

LIMITED OCCURRENCE INVESTIGATION REPORT – FINAL

Reference Number	CA18/3/2/1469						
Classification	Serious Incident	Date	1 February 2025	Time	0915Z		
Type of Operation	Private (Part 94)						
Location							
Place of Departure	Stellenbosch Airfield (FASH), Western Cape Province		Place of Intended Landing	Stellenbosch Airfield (FASH), Western Cape Province			
Place of Occurrence	On a field near Alfon Primary School, situated 17 nm north of Stellenbosch Airfield (FASH)						
GPS Co-ordinates	Latitude	33°34'39.30" S	Longitude	018°54'56.72" E	Elevation	260 ft	
Aircraft Information							
Registration	ZU-EJB						
Make; Model; S/N	Aeroprakt LTD; A-22 (Serial Number: 161)						
Damage to Aircraft	None			Total Aircraft Hours	2201.0		
Pilot-in-command							
Licence Type	Private Pilot Licence (PPL)		Gender	Male		Age	33
Licence Valid	Yes	Total Hours	130	Total Hours on Type	9		
Total Hours 30 Days	2.5		Total Flying on Type Past 90 Days	2.5			
People On-board	1+1	Injuries	0	Fatalities	0	Other (on the ground)	0
What Happened							
<p>On Saturday, 1 February 2025, a pilot and a passenger on-board an Aeroprakt A-22 aircraft registered ZU-EJB took off on an hour building flight from Stellenbosch Airfield (FASH) in Western Cape province to the general flying area (FAD69) with the intention to land back at the same take-off aerodrome. 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.</p> <p>According to the pilot, he conducted the pre-flight checks and no abnormalities were noted on the aircraft. The aircraft was fuelled to capacity with approximately 90 litres of Aviation Gasoline 100 Low Lead (Avgas 100LL); the fuel was distributed equally between the two fuel tanks on each wing. The pilot stated that the take-off and the initial climb were uneventful; the aircraft routed north towards Diemerskraal Aerodrome, located 24 nautical miles (nm) north of FASH. The aircraft maintained a cruising altitude of 1500 feet (ft) above ground level (AGL). Upon entering Diemerskraal Aerodrome airspace, the pilot initiated a climb to 3500ft to remain clear of the aerodrome traffic circuit. Whilst descending past the circuit to approximately 2800ft heading south, the engine ran rough before it subsequently lost power. The pilot immediately established the best glide speed and initiated an engine restart. This resulted in a brief engine run before it ceased again. Despite the pilot's multiple restart attempts, the engine remained unresponsive.</p>							

The pilot scanned and identified a suitable field on which to land ahead of the flight path. He maintained a stable glide profile and conducted a successful forced landing. The aircraft was not damaged. The pilot and the passenger were unharmed. Later on, a flight instructor from the Aviation Training Organisation (ATO) that hired out the aircraft started the engine without difficulty or anomalies found. The aircraft was recovered by an approved aircraft maintenance organisation (AMO).

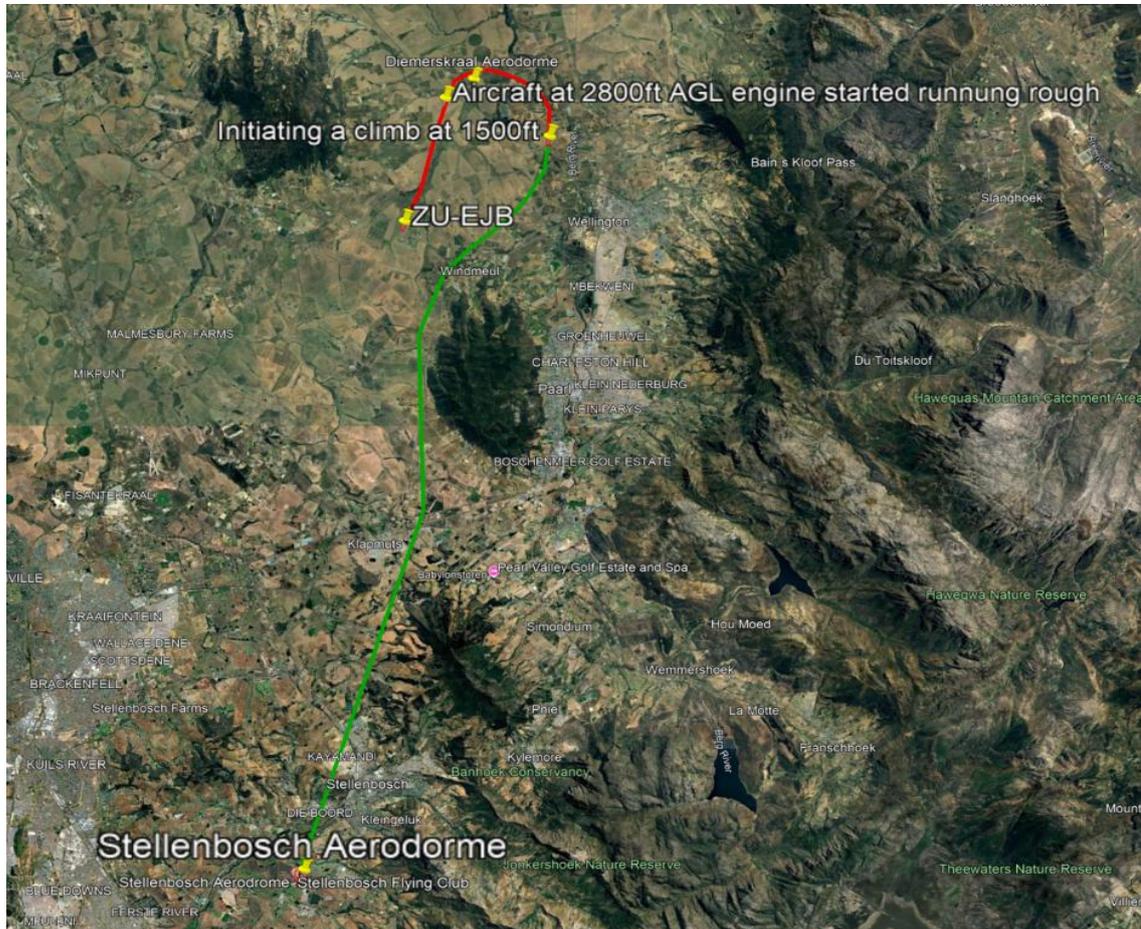


Figure 1: The flight route of ZU-EJB. (Google Earth Map)



Figure 2: The aircraft after it had come to a stop. (Operator)

Post-incident Inspection

A post-incident inspection was performed by the AMO and included examination of the electrical components, fuel transfer and mechanical systems. No abnormalities or defects were detected. Additionally, engine runs and a flight test were conducted, and no irregularities were found.

Meteorological Information

The following weather information was obtained from Cape Town International Airport (FACT) on 1 February 2025 at 0900Z.

FACT 0900Z 190/10 9999 FEW025 24/14 1013 NOSIG

According to the carburettor icing probability chart, the following calculations were made:

Dewpoint depression:

Temperature (Temp) minus (-) Dewpoint (Dew Pt) = Dewpoint Depression (Dew Pt. Dep)

Temp – Dew Pt= Dew Pt Dep

24°C – 14°C= Dew Pt Dep

10°C = Dew Pt

The following Carburetor Icing-probability Chart was used to determine the possibility of carburetor icing at the time of the serious incident.

New Carburettor icing-probability chart

To work out dew point depression:

$$\text{Temp} \text{ Minus Dew Pt.} = \text{Dew Pt. Depression}$$

To use this chart:

- obtain the temperature and dew point
- calculate the difference between the two. This is the 'dew point depression'
- for example, if the temperature is 12° C ① and the dew point is 2° the dew point depression will be 10° ②
- for icing probability, refer to the shading legend appropriate to the intersection of the lines ③
- for relative humidity, refer to the right hand scale ④

- Serious icing – any power
- Moderate icing – cruise power; Serious icing – descent power
- Serious icing – descent power
- Light icing – cruise or descent power

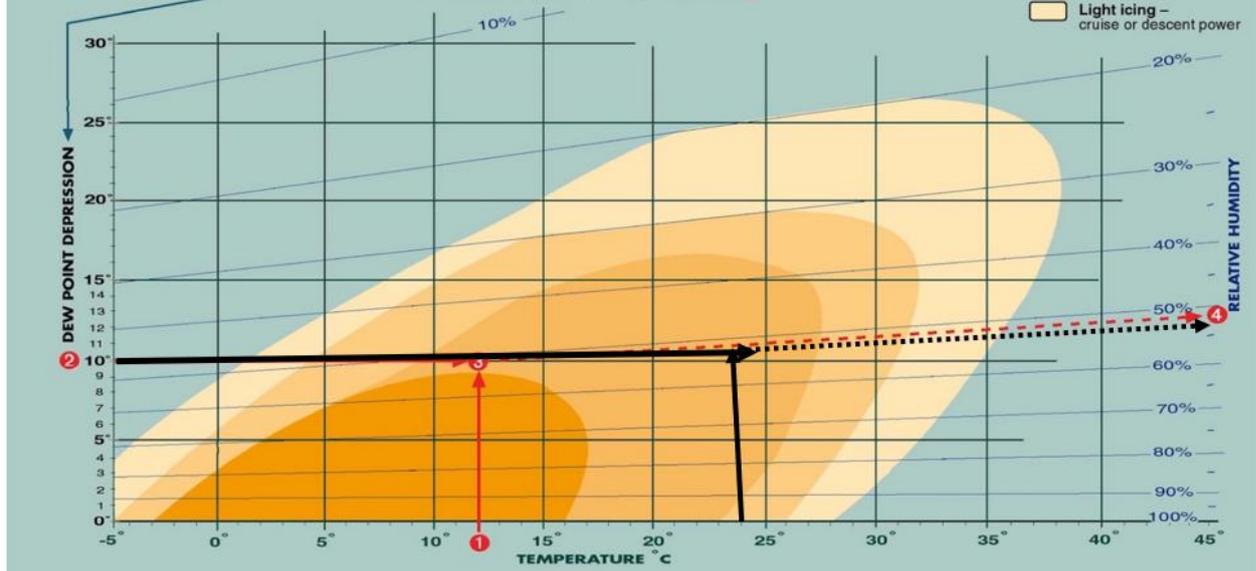


Figure 3: Carburetor Icing probability calculations.

The dew point depression of 10°C and a temperature of 24°C indicated a high chance of relative humidity at above 50% with serious icing during descent power settings.

Carburetor Icing (Source: powerplant handbook: www.faa.gov/sites/faa.gov/files/09_phak_ch7.pdf)

Carburettor ice occurs due to the effect of fuel vaporisation and the decrease in air pressure in the venturi, which causes a sharp temperature drop in the carburettor. If water vapour in the air condenses when the carburettor temperature is at or below freezing, ice may form on the internal surfaces of the carburettor, including the throttle valve. The reduced air pressure, as well as the vaporisation of fuel, contributes to the temperature decrease in the carburettor. Ice generally forms in the vicinity of the throttle valve and in the venturi throat. This restricts the flow of the fuel-air mixture and reduces power. If enough ice builds up, the engine may cease to operate. Carburettor ice is most likely to occur when temperatures are below 70 degrees Fahrenheit (°F) or 21 degrees Celsius (°C) and the relative humidity is above 80 percent. Due to the sudden cooling that takes place in the carburettor, icing can occur even in outside air temperatures as high as 100 °F (38 °C) and humidity as low as 50 percent.

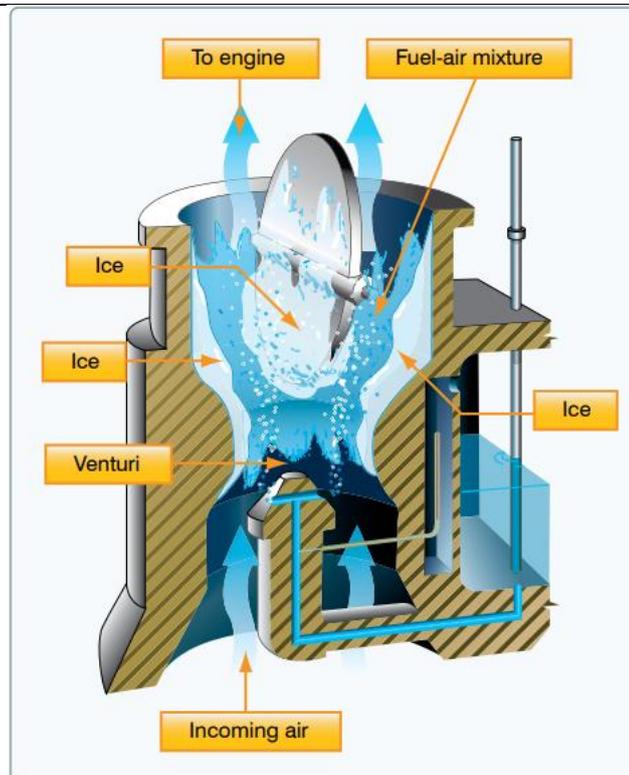


Diagram 1: Illustration of the formation of carburettor icing.

Carburettor icing can cause a range of symptoms during flight, particularly at low or partial power settings. The main indications include:

1. *Gradual loss of power – a slow reduction in engine RPM (for fixed-pitch propellers) or manifold pressure (for constant-speed propellers).*
2. *Engine roughness – the engine may run unevenly or misfire due to the disrupted fuel-air mixture.*
3. *Reduced airspeed and performance – Loss of power leads to decreased climb performance and slower cruise speeds.*
4. *Unresponsive throttle – The engine may not respond smoothly to throttle inputs.*
5. *Potential engine sputtering or shutdown – In severe cases, icing can cause the engine to sputter, backfire, or completely shut down.*

Carburettor icing most likely occur at low power settings, such as during descent or approach, especially in humid conditions. Applying carburettor heat early can help prevent or clear the ice.

Pilot's Licence Type Endorsement Timeline

On 16 October 2024, the pilot successfully completed the required aircraft type difference training; his logbook was endorsed accordingly.

On 22 October 2024, the pilot submitted a licence renewal application, which included a request for a type rating endorsement. This submission was accompanied by:

- A Type Rating Endorsement Request Form for notification of aircraft difference or familiarisation training.

- A Temporary Certificate of Competency for the rating request, which would have permitted the pilot to operate the aircraft for 30 days within the country of registry. However, this certificate was not signed.

Regulator's Licence Application Process

- *Applications were submitted via the Client Service Portal (email: BulkApplication@caa.co.za).*
- *Submissions undergo verification and invoicing review within 7 to 10 working days.*
- *Upon receipt of proof of payment, the application is assigned to a licensing officer for processing within the same 7 to 10 working days, provided all supporting documents meet the required standards.*

On 5 November 2024, the pilot's licence renewal was approved and issued; however, the aircraft type endorsement was omitted. The pilot did not follow up with the Regulator regarding the missing endorsement. When the investigating team enquired from the Regulator about the missing endorsement, the Regulator stated that its omission was an oversight as there were no valid reasons that should have affected the issuance of the endorsement.

Civil Aviation Regulations (Source: CAR Part 61.03.5)

*Under the South African Civil Aviation Regulations (SACAR), a pilot is prohibited from carrying passengers in an aircraft type that is not endorsed on their licence. Specifically, **Part 61** of the SACAR outlines the requirements for pilot licensing, including the necessity for appropriate type ratings and endorsements. Operating an aircraft without the required endorsement on one's licence is a violation of these regulations and renders the pilot unauthorized to carry passengers in that aircraft type.*

Privileges and Limitations of a PPL(A)

61.03.5(1) *The holder of a PPL(A) may not exercise the privileges of that licence unless he or she is*
The holder of a valid PPL(A) may, in VMC, act as PIC or co-pilot in any aeroplane for which he or she holds the appropriate valid class rating or type rating.

Findings

Man

1. The pilot had a Private Pilot Licence (PPL) that was initially issued by the Regulator on 25 July 2023. The PPL was reissued on 5 November 2024 with an expiry date of 31 October 2026. The pilot's Class 2 aviation medical certificate was issued on 27 October 2022 with an expiry date of 31 October 2027.
2. The pilot had a total of 130 flying hours, including 9 hours that were accumulated on the aircraft type. The aircraft type was endorsed on the pilot's logbook; however, it did not reflect on his licence. On 22 October 2024, the pilot applied to the Regulator for the aircraft type endorsement. However, when his licence was

issued, the endorsement was omitted. The pilot did not follow up with the Regulator to query the omission. Additionally, the temporary certificate that would have permitted him to operate the aircraft for 30 days was submitted without a signature, making it invalid at the time of the flight.

3. The pilot, although licensed, was not authorised to act as the pilot-in-command of the aircraft. Additionally, carrying a passenger was not permitted. Part 61 of the South African CAR 2011 require pilots to have the appropriate type rating and endorsement on their licences. Operating an aircraft without proper authorisation is a regulatory violation.

Machine

4. The aircraft had a valid Authority-to-fly (ATF) Certificate that was issued by the Regulator on 25 June 2024 with an expiry date of 30 June 2025. The Certificate of Registration (C of R) was issued to the current owner on 5 June 2019.
5. The latest annual inspection of the aircraft was conducted and certified on 27 November 2024 at 2170.50 hours after which a Certificate of Release to Service (CRS) was issued with an expiry date of 26 November 2025 or at 2270.50 hours, whichever comes first. The aircraft had a total of 2200.6 hours at the time of the accident. It had accumulated a total of 30.1 hours since the annual inspection.
6. The aircraft maintenance organisation (AMO) that conducted the mandatory service on the aircraft had an AMO Certificate that was issued on 2 March 2024 with an expiry date of 28 February 2025. The aircraft type was endorsed on the AMO's operational specifications.

Environment

7. During the flight, weather conditions were favourable with a temperature of 24°C and a dew point of 14°C. However, these conditions posed a significant risk of carburettor icing at certain power settings.
8. As the aircraft descended from 3500ft to 2800ft, the engine spluttered, followed by a complete shutdown which was due to carburettor icing. After the serious incident, the engine was restarted without difficulty, and no damage or system faults were found.

Probable Cause(s)

A successful forced landing after an in-flight engine shutdown which was likely due to a possible carburettor icing.

Contributing Factor(s)

Weather conditions: High humidity levels increased the likelihood of serious carburettor icing during descent power settings, posing a significant hazard.

Safety Action(s)

None.

Safety Message and/or Safety Recommendation/s

1. Pilot Compliance with Regulatory Requirements

Pilots must strictly adhere to regulatory requirements and ensure that they hold the correct aircraft type rating and endorsement. In this case, although the pilot was qualified to operate the aircraft, the absence of the required type-endorsement on their licence, along with carrying a passenger on-board resulted in a regulatory violation.

2. Safety Recommendation: Addressing Licensing Irregularities in the SACAA Licensing Division

It has been observed that licensing irregularities persist within the SACAA Licensing Division where pilots submit endorsement applications with the required supporting evidence, yet the final approval either omits the necessary aircraft type or endorses an incorrect one.

As per the existing licensing procedure, each application must undergo a review and verification process to ensure accuracy and compliance. Given that endorsements are based on documented evidence, such discrepancies, indicate a procedural lapse that undermines regulatory integrity and aviation safety.

To address this issue, it is recommended that SACAA:

- Strengthens the verification procedures to ensure a rigorous review of submitted evidence before final approval.
- Enhances accountability to establish a clear process to track and rectify licensing errors.
- Implements quality control measures to introduce additional oversight to prevent recurring inaccuracies.

By reinforcing these measures within the existing framework, SACAA can enhance the reliability of its licensing system and uphold aviation safety standards.

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 desktop inquiries 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**