SOUTH AFRICAN CIVIL AVIATION AUTHORITY

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

LIMITED OCCURRENCE INVESTIGATION REPORT

Reference Number	CA18/2/3/1438						
Classification	Serious Incident		**Date**	5 July 2024		**Time**	1400Z
Type of Operation	Private (Part 94)						
Location							
Place of Departure	Sishen Airport (FASS), Northern Cape Province		Place of Intended Landing	Brui, North West Province			
Place of Occurrence	Remote area near Brui, North West Province						
GPS Co-ordinates	Latitude	25°59'04.2" S	Longitude	23°29'43.1" E		Elevation	3 840 ft
Aircraft Information							
Registration	ZU-DLU						
Make; Model; S/N	Tecnam; P96 Golf (Serial Number: 043)						
Damage to Aircraft	Minor			Total Aircraft Hours		2 085.0	
Pilot-in-command							
Licence Type	Private Pilot Licence (PPL)		Gender	Male		Male	53
Licence Valid	Yes	Total Hours	605.2		Total Hours on Type		150.4
Total Hours Past 30 Days	9		Total Flying Hours on Type Past 90 Days			18.0	
People On-board	1 + 0	**Injuries** 0	**Fatalities**	0	**Other (on ground)**		0

What Happened

On Friday, 5 July 2024, a pilot on-board a Tecnam aircraft with registration ZU-DLU took off on a private flight from Sishen Airport in Northern Cape province to Brui in North West province. Visual meteorological conditions (VMC) by day prevailed at the time of the flight which was conducted under the provisions of Part 94 of the Civil Aviation Regulations (CAR) 2011 as amended.

The pilot reported that approximately 10 minutes after take-off whilst cruising overhead a remote area near Brui, the low fuel pressure warning indication illuminated and, subsequently, the engine lost power. The aircraft had 50 litres of fuel on-board prior to the incident, the total fuel capacity of the aircraft is 70 litres. The pilot surveyed the surrounding area and identified a gravel road on the left side of Reginal Road 379 (R379) and executed a forced landing. During the landing roll on an uneven surface dotted with shrubs, the left wing, left elevator and under fuselage skin were scratched which caused minor damage to the aircraft. The pilot was not injured during the serious incident. The aircraft was last flown on 29 June 2024 prior to this serious incident.

The following weather report was provided by the pilot through the pilot questionnaire.
Wind direction: southwest°; wind speed: 05 knots; air temperature: 18°C; visibility: CAVOK.

There were no weather stations in the immediate vicinity of the site to obtain an accurate weather report.

Figure 1: Aerial view of the serious incident site. (Source: Google Earth)

Figure 2: The aircraft as it came to rest after the serious incident. (Source: Pilot)

Fuel System (Source: Pilot's Operating Handbook [POH])

The system consists of two 35-litre aluminium fuel tanks that form an integral part of the leading edge. Each tank is equipped with cabin installed shut-off valve and a main filter located on the engine firewall and equipped with a drainage valve. Fuel level is monitored via two analogic displays located on the instrument panel. Fuel feed is via an engine-driven fuel pump and an emergency electric fuel pump which can be operated with a switch located on the left side of the instrument panel (pilot side). A fuel pressure indicator monitors the correct fuel feed to the carburettors.

Post-accident Investigation

According to the approved person (AP) rated on the aircraft type, the engine was intact and with no signs of mechanical defects that would have contributed to the engine power loss. The aircraft had sufficient fuel; it was of the correct grade and was free of contaminants. No disconnections were found in the throttle control and carburettors. The engine was later started, and the power was increased in stages. The engine met all the operating parameters as outlined in the operator's manual. No signs of fuel restriction or defects were noticed during the engine run that would have contributed to the drop of fuel pressure.

An assessment of the fuel system revealed that there was no overflow fuel return line fitted in the aircraft fuel system. This was likely to have contributed to an induced fuel vapor lock during flight due to the heat arising from the engine whilst the aircraft was being operated. The technical report revealed that the aircraft, built and designed in Europe, might have technical snags when operated in extreme heat conditions such as in South Africa (SA).

Aircraft Performance and Operations

The aircraft was equipped with a Rotax engine.

Aircraft Fuel System Description and Schematic (Source: Rotax Operator's Manual 912 LSU, Chapter 7[7.2])

Figure 3 shows the flow of fuel from fuel tank (1) via a coarse filter (2), the fire cock (3), and fine filter (4) to the mechanical fuel pump (5). From the pump, fuel passes on via the fuel manifold (6) to the two carburettors. The return-line diverts fuel flows back to the fuel tank and suction side of the fuel system.

The aircraft was not fitted with the fuel line Number 9 shown in Figure 4. It is not standard for the Rotax engine to be fitted with the return fuel line.

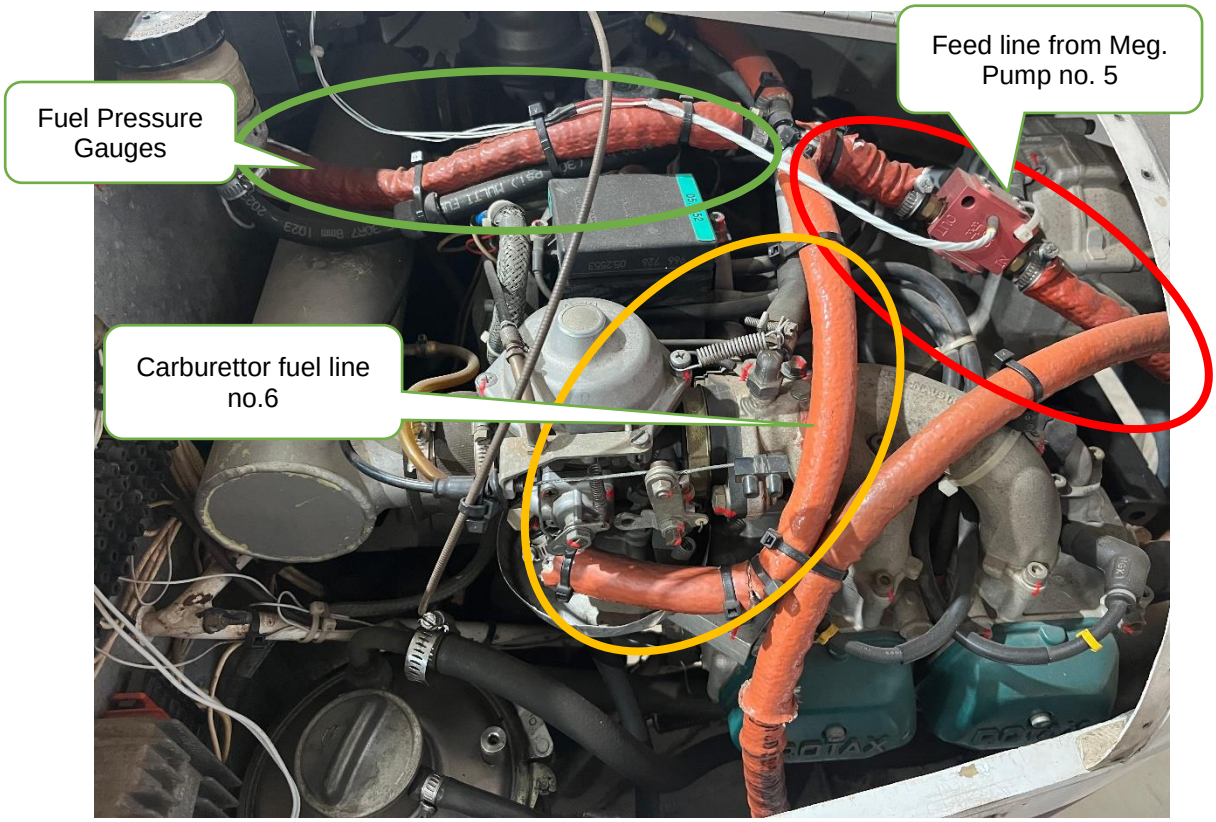

Figure 3: Picture of the Rotax engine without the return line.

Return line	Via the return line (5) surplus fuel flows back to the fuel tank and suction side of fuel system.
	NOTE: The return line prevents malfunctions caused by the formation of vapor lock.

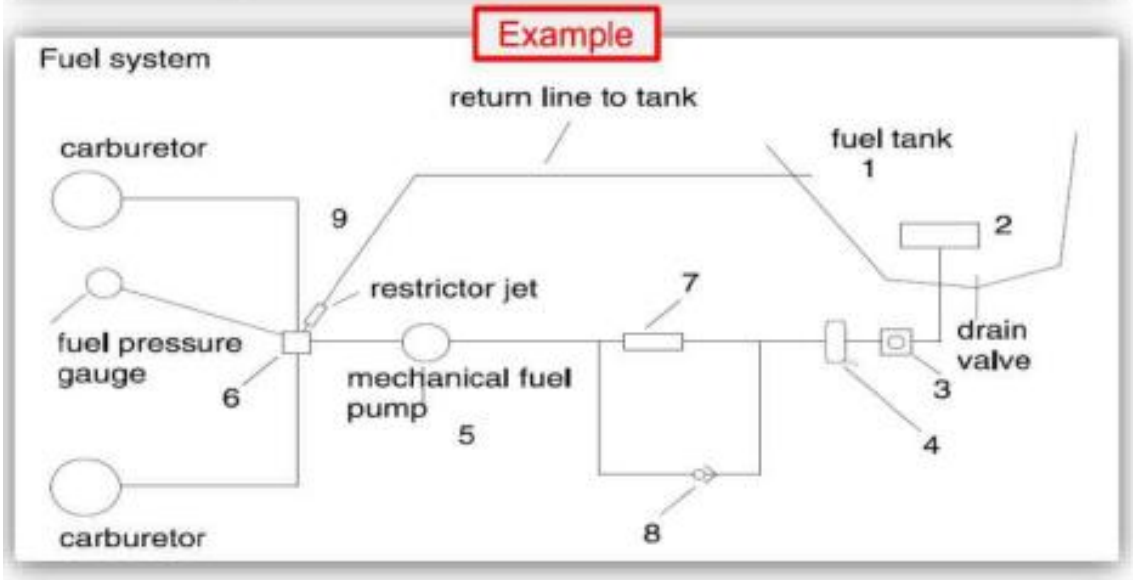

Diagram 1: Rotax 912 ULS fuel system schematic.

Findings

1. The pilot had a Private Pilot Licence (PPL) that was initially issued by the Regulator (SACAA) on 13 May 2009. The latest PPL was reissued on 3 November 2023 with an expiry date of 30 November 2024. The pilot had flown a total of 605.2 hours of which 150.4 hours were acquired on the aircraft type.

2. The aircraft type was endorsed on the pilot's PPL. The pilot had a valid Class 2 aviation medical certificate that was issued on 3 November 2023 with an expiry date of 3 November 2024.

3. The Certificate of Registration (C of R) was issued to the current owner on 18 March 2020.

4. The aircraft had a valid Authority-to-fly (ATF) Certificate that was issued by the Regulator on 3 April 2024 with an expiry date of 31 March 2025.

5. The aircraft was issued a Certificate of Release to Service (CRS) on 13 March 2024 at 2062.8 hours with an expiry date of 12 March 2025 or at 2162.8 hours, whichever occurs first. There were no defects recorded in the flight folio at the time of the flight.

6. Post-incident investigation revealed no anomalies with the engine during the run-up checks.

Probable Cause

Undetermined loss of engine power.

Contributing Factor

None.

Safety Action(s)

None.

Safety Message

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 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