

AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

					Reference:	CA18/2/3/9221	
Aircraft Registration	ZS-DWJ	Date of Accident	15 September 2013		Time of Accident	1030Z	
Type of Aircraft	Piper Cherokee 235		Type of Operation		Private		
Pilot-in-command Licence Type		Private Pilot	Age	55	Licence Valid	Yes	
Pilot-in-command Flying Experience		Total Flying Hours	465.5		Hours on Type	450.6	
Last point of departure		Mabalingwe Aerodrome (FAMA), Limpopo Province					
Next point of intended landing		Vryburg Aerodrome (FAVB), North West Province					
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
150 m North west of the extended centre line of Runway 04 at Mabalingwe Aerodrome (GPS position S 24°49'53"E 028°34'18").							
Meteorological Information		Wind: 350°/10KT Visibility:10000m Temperature:35°C Dew point: Unknown Cloud cover: No clouds					
Number of people on board		1+3	No. of people injured	1+1	No. of people killed	0	
Synopsis		<p>A Piper Cherokee 235, ZS-DWJ, with four occupants on board, took off from Runway 04 at Mabalingwe aerodrome for a flight to Vryburg aerodrome.</p> <p>Shortly after take-off, as the pilot turned into the wind, the stall warning sounded and the aircraft could not maintain height.</p> <p>The aircraft then collided with trees and shortly thereafter hit the ground.</p> <p>The pilot and one of the passengers were injured during the accident and the aircraft was substantially damaged.</p> <p>The aircraft was stalled as a result of a high nose attitude during take-off, 25 degree flap selection after take-off and a turn to the left at low airspeed.</p>					
Probable Cause		The pilot stalled the aircraft after take-of resulting in the aircraft impacting vegetation and then the ground.					
Contributing factors		High temperature conditions resulting in a high density altitude which decreased the aircraft's performance.					
IARC Date			Release Date				

AIRCRAFT ACCIDENT REPORT

Name of Owner : A J Fourie
Name of Operator : A J Fourie
Manufacturer : Piper Aircraft Corporation
Model : PA-28-235
Nationality : South African
Registration Marks : ZS-DWJ
Place : Mabalingwe Game Reserve
Date : 15 September 2013
Time : 1030Z

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 of the Investigation:

*In terms of Regulation 12.03.1 of the Civil Aviation Regulations (1997) 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 establish legal liability.***

Disclaimer:

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1. FACTUAL INFORMATION

1.1 History of Flight

- 1.1.1 On 15 September 2013, at 1030Z, a Piper Cherokee 235, registration ZS-DWJ, with four occupants on board, took off from Mabalingwe Aerodrome (FAMA) on a private flight with the intention of landing back at Vryburg Aerodrome (FAVB). The private flight was being conducted under visual meteorological conditions (VMC) and during daylight.
- 1.1.2 The take-off was from Runway 04 at Mabalingwe Aerodrome. The pilot indicated he used a longer take-off distance than normal to get airborne. Immediately after take-off the pilot experienced turbulence and the stall warning sounded. The pilot then selected 25 degree flaps (initially 0° flap setting) and turned slightly to the left

to position the aircraft into wind. During the turn the stall warning sounded and the pilot experienced excessive turbulence.

1.1.3 The aircraft could not maintain flight and collided with trees and thereafter with the ground.

1.2 Injuries to Persons

Injuries	Pilot	Crew	Pass.	Other
Fatal	-	-	-	-
Serious	1	-	1	-
Minor	-	-	-	-
None	-	-	-	2

1.3 Damage to Aircraft

1.3.1 The aircraft sustained substantial damage during the sequence of the accident.



Figure 1. A view of the aircraft as it came to rest.

1.4 Other Damage

- 1.4.1 Damage was caused to the surrounding vegetation when the aircraft collided with trees before hitting the ground.
- 1.4.2 Minor damage was also caused to surrounding grass, and the ground was contaminated by Avgas fuel and engine oil.



Figure 2. Damage caused to the surrounded vegetation.

1.5 Personnel Information

Nationality	South African	Gender	Male	Age	55
Licence Number	0270452865	Licence Type	Private Pilot		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Night rating				
Medical Expiry Date	31 March 2014				
Restrictions	Corrective Lenses				
Previous Accidents	No previous accidents recorded				

Flying Experience:

Total Hours	465.5
Total Past 90 Days	5.4
Total on Type Past 90 Days	5.4
Total on Type	450.6

1.6 Aircraft Information

Airframe:

Type	Piper PA-28-235	
Serial Number	28-10233	
Manufacturer	Piper Aircraft Corporation	
Year of Manufacture	1964	
Total Airframe Hours (At time of Accident)	2980.6	
Last MPI (Date & Hours)	19 July 2013	2970.6
Hours since Last MPI	10.00	
C of A (Issue Date)	24 April 1969	
C of R (Issue Date) (Present owner)	24 February 1997	
Operating Categories	Standard Part 91	

Engine:

Type	Lycoming O-540-B4B5
Serial Number	L-7060-40
Hours since New	2970.6
Hours since Overhaul	859.9

Propeller:

Type	Hartzell HC-C2Yk-1BF
Serial Number	736E
Hours since New	2970.6
Hours since Overhaul	137.4

1.6.1 Aircraft weight calculation

Weight of the aircraft	729 kg
Pilot	96 kg
Passengers	185 kg
Fuel (63 Gal)	190 kg
Baggage	15 kg
Total	1215 kg

The aircraft's take-off mass was calculated to be 100 kg below the maximum certified take-off mass of 1315 kg.

1.7 Meteorological Information

1.7.1 Meteorological information was obtained from the South African Weather Service. The most likely weather conditions at the time of the accident are given in the table below.

Wind direction	350°M	Wind speed	10 Knots	Visibility	10000m
Temperature	35°C	Cloud cover	No Cloud	Cloud base	N/A
Dew point	Unknown				

1.7.2 Density altitude

The density altitude at the time of the accident was calculated to be 6750 feet. (QNH 1019, Temperature 35°C and altitude 3850 feet)

1.8 Aids to Navigation

1.8.1 The aircraft was equipped with standard navigational equipment as per the Minimum Equipment List approved by the regulator. There were no recorded defects to the navigational equipment prior to the flight.

1.9 Communications.

1.9.1 The aircraft was equipped with standard communication equipment as per the Minimum Equipment List approved by the regulator. There were no recorded defects to the communication equipment prior to the flight.

1.9.2 The pilot communicated his intentions on very high frequency (VHF) 124,8MHz.

1.10 Aerodrome Information

Aerodrome Location	28 km West of the town Bela-Bela	
Aerodrome Co-ordinates	S 24°50'1.6" E 028°03'0.7"	
Aerodrome Elevation	3850ft AMSL	
Runway Designations	04/22	
Runway Dimensions	1000m x 5m	
Runway Used	04	
Runway Surface	Asphalt	
Approach Facilities	None	



Figure 3 Runway 04 towards the mountain.

1.11 Flight Recorders

1.11.1 The aircraft was not fitted with a cockpit voice recorder (CVR) or a flight data recorder (FDR) and neither was required by regulations to be fitted to this type of aircraft.

1.12 Wreckage and Impact Information



Figure 4 Position of the aircraft as it came to rest.

1.12.1 Final position of the flight path

The final position of the flight path was at a point 150m to the North West of the extended centre line of Runway 04 and 230m from the end of the runway. The nose was pointing in a direction of 040 degrees magnetic.

1.12.2 Impact sequence

The aircraft hit several trees at heights between 10 and 15 meters before it hit the ground. The skidding movement of the aircraft on the ground was stopped by a tree in the skid path of the aircraft.

1.12.3 Aircraft attitude during impact

Evidence indicates the aircraft was in a left wing low attitude when the first impact

with the tree occurred. The aircraft then hit the ground with a slight left and forward movement.

1.12.4 Aircraft configuration during impact

The aircraft had 25 degrees (2nd notch) flaps selected at the time of the accident.

1.12.5 The left wing was broken off and found underneath the right wing on the opposite side of the fuselage. The right wing sustained leading edge crush damage along the entire length, with substantial damage to the wing tip.

The engine remained inside the engine mounting support and displayed impact damage.

The propeller was not separated from the engine but showed substantial damage to all three blades.

The nose landing gear was separated from the aircraft and was found close to the main wreckage.

The baggage door opened at impact and the objects installed inside the compartment were found outside the aircraft close to the main wreckage.

The investigation on the crash site concluded that no part of the airframe structure and no control surfaces were missing.

The tail section of the aircraft sustained minor damage during the accident.

1.13 Medical and Pathological Information

1.13.1 The pilot and one passenger sustained serious injuries and were hospitalized for several days after the accident. The duration of their stay in hospital was not known to the investigator.

1.14 Fire

1.14.2 There was no pre- or post-impact fire.

1.15 Survival Aspects

1.15.1 The accident was considered survivable as a result of the low kinetic forces involved. The cockpit and cabin area remained intact and the pilot and passengers were wearing safety harnesses.

1.16 Tests and Research

1.16.1 During the investigation, the POH was consulted. The POH suggested 0 degree flaps for a normal take-off. The POH also indicate the high density altitude, weight of the aircraft and up-hill runway would have an effect on the performance of the aircraft. A 25 degree flap setting will be selected only if an obstacle clearance take-off is planned in which case the selection will be made before the take-off and not after take-off.

1.17 Organizational and Management Information

1.17.1 The last mandatory periodic inspection (MPI) before the accident was certified on 19 July 2013 at 2970.6 airframe hours by a SACAA approved Aircraft Maintenance Organization (AMO) in possession of a valid AMO certificate.

1.17.2 The flight was a private flight.

1.18 Additional Information

1.18.1 Eye witness report

According to an eye witness who was standing at the end of the runway, the aircraft used approximately three quarters of the runway before it got air born. The witness also reported the aircraft was drifting to the right of the runway after take-off. He then saw the nose of the aircraft briefly lowered before it pitch up again and entered into a turn to the left and loosing height before it hit trees to the left of the runway.

1.18.2 Runway slope

Runway 04 was used for the take-off. The slope on Runway 04 was calculated to be a +1% slope.



Figure 5 Upslope runway towards the mountain.

1.18.3 Aircraft performance

Aircraft performance was reduced by several factors:

High density altitude.

High take-off weight.

The upslope runway that was used for the take-off.

1.18.4 The take-off direction was in a 040 degree direction and towards a mountain on the extended centre line of Runway 04. Several pilots were interviewed who regularly use the runway at Mabalingwe and all of them agreed they never depart from Runway 04 due to the up-slope of the runway and the mountain at the end of the runway.

1.18.5 During an interview with the pilot after the accident, he admitted to not performing weight and balance calculation before the flight. The pilot also mentioned that he could hear the stall warning several times after rotation. He stated that he made the take-off direction choice and could not give any explanation for his decision to take off on the up-slope runway and towards the mountain at the end of the runway. The pilot also admitted he did not get any surface data for the area before take-off and that he could feel the decreased performance of the aircraft during the take-off.

1.19 Useful or Effective Investigation Techniques

1.19.1 No new methods were applied.

2. ANALYSIS

- 2.1 The pilot was the holder of a valid private pilot's licence. He was in possession of a valid medical certificate, with the use of corrective lenses endorsed onto the certificate.
- 2.2 The pilot made the decision to take-off on the up-slope runway and towards the mountain at the end of Runway 04. He did not consult the Pilot Operating Handbook prior to take-off, neither did he calculate the weight and balance. He experienced a decreased performance from the aircraft during the take-off roll and was aware of the stall warning that sounded several times. It is possible that the mountain was not clearly visible to the pilot directly after take-off due to the higher nose attitude. This might have caused him to pull the nose higher than he would normally to avoid the mountain which he knew was in front of him but was perhaps unable to see.
- 2.3 Selection of flaps to 25 degrees after the take-off, high density altitude, high nose attitude and the turn to the left after take-off all increased the possibility of stalling the aircraft during the take-off phase.
- 2.4 Maintenance records revealed the last mandatory periodic inspection (MPI) on this aircraft was certified on 19 July 2013 at 2970.6 airframe hours by an approved Aviation Maintenance Organization (AMO) which was in possession of a valid AMO certificate.

The aircraft had a valid Certificate of Airworthiness and had no recorded defects before the accident flight.

The aircraft flew a total of 10 hours since the certification of the last MPI.

The low atmospheric density and up-slope of the runway, together with the weight of the aircraft had an influence on its performance which resulted in a longer than normal take-off distance.

- 2.5 The surface temperature at the time of the accident was estimated as 35°C which increased the pressure altitude of 3850ft to 6750ft. The increase in density altitude decreased the performance of the aircraft. At no stage before the flight did the pilot consult the POH to establish the performance needed from the aircraft for the take-off.

- 2.6 The mountain at the end of the runway could have had an influence on the pilot's operation of the flight controls after take-off as he could not see the mountain clearly due to the high nose attitude during take-off.
- 2.7 Although the pilot stated that he had experienced turbulence after take-off, this could be misinterpreted as the buffet from a stall as the general weather conditions were fine.

3. CONCLUSION

3.1 Findings

- 3.1.1 The pilot was properly certified and qualified according to regulations to perform this flight and was in possession of a valid medical certificate.
- 3.1.2 The pilot did not consult the POH before take-off to establish aircraft performance for the temperature of the day and the up-slope runway.
- 3.1.3 The pilot did not do a weight and balance calculation before the take-off.
- 3.1.4 The pilot stalled the aircraft during his climb away after take-off.
- 3.1.5 The aircraft had a valid Certificate of Airworthiness and was recorded as being serviceable at the time of the flight.
- 3.1.6 The warm weather and high density altitude at the time of the accident had an effect on the take-off as it reduced the performance of the aircraft.

3.2 Probable Cause/s

- 3.2.1 The pilot stalled the aircraft after take-off resulting in the aircraft colliding with vegetation and then the ground.

3.3 Contributing factors

3.3.1 High temperature conditions resulting in a high density altitude which decreased the aircraft's performance.

4. SAFETY RECOMMENDATIONS

4.1 None.

5. APPENDICES

5.1 None.