



LIMITED OCCURRENCE INVESTIGATION REPORT – FINAL

Reference Number		CA18/2/3/10593					
Classification	Accident	Date	15 July 2025			Time	1820Z
Type of Operation	Private (Part 91)						
Location							
Place of Departure		Wonderboom Aerodrome (FAWB), Gauteng Province		Place of Intended Landing		Wonderboom Aerodrome (FAWB), Gauteng Province	
Place of Occurrence		On a bushy terrain approximately 3 nautical miles north-east of FAWB					
GPS Co-ordinates	Latitude	25°38'10.9" S	Longitude	28°16'03.8" E	Elevation	4018 ft	
Aircraft Information							
Registration		ZS-EAD					
Make; Model; S/N		Cessna; 172F (Serial Number 172-52464)					
Damage to Aircraft		Minor		Total Aircraft Tachometer Hours		4730.71	
Pilot-in-command							
Licence Type		Private Pilot Licence (PPL)		Gender		Male	
Age		22		Total Hours		123.7	
Licence Valid		Yes		Total Hours on Type		19	
Total Hours Past 30 Days		1		Total Flying on Type Past 90 Days		1	
People On-board		1+2		Injuries		0	
Fatalities		0		Other (on ground)		0	
What Happened							
<p>On Tuesday evening, 15 July 2025, a pilot and two passengers on-board a Cessna 172 aircraft with registration ZS-EAD took off on a private flight from Wonderboom Aerodrome (FAWB) in Gauteng province with the intention to return to the same aerodrome. The flight was conducted under visual meteorological conditions (VMC) and under the provisions of Part 91 of the Civil Aviation Regulations (CAR) 2011 as amended.</p> <p>The pilot stated that prior to the flight, the aircraft was refuelled to capacity and a pre-flight inspection conducted with no anomalies noted. The pilot had planned to fly to Vereeniging Aerodrome (FAVV) in Gauteng province without landing and then return to FAWB for a full-stop landing. The take-off from FAWB was uneventful; the pilot continued with the route as planned. On his return whilst overhead Rosslyn industrial area, north of Pretoria and west of FAWB at 3 500 feet (ft) above ground level (AGL), the aircraft descended to 1 500ft AGL whilst orbiting overhead the industrial area.</p> <p>The pilot monitored the frequency for other aircraft and broadcasted on FAWB frequency 118.35-Megahertz (MHz) to establish traffic in the FAWB airspace. The pilot approached the aerodrome</p>							

overhead from the right of Runway 11 with the intention to land. After observing an aircraft ahead of his, turn north across Runway 29 to land on Runway 11, the pilot broadcasted his position and his intention to follow the aircraft (ahead) to land on Runway 11; he then proceeded to descend to circuit altitude 1 000 ft AGL. Immediately after the radio call, the aircraft engine stopped. The pilot attempted to restart the engine as per the Engine Failure In-flight Procedure but was unsuccessful. He then decided that he would perform a forced landing on a field ahead of his flight path instead of landing on Runway 11. The pilot then broadcasted a Mayday call and reported his approximate location and his intention to perform a forced landing north-east of FAWB. He configured the aircraft in accordance with the Emergency Landing Without Engine Power checklist for a flapless forced landing; the aircraft landed on a bushy terrain in a farm north-east of FAWB. Once the aircraft had come to a stop, he followed the shutdown checklist and secured the aircraft.

The pilot and the two passengers were not injured during the accident sequence. The aircraft sustained minor damage to the right horizontal stabiliser, right-wing leading edge, windscreen and right-wing strut mount.



Figure 1: The aircraft at the scene of the accident.

The weather information below was obtained from the pilot via the pilot questionnaire.

Wind Direction	340°	Wind Speed	8 kts	Visibility	10km
Temperature	19°C	Cloud Cover	Scattered	Cloud Base	4 500 ft
Dew Point	3°C				

On Wednesday morning, 16 July 2025, the investigation team dispatched to the scene of the accident to examine the aircraft. Upon inspection of the aircraft, there were no signs of oil or fuel leaks. The cockpit, cabin, engine and propeller were inspected, and no anomalies were found. The engine's sparkplug leads, magnetos and induction pipes were found properly secured and intact. The fuel tank caps were in place and properly secured. The investigators examined the fuel tanks and discovered that the fuel level in the left tank was almost at maximum capacity whilst the fuel level on the right tank was almost empty. The propeller was rotated freely by hand; compression was felt on all cylinders with no binding or abnormal noise. This indicated that the engine did not cease.

An aircraft maintenance engineer (AME) accompanied the investigators to examine the aircraft; after priming the engine, it started and idled normally. Power was increased in stages, and no anomalies were noted.

The aircraft was later recovered to a local aircraft maintenance organisation (AMO) facility at FAWB where approximately 68L (18 gallons) of fuel was drained from the left tank and 10L (2.6 gallons) from the right tank. The drained fuel was confirmed as clean and free of contamination and sediment. The fuel system plumbing from the right fuel tank was also inspected and it was confirmed to be free of obstruction.

During an interview, the pilot stated that he was not certain of the position of the fuel selector at the time of engine stoppage. He recalled that it was off to one side when he moved the fuel selector to change fuel tank selection when he was carrying out the Engine Stoppage In-flight checklist.

According to the Cessna 172 aircraft flight checklist, "the pilot is required to operate the aircraft with the fuel switch selected to 'both' tanks".

Examination of the pilot's logbook indicated that the pilot had acquired most of his flight experience on a Piper PA-28 Cherokee which requires the fuel switch selection on either left or right tank for continuous and uninterrupted fuel flow to the engine under all conditions.

Aircraft Fuel System (Source: ZS-EAD Approved Flight Manual [AFM])

The Cessna 172 has an integral fuel tank in both the left and right wing. Fuel is gravity fed to a four-way selector valve, then through a strainer to the engine-driven fuel pump and on to the carburettor. The fuel selector allows fuel to be fed from the left tank, right tank, both fuel tanks, and to be selected to the OFF position.

According to the ZS-EAD approved flight manual, the fuel selector valve should be selected or placed to both positions during take-off, climb, descent, landing and manoeuvres that involve prolonged slips or skids. The aircraft had a fuel tank capacity of 19.5 gallons per tank of which 18 gallons is usable in all flight conditions (see Figure 2).

FUEL QUANTITY DATA (U.S. GALLONS)					
TANKS	NO.	USABLE FUEL ALL FLIGHT CONDITIONS	ADDITIONAL USABLE FUEL (LEVEL FLIGHT)	UNUSABLE FUEL (LEVEL FLIGHT)	TOTAL FUEL VOLUME EACH
LEFT WING	1	18.0 gal.	1.0 gal.	0.5 gal.	19.5 gal.
RIGHT WING	1	18.0 gal.	1.0 gal.	0.5 gal.	19.5 gal.

Figure 2: Fuel data for a Cessna 172 aircraft. (Source: Cessna Approved Flight Manual)

BEFORE TAKE OFF CHECKS	AFTER TAKE OFF CHECKS
Fuel Selector Both Trimmer Set for Takeoff Mixture Set for Takeoff	Brakes Applied Fuel Selector Confirm on both Mixture and Throttle Set for the climb
DOWNWIND CHECKS	FREDASS CHECKS
Brakes Applied Fuel Selector Both Mixture and Throttle Set	Fuel Contents sufficient and tank selected Radios On and selected (frequency)

Figure 3: Various portions of the operator’s aircraft checklist require the tank selector to be on “both” positions.

Fuel, Radio, Engine, Direction and Altimeter (FREDA) Checklist

FREDA is a popular mnemonic used in general aviation and by pilot training institutions, which lists critical items for a pilot to check periodically. There are variations of the mnemonic used in general aviation where aviators add additional letters to the mnemonic to expand their list of items to be check.

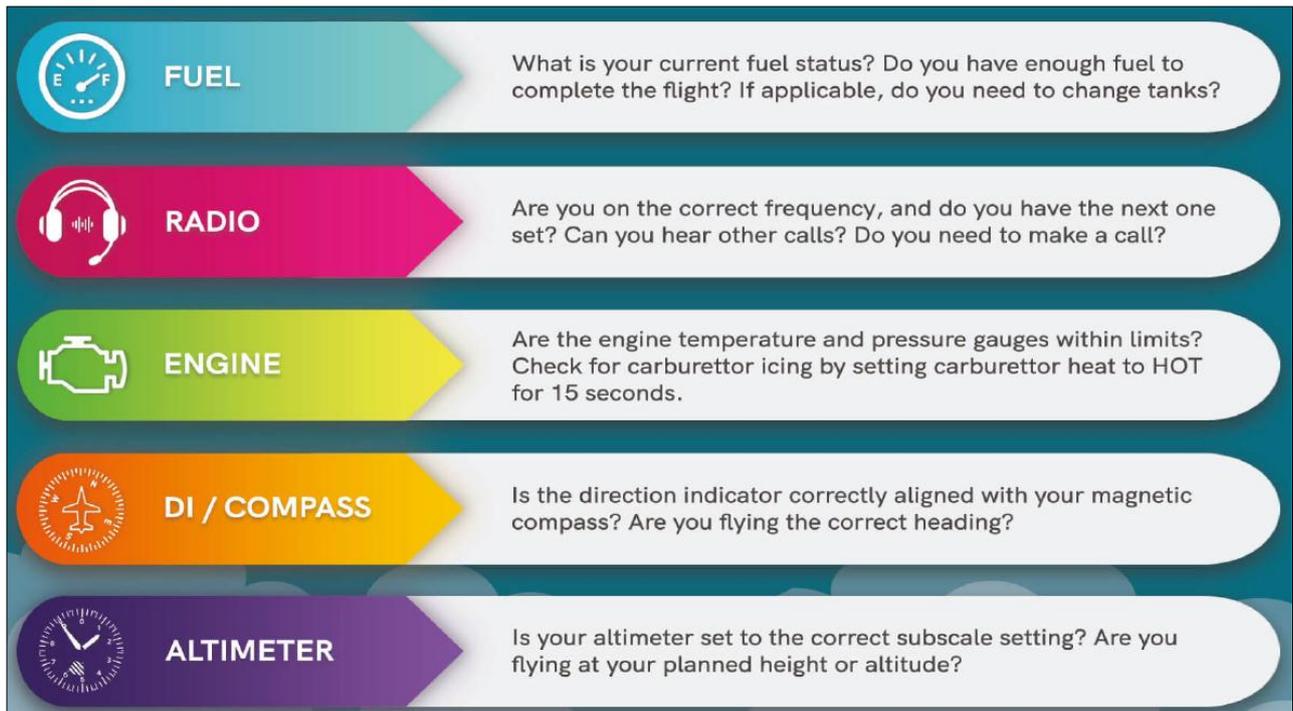


Figure 4: An example of a FREDa checklist. (Source: Flyngy Pilot Training)

Findings

1. Personnel Information

- 1.1. The pilot had a Private Pilot Licence (PPL) that was initially issued by the Regulator (SACAA) on 24 August 2022. The licence was reissued on 4 September 2024 with an expiry date of 31 March 2026. The pilot had the aircraft type endorsed on his licence. He had accumulated 114 total flying hours with 19 hours on the aircraft type. The pilot had last flown the aircraft type on 9 July 2025 for 1 hour. Before the flight on 9 July 2025, he had flown the aircraft type on 5 November 2024 and, prior to that, on 12 September 2024.
- 1.2. The pilot had a Class 2 aviation medical certificate that was issued on 9 November 2021 with an expiry date of 9 November 2026. The pilot had no restrictions listed on his medical certificate.
- 1.3. The pilot had 19 hours of flight time on the Cessna 172. The rest of his flying experience totalling 95 hours was accumulated on a Piper PA-28 Cherokee aircraft.

2. Aircraft

- 2.1 The initial Certificate of Airworthiness (C of A) was issued on 31 March 1970. The most recent C of A had an expiry date of 31 March 2026.

2.2 The Certificate of Registration (C of R) was issued to the present owner on 28 July 2021.

2.3 Maintenance records indicated that the aircraft's maintenance schedule was up to date and was undertaken by an approved aircraft maintenance organisation (AMO). The last maintenance inspection of the aircraft was certified on 26 June 2025 at 4708.4 Tachometer hours after which a Certificate of Release to Service (CRS) was issued with an expiry date of 25 June 2026 or at 4758.4 Tachometer hours, whichever comes first.

2.4 The aircraft had a total of 6284.51 airframe hours and 4730.71 Tachometer hours at the time of the accident.

2.5 The aircraft had 2.6 gallons of fuel that remained in the right fuel tank whilst it was orbiting prior to landing. There was a high probability that during orbiting, fuel moved away from the gravity feed pick-up which caused the engine stoppage due to fuel starvation.

3. Procedures

3.1 Part 91.03.2 of the South African Civil Aviation Regulations 2011 as amended "*requires the operator to establish an aircraft checklist for use by flight crew and other personnel for all phases of aircraft operation under normal, abnormal and emergency conditions*". The pilot failed to follow the fuel selection requirements as stated on the operator's aircraft checklist.

4. Environment

4.1 Good weather conditions prevailed at the time of the flight; the weather did not contribute to this accident.

Probable Cause(s)

Engine stoppage caused by fuel starvation due to improper fuel management.

Contributing Factor(s)

- Failure to follow the fuel selection requirements as stipulated on the operator's aircraft checklist.

Safety Action(s)

The SACAA approved Aircraft Flight Manual (AFM) for ZS-EAD is made up of extracts from the original (Federal Aviation Administration [FAA] approved) Cessna 172 Owner's Manual. Page 13 of the AFM re-introduces the aircraft fuel system with a schematic of a fuel system with an auxiliary (aux) fuel tank included and details the aircraft's operating procedures. There is, however, no explicit note on page 13 that the fuel system and operating procedures are only to be used on aircraft with auxiliary fuel tank modification. There is no introduction which indicates that the schematic and procedures are only applicable to aircraft with the auxiliary fuel tank modification (see Figure 3).

<p>The operator should revise its approved Aircraft Flight Manual to reflect the fuel system and fuel management procedures as applicable to the configuration of ZS-EAD and remove contradicting information that might cause confusion.</p>
<p>Safety Message</p>
<p>Pilots are reminded to always maintain situational awareness when flying aircraft. FREDA checks are an excellent tool for building good habits in maintaining situational awareness and ensuring vital aircraft systems are configured correctly and that they are operating normally.</p>
<p>About this Report</p>
<p><i>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.</i></p> <p><i>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.</i></p>
<p>Purpose</p>
<p><i>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.</i></p>
<p>Disclaimer</p>
<p><i>This report is produced without prejudice to the rights of the AIID, which are reserved.</i></p>

This report is issued by:

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