LIMITED OCCURRENCE INVESTIGATION REPORT – FINAL

Reference Number	CA18/2/3/10632						
Classification	Accident	**Date**	31 January 2026		**Time**	1013Z	
Type of Operation	Training (Part 141)						
Location							
Place of Departure	Rand Airport (FAGM), Gauteng Province	Place of Intended Landing	Rand Airport (FAGM), Gauteng Province				
Place of Occurrence	Rand Airport (FAGM) perimeter fence, beyond Runway 35, Gauteng Province						
GPS Co-ordinates	Latitude	26°14'07.1" S	Longitude	28°08'52.0" E	Elevation	5 432ft	
Aircraft Information							
Registration	ZS-OFU						
Make; Model; S/N	Cessna; 172N (Serial Number: 172-72775)						
Damage to Aircraft	Substantial		Total Aircraft Hours	9 853.9			
Pilot-in-command							
Licence Type	Commercial Pilot Licence (CPL)		Gender	Male	Age	23	
Licence Valid	Yes	Total Hours	580	Total Hours on Type	324.2		
Total Hours 30 Days	26.6		Total Flying on Type Past 90 Days	70			
People on board	2+1	**Injuries**	0	**Fatalities**	0	**Other (on ground)**	0

What Happened

On Sunday, 31 January 2026, two flight instructors (FI) and a student pilot (SP) on-board a Cessna 172N aircraft registered ZS-OFU were conducting a training flight from Rand Airport (FAGM) in Gauteng province with the intention to land at the same airport. The flight was conducted under visual meteorological conditions (VMC) by day and in accordance with the provisions of Part 141 of the Civil Aviation Regulations (CAR) 2011, as amended.

The flight instructor (FI) who was seated in the front left seat was the pilot monitoring (PM), and the student pilot seated in the front right seat was the pilot flying (PF). The second FI was seated at the back seat and had no flying duties. The FI stated that a pre-flight inspection of the aircraft was conducted with no anomalies noted. He conducted a pre-flight briefing to ensure that the SP understood the training exercise, *Exercise 9*, which involved turning manoeuvres and maintaining a medium-level flight. The SP was also briefed that in the event of an emergency, the FI would take control of the aircraft. The aircraft had approximately 113.5 litres (L) of Avgas 100LL in the tanks (approximately 70% full). After receiving take-off clearance from the air traffic control (ATC) officer, the SP opened the throttle to 2 250 revolutions per minute (RPM) and commenced with the take-off run on Runway (RWY) 35. The aircraft rotated at a speed of approximately 56 knots (kts).

As the aircraft climbed to approximately 50 feet (ft) above ground level (AGL), the FI noticed that it was struggling to climb farther, yet the engine parameters remained within the green arch (normal). After the aircraft had passed the intersection of RWY 35 and RWY 29, the FI decided to take control of the aircraft and elected to abort take-off. The FI reduced the throttle and, subsequently, retarded the power before landing the aircraft on RWY 35. During the landing roll at approximately 70 kts with the flaps set at 10 degrees, the FI engaged the brakes and the aircraft initially decelerated; however, there was insufficient runway remaining to bring it to a safe stop. The aircraft overran the threshold of RWY 11 (opposite) and impacted the airport's perimeter fence (beyond the end of the runway). The aircraft was substantially damaged; third-party damage was limited to the airport perimeter fence. Approximately 98.4L of Avgas remained in the aircraft's fuel tanks. The FI in the right front seat and the SP were not injured; however, the FI in the back seat sustained minor injuries.

The accident occurred during daylight at Global Positioning System (GPS) co-ordinates determined to be 26°14'07.1" South 28°08'52.0" East, at an elevation 5 423 feet (ft).

Figure 1: An aerial view of the approximate accident site (red pin). (Source: Google Earth)

Figure 2: The front view of the aircraft in its resting position after the accident. (Source: Operator)

Aircraft Description (Source: Pilot's Operating Handbook [POH])

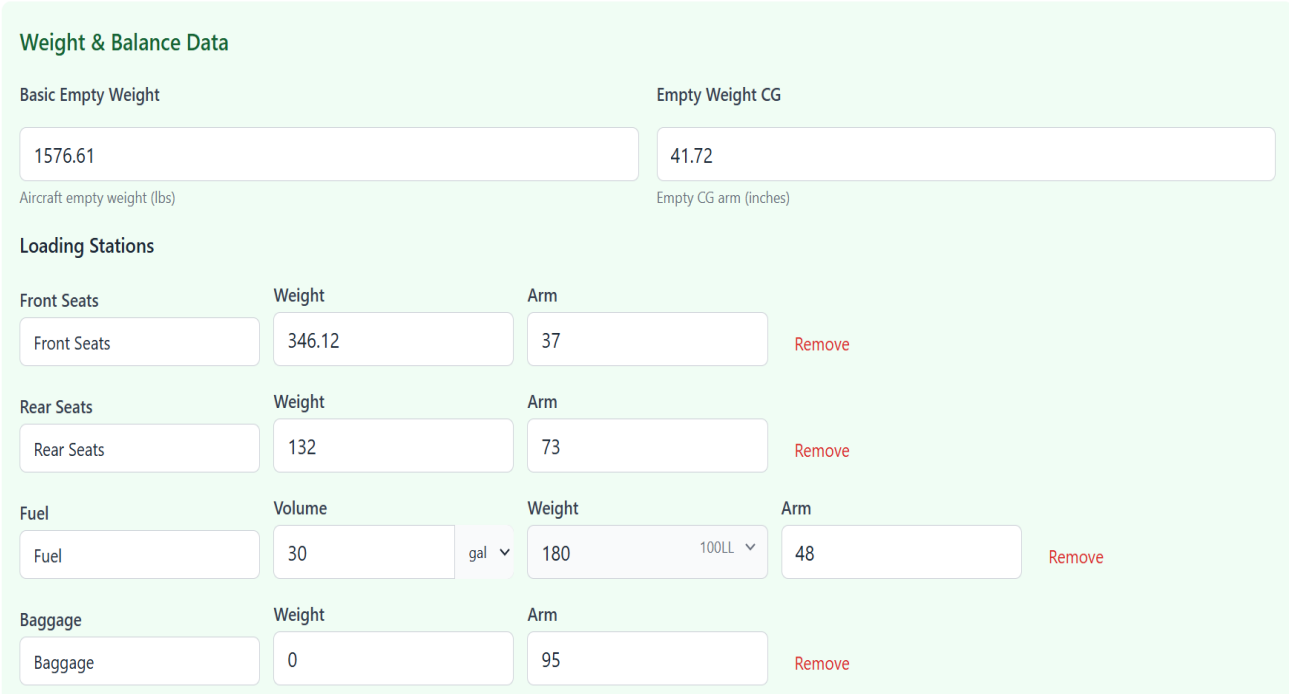
The Cessna 172N POH describes the aircraft's performance as typical of a normally aspirated, four-seat training and touring aircraft, with performance primarily influenced by weight, altitude and temperature. The aircraft is equipped with a Lycoming O-320 engine producing approximately 160 horsepower, and its take-off, climb, cruise and landing capabilities are presented through performance charts that account for pressure altitude and ambient temperature. Under standard sea level conditions, the aircraft demonstrates a steady but moderate climb performance which progressively decreases with increasing altitude due to reduced engine power and air density. Cruise performance is optimised within specified power settings, allowing for a balance between fuel efficiency and airspeed, whilst range and endurance vary depending on mixture setting and altitude.

The POH emphasises that all performance figures assume a properly maintained aircraft operated within the prescribed limits, and that deviations such as high-density altitude, increased aircraft weight, or improper configuration will significantly degrade overall performance, particularly during take-off and climb phases.

7.	AIRCRAFT EMPTY WEIGHT					
	1576.3	lb	41.5	in	65416.5	lb-in
	715.0	kg	1.0	m	7150	kg-m
8.	MAXIMUM CERTIFICATED TAKEOFF MASS		2299	lb	1,043.00	kg

Figure 3: The mass and balance of the aircraft. (Source: ZS-OFU CAR 43.02.7 Mass and Balance report)

Weight and Balance Calculation



Total Weight – 2 234.73 pounds (lbs)

Total Moment – 96 858.6

Arm (CG Position) – 43.34

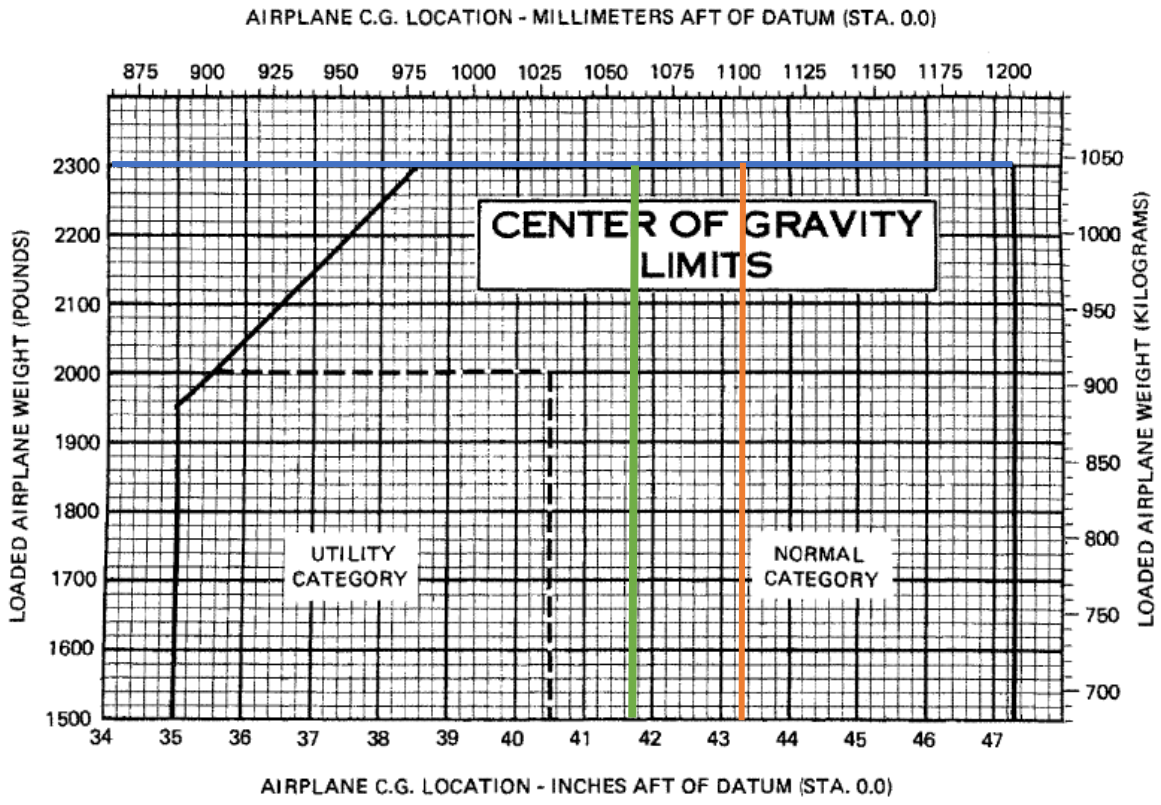


Figure 6-8. Center of Gravity Limits

Figure 4: Graph indicating centre-of-gravity limits. (Source: POH)

Graph Key

	Max Take-off Weight
	CG Empty Weight
	CG Results

Based on the Weight and Balance calculations and centre-of-gravity (CG) results, the aircraft's CG was determined to be too forward. The calculated take-off weight for the flight carrying three passengers was 2 234.73 pounds (lbs), as obtained from both the load sheet and the supporting weight and balance calculations above. Although this weight remained within the allowable limit by 64.27 lbs, the forward CG condition could adversely affect aircraft handling characteristics. An excessively forward CG increases longitudinal stability but may result in heavier control forces, reduced elevator authority during rotation and flare, and longer take-off and landing distances.

WEIGHT LBS	PRESS ALT FT	CLIMB SPEED KIAS	RATE OF CLIMB - FPM			
			-20°C	0°C	20°C	40°C
2300	S.L.	73	875	815	755	695
	2000	72	765	705	650	590
	4000	71	655	600	545	485
	6000	70	545	495	440	385
	8000	69	440	390	335	280
	10,000	68	335	285	230	---
	12,000	67	230	180	---	---

Figure 5: Rate of climb. (Source: POH)

According to the aircraft's rate-of-climb performance table, the recommended climb speed at the maximum allowable weight of 2 300 lbs is 71 knots indicated airspeed (KIAS). However, the pilots achieved a climb speed of only 56 kts whilst operating at a take-off weight of 2 234.73 lbs, which was within by 64.27 lbs of the maximum allowable weight. Operating below the recommended climb speed at a weight close to the aircraft's maximum limit would have adversely affected climb performance and aircraft controllability.

Aerodynamics of Flight

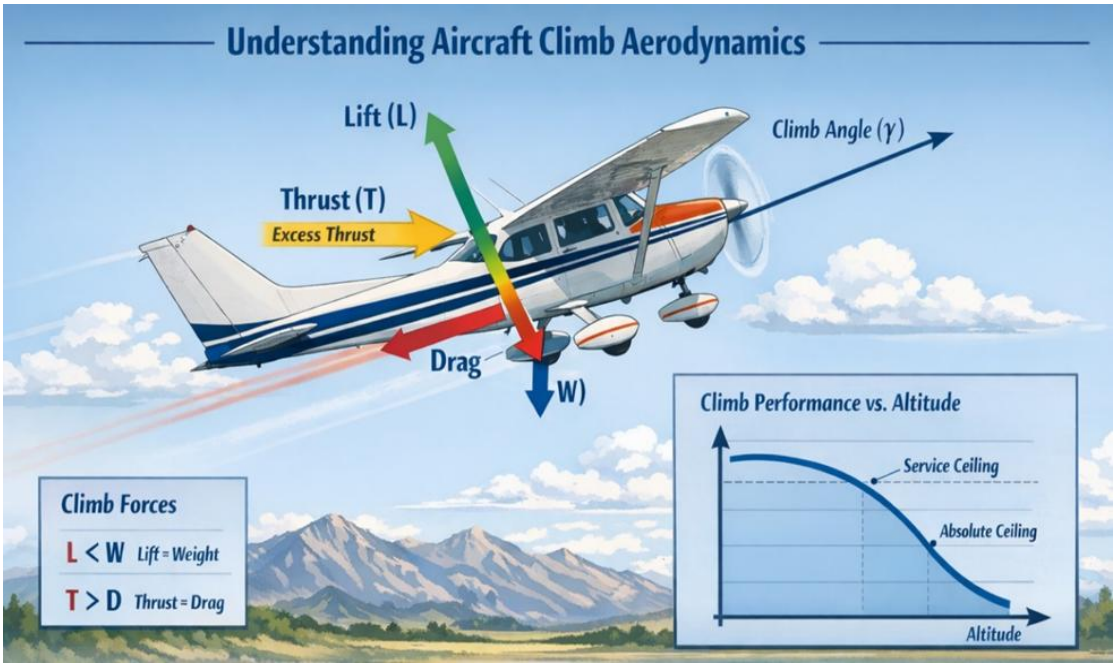


Figure 6: A diagrammatic representation of an aircraft climb based on aerodynamics. (Source: Aerodynamics of Flight)

Aerodynamically, the aircraft was operating at a weight close to the maximum allowable limit which significantly affected its aerodynamic performance during climb. A heavier aircraft requires greater lift to overcome its weight, resulting in a higher angle-of-attack and increased induced drag. As

altitude increases and air density reduces, engine power, propeller efficiency and lift capability also decrease, further degrading climb performance. Under these conditions, the low climb speed caused the aircraft's airspeed to decay below the recommended best rate-of-climb speed (Vy), leaving insufficient excess thrust to sustain the climb and reducing the aircraft's ability to support its weight aerodynamically.

The weight and degraded climb performance also adversely affected the attempted aborted landing. With limited excess power available, the pilot was unable to effectively arrest the descent and regain adequate climb performance. The increased drag associated with the higher angle-of-attack, combined with the aircraft's weight caused it (aircraft) to settle and descend instead of successfully climbing up.

WEIGHT LBS	TAKEOFF SPEED KIAS		PRESS ALT FT	0°C		10°C		20°C		30°C		40°C	
	LIFT OFF	AT 50 FT		GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS
2300	52	59	S.L.	720	1300	775	1390	835	1490	895	1590	960	1700
			1000	790	1420	850	1525	915	1630	980	1745	1050	1865
			2000	865	1555	930	1670	1000	1790	1075	1915	1155	2055
			3000	950	1710	1025	1835	1100	1970	1185	2115	1270	2265
			4000	1045	1880	1125	2025	1210	2175	1300	2335	1400	2510
			5000	1150	2075	1240	2240	1335	2410	1435	2595	1540	2795
			6000	1265	2305	1365	2485	1475	2680	1585	2895	1705	3125
			7000	1400	2565	1510	2770	1630	3000	1755	3245	1890	3515
			8000	1550	2870	1675	3110	1805	3375	1945	3670	2095	3990

Figure 7: Take-off distance. (Source: POH)

The take-off distance the aircraft required at 20 degrees Celsius was 1 335 feet (406.9 metres). The length of RWY 35 is 1 311 metres.

WEIGHT LBS	SPEED AT 50 FT KIAS	PRESS ALT FT	0°C		10°C		20°C		30°C		40°C	
			GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS
2300	60	S.L.	495	1205	510	1235	530	1265	545	1295	565	1330
		1000	510	1235	530	1265	550	1300	565	1330	585	1365
		2000	530	1265	550	1300	570	1335	590	1370	610	1405
		3000	550	1300	570	1335	590	1370	610	1405	630	1440
		4000	570	1335	590	1370	615	1410	635	1445	655	1480
		5000	590	1370	615	1415	635	1450	655	1485	680	1525
		6000	615	1415	640	1455	660	1490	685	1535	705	1570
		7000	640	1455	660	1495	685	1535	710	1575	730	1615
		8000	665	1500	690	1540	710	1580	735	1620	760	1665

Figure 8: Landing distance. (Source: POH)

The landing distance the aircraft required at 20 degrees Celsius was 635 feet (193.5m). The length of RWY 35 is 1 311m.

Student Pilot Licence

According to the Civil Aviation Regulations 2011, Part 61, Subpart 1: "*61.01.2 (1) No person may act as a pilot of a South African registered aircraft, except in the case of dual instruction with an appropriately rated flight instructor, unless such person holds a valid pilot licence with applicable ratings issued, reissued, validated or revalidated by the Director or by an appropriate authority in terms of this Part or Part 62, provided that a SPL may have been issued without a class rating or type rating."*

In terms of the regulation, at the time of the accident (31 January 2026) the SP did not have a SPL. The SP was only issued a SPL after the accident on 11 February 2026; however, with respect to the regulation, there was a flight instructor with an aircraft rating. Therefore, the pilots did not contravene Part 61.01.2 (1) of the CAR 2011.

Findings

1. Personnel Information

1.1. The FI had a Commercial Pilot Licence (CPL) that was initially issued by the Regulator (SACAA) on 20 July 2023. The licence was reissued on 15 September 2025 with an expiry date of 30 September 2026. The FI had accumulated a total of 580 flight hours of which 324.2 were on the aircraft type.

1.2. The FI had a Class 1 aviation medical certificate that was issued on 31 July 2025 and valid until 31 July 2026 with no restrictions.

1.3. The student pilot (SP) did not have a Student Pilot Licence (SPL) at the time of the accident. The SP applied for the SPL on 29 January 2026, and it was issued on 11 February 2026 with an expiry date of 10 February 2027. The SP did not contravene Part 61.01.2 (1) of the CAR 2011.

1.4. The SP had accumulated a total of 7.9 flight hours of which 6.3 were on the aircraft type.

1.5. The SP had a Class 2 aviation medical certificate that was issued on 5 December 2025 and valid until 30 November 2026 with no restrictions.

2. Aircraft Information

2.1. The latest mandatory periodic inspection (MPI) of the aircraft was certified on 9 December 2025 at 9 818 total airframe hours. The aircraft had accrued 35.9 hours since the last MPI.

2.2. The aircraft was issued a Certificate of Release to Service (CRS) on 9 December 2025 at 9 818 airframe hours with an expiry date of 8 December 2026 or at 9 372.6 Tachometer hours, whichever occurs first.

2.3. The aircraft was maintained by an approved aircraft maintenance organisation (AMO) which had an AMO Certificate that was issued on 21 March 2025 with an expiry date of 31 March 2026.

2.4. The aircraft had a Certificate of Airworthiness (C of A) that was initially issued on 29 September 2019. The latest C of A had an expiry date of 31 July 2027.

2.5. The aircraft's Certificate of Registration (C of R) was issued to the present owner on 19 January 2024.

2.6. The recommended climb speed at the maximum allowable weight of 2 300 pounds (lbs) is 71 knots indicated airspeed (KIAS); however, the pilots achieved only 56 kts during the climb. With the aircraft operating close to its maximum allowable weight at 2 234.73 lbs, the reduced climb speed likely degraded the climb performance and controllability.

2.7. The aircraft's centre-of-gravity (CG) was determined to be too forward, placing the aircraft close to its operational limits, increasing take-off and landing distances. However, the aircraft's take-off weight remained within the maximum permissible limit of 2 300 lbs by a margin of 64.27 lbs.

2.8. The post-accident technical report indicated no irregularities or defects with the aircraft that could have contributed to this accident.

Probable Cause(s)
The aircraft was rotated prior to reaching the desired take-off speed during the initial climb and it failed to gain lift; the pilot (FI) decided to land back on the runway whereafter a runway excursion followed before the aircraft impacted the perimeter fence.
Contributing Factor(s)
1. Failure to achieve take-off speed due to weight. 2. Forward centre-of gravity.
Safety Action(s)
None.
Safety Message and/or Safety Recommendation/s
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.
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This report is issued by:

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