel and transported to FAWB by road.

Figure 1: The layout of the landing site. (Source: Google Earth)

Figure 2: The aircraft post-incident. (Source: AIID)

Figure 3: The damaged strobe light. (Source: Operator)

The weather information in the table below was obtained from the South African Weather Service (SAWS), prepared for FAWB on 11 January 2024 at 1230Z. FAWB is located approximately 12 nautical miles south of the incident site.

Wind Direction	300º	Wind Speed	3 knots	Visibility	10000 m
Temperature	25ºC	Cloud Cover	CAVOK	Cloud Base	CAVOK
Dew Point	17ºC	QNH	1016		

What Causes Carburetor Icing? (Source:https://alaskafloatratings.com/float-flying-journal/what-is-carburetor-icing/)

Carburetor icing is the most common of several types of induction system icings. It occurs as a consequence of the sudden drop of temperature caused by the vaporization of the fuel and the pressure reduction in the carburetor venturi. The decline of temperature of up to 20-30 degrees Celsius causes the moisture in the atmosphere to freeze, and the ice will gradually block the venturi tube restricting airflow.

Carburetor icing can occur throughout a wide temperature and humidity range, and is likely at most temperatures that are common in Alaska. The probability of icing depends on both air temperature, relative humidity, engine power and fuel type, though the greatest risk and the most severe icing is found in air temperatures above but near freezing. The probability of icing increases with the relative humidity of the atmosphere. At reduced engine power there is a higher risk of carburetor icing caused by the lower intake temperature and the partly closed throttle valve.

The probability of carburetor icing can be predicted from values of air temperature and dew point depression by use of the below carburetor Icing-Probability Chart (figure 4).

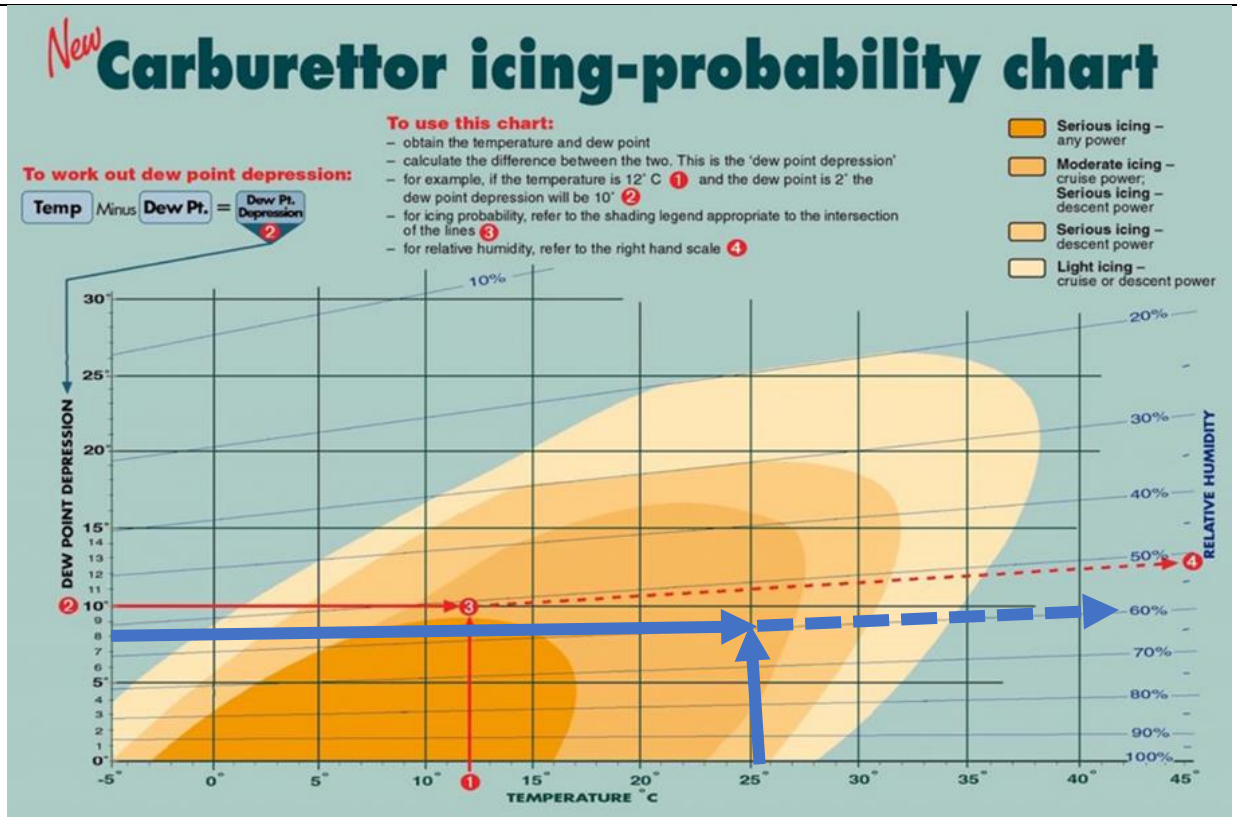

Figure 4: The carburettor icing-probability chart.

The carburettor icing probability chart for the day indicated that the dew point depression was 8ºC with 25ºC temperature, and a dew point of 17ºC with relative humidity at 60%. This placed the engine carburettor at risk of serious icing probability when in a descent power setting. The aircraft was descending at a reduced power setting; when the power lever was advanced to climb, the engine did not produce power.

Findings

1. Personnel Information

1.1 The instructor pilot had a Commercial Pilot Licence (CPL) that was initially issued on 12 October 2022. The CPL was reissued on 28 October 2023 with an expiry date of 31 October 2024. The pilot had flown a total of 132.9 hours as pilot-in-command on the aircraft type, according to the pilot's questionnaire form.

1.2 The instructor pilot was issued a Class 1 aviation medical certificate on 18 October 2023 with an expiry date of 31 October 2024 with no limitations.

1.3 The approved training organisation was issued an Approved Training Organisation (ATO) Certificate by the Regulator (SACAA) on 28 September 2022 with an expiry date of 30 November 2027.

2. Aircraft Information

2.1 The mandatory periodic inspection (MPI) that was conducted on the aircraft prior to the incident flight was certified on 9 October 2023 at 4147.5 airframe hours. The aircraft had accrued 49.1 hours since the last inspection.

2.2 The aircraft had a valid Certificate of Airworthiness (C of A) that was issued on 24 October 2019 with an expiry date of 31 October 2024.

2.3 The aircraft's Certificate of Registration (C of R) was issued to the present owner on 14 November 2017. The aircraft's engine was last overhauled on 8 August 2023 at 410.5 hours. The engine had accrued 49.1 hours at the time of the incident.

2.4 The aircraft was issued a Certificate of Release to Service (CRS) on 9 October 2023 with an expiry date of 9 October 2024 or at 4247.5 airframe hours, whichever occurs first.

2.5 The aircraft was maintained by an approved aircraft maintenance organisation (AMO) with an AMO Certificate that was issued by the Regulator on 15 August 2023 with an expiry date of 31 August 2024.

3. Meteorological Information

3.1 The weather conditions were a contributory factor to this incident as indicated by the carburettor probability chart.

4. Conclusion

4.1 The engine lost power probably due to carburettor icing during the third simulated engine failure exercise when the pilot advanced the power lever.

Probable Cause(s)
Loss of engine power was probably due to carburettor icing, which resulted in a forced landing.
Contributing Factor(s)
Possible carburettor icing.

Safety Action(s)
None.
Safety Message
To avoid injuries and damage to property, pilots are advised to conduct a proper flight planning by considering the effects of carburettor icing due to the closeness of the temperature and due point.
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 produced without prejudice to the rights of the AIID, which are reserved.

This report is issued by:
Accident and Incident Investigations Division
South African Civil Aviation Authority
Republic of South Africa