SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Section/division **Occurrence Investigation**

Form Number: CA 12-12a

AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/8389		
Aircraft Registration	**ZS-FTH**	**Date of Accident**	14 November 2007		**Time of Accident**	1320Z	
Type of Aircraft	PA28-140		**Type of Operation**		Training		
Pilot-in-command Licence Type	Commercial		**Age**	54	**Licence Valid**	Yes	
Pilot-in-command Flying Experience	Total Flying Hours		4 070		Hours on Type	180	
Last point of departure	Brakpan Benoni Aerodrome (FABB)						
Next point of intended landing	Brakpan Benoni Aerodrome (FABB)						
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
On the traffic island of the N17 highway, GPS position: S26° 15.204" E028° 18.482"							
Meteorological Information	Surface wind 9 kts, temperature, 29°C, visibility CAVOK						
Number of people on board	1 + 1	**No. of people injured**	1 + 1	**No. of people killed**	0		

Synopsis

On the 14 November 2007 at approximately 1315Z, the instructor and a student pilot took off from runway 18 at BrakpanBenoni Aerodrome (FABB) on a dual training flight with the intention of returning to FABB.

The pilot stated that on take-off, during the climb-out phase, the aircraft experienced a sink and a sudden deterioration in climb performance. He also mentioned that he tried to check if there were any abnormalities from within the cockpit, but could not observe anything wrong. The pilot looked left and right in an attempt to identify a suitable place for a forced landing, but because of trees in the way, he decided to fly straight instead. The aircraft then collided with high-tension wires (running parallel to the N17 highway) and crashed on the centre island of the N17 highway near Carnival City in Brakpan.

The instructor and the student sustained minor injuries. The aircraft was substantially damaged.

Probable Cause

Poor aircraft climb performance resulted in failure to clear obstacles.

Contributory remark:

A high density altitude condition prevailed on the day.

IARC Date		Release Date	

AIRCRAFT ACCIDENT REPORT

Name of Owner/Operator : JA Rodger
Manufacturer : Piper
Model : PA28-140
Nationality : South African
Registration Marks : ZS-FTH
Place : N17 highway (Brakpan)
Date : 14 November 2007
Time : 1320Z

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 two hours.

Purpose of the Investigation:

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (1997), this report was compiled in the interests of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and ***not to establish legal liability****.*

Disclaimer:

This report is given without prejudice to the rights of the CAA, which are reserved.

1. FACTUAL INFORMATION

1.1 History of Flight

1.1.1 On the 14 November 2007 at approximately 1315Z, the instructor and a student pilot took off from runway 18 at Brakpan Aerodrome (FABB) on a dual training flight with the intention of returning to FABB.

1.1.2 The pilot stated that on take-off, during the climb-out phase, the aircraft experienced a sink and a sudden deterioration in climb performance. He also mentioned that he tried to check if there were any abnormalities from within the cockpit, but could not observe anything wrong.

1.1.3 The pilot also stated that he looked left and right in an attempt to identify a suitable place for a forced landing, but because of trees in the way, he decided to fly straight instead. The aircraft then collided with high-tension wires (running parallel to the N17 highway) and crashed on the centre island of the N17 highway near Carnival City in Brakpan.

1.1.4 The accident occurred in daylight conditions at approximately 1320Z on the traffic island of the N17 highway, at GPS position S26° 15.204" E028° 18.482" and at an elevation of approximately 5 320 ft above mean sea level (AMSL).

1.2 Injuries to Persons

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

1.3 Damage to Aircraft

1.3.1 The aircraft was substantially damaged.

Figure 1: Damage to the aircraft

1.4 Other Damage

1.4.1 There was minor damage caused to the Eskom power lines.

1.5 Personnel Information

1.5.1 Pilot-in-command:

Nationality	British	Gender	Male	Age	54
Licence Number	**********	Licence Type	Commercial		
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	Instrument, Instructor, Flight Test				
Medical Expiry Date	28/04/2008				
Restrictions	Must wear glasses				
Previous Accidents	None				

1.5.1.1 Flying Experience:

Total Hours	4 070
Total Past 90 Days	172
Total on Type Past 90 Days	30
Total on Type	180

1.5.2 Student Pilot:

Nationality	South African	Gender	Male	Age	31
Licence Number	**********	Licence Type	Student		
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	None				
Medical Expiry Date	25 October 2008				
Restrictions	None				
Previous Accidents	None				

1.5.2.1 Flying Experience:

Total Hours	9.4
Total Past 90 Days	9.4
Total on Type Past 90 Days	9.4
Total on Type	9.4

1.6 Aircraft Information

1.6.1 Airframe:

Type	PA28-140	
Serial Number	28-24281	
Manufacturer	Piper	
Year of Manufacture	1968	
Total Airframe Hours (At Time of Accident)	12 268.6	
Last MPI (Date & Hours)	12/10/2007	12 197.7
Hours Since Last MPI	71.6	
C of A (Issue Date)	14/07/2005	
C of R (Issue Date) (Present Owner)	29/11/2001	
Operating Categories	Standard	

1.6.2 Engine:

Type	Lycoming 0-320 E2A
Serial Number	L-16881-27A
Hours Since New	Unknown
Hours Since Overhaul	69

NOTE: The engine was overhauled on the 10 October 2007, but due to the unavailability of previous engine logbooks, the total number of engine hours was recorded as unknown.

1.6.3 Propeller:

Type	Sensenich 74DM6-0-58
Serial Number	A 58560
Hours Since New	1 699
Hours Since Overhaul	Not yet reached

1.6.4 Weight and Balance:

	Weight (lbs)	Arm (inches)	Moment (lbs.inch)
A/C Empty Weight	1 366.2	85.36	116 618.832
Pilot	313.05	85.5	26 765.775
Fwd Passenger	205.03	85.5	17 530.065
Fuel (30 US gal)	180	95.0	17 100
TOTAL	**2 064.28**	**86.24**	**178 014.28**

The aircraft's maximum take-off weight is 2 150 lbs. The calculated take-off weight was estimated as 2 064.28 lbs. The aircraft was operated within its weight limits.

1.7 Meteorological Information

1.7.1 The following weather information was obtained from the official weather report from the South African Weather Service:

Wind Direction	300°	Wind Speed	9 kts	Visibility	CAVOK
Temperature	29℃	Cloud Cover	Scattered	Cloud Base	N/a
Dew Point	N/a				

1.8 Aids to Navigation

1.8.1 The aircraft was equipped with standard navigation equipment. All the navigation equipment was serviceable prior to the accident.

1.9 Communications

1.9.1 The communication equipment that was installed in the aircraft was found to be in accordance with the approved equipment list. There were no defects reported with the communication equipment prior to the accident.

1.10 Aerodrome Information

1.10.1 The aircraft took off from runway 18 at Brakpan Aerodrome and crashed on the island of the N17 highway approximately 1.5 km from the aerodrome, at GPS position S26° 15.204" E028° 18.482" and at an elevation of approximately 5 320 ft AMSL.

1.10.2 Take off aerodrome

Aerodrome Location	1nm South of Benoni CBD	
Aerodrome Co-ordinates	S26º14'17.0" E028º18'21.0"	
Aerodrome Elevation	5 300 feet AMSL	
Runway Dimensions	18/36	1 440m x 15m
Runway Used	18	
Runway Surface	Tar	
Approach Facilities	None	
Aerodrome Status	Licensed	

1.11 Flight Recorders

1.11.1 The aircraft was not fitted with a flight data recorder (FDR) or a cockpit voice recorder (CVR), nor was either required by regulation.

1.12 Wreckage and Impact Information

1.12.1 The accident site was a level grassy area next to the N17 highway in Brakpan. The aircraft made initial impact with Eskom power lines that run parallel to the highway. The aircraft struck the upper earth wire, banked to the left and crashed on the highway island. Evidence and airframe damage indicated that it struck the ground on a south-easterly heading, while in a slight nose-down and low-right-wing attitude.

1.12.2 The fuselage aft of the cockpit remained relatively intact. The right wing, the undercarriage and the propeller were substantially damaged during the impact sequence.

Eskom power lines that the aircraft impacted before it crashed

Figure 2: The accident site and nearby power lines

1.13 Medical and Pathological Information

1.13.1 The instructor and the student pilot sustained minor injuries; both were admitted to a local hospital.

1.14 Fire

1.14.1 There was no evidence of a pre- or post-impact fire.

1.15 Survival Aspects

1.15.1 The accident was survivable, as both pilot and passenger were properly restrained, and the cabin area remained intact.

1.16 Tests and Research

1.16.1 On-site evaluation of the engine and propeller suggested that the engine was operating normally at the time of impact, hence the engine was not taken for a strip down or engine run.

1.16.2 On-site inspection of the wreckage revealed that all of the structural damage was consistent with the impact. Nothing was found to suggest that there had been any pre-impact failure of the primary structure.

1.16.3 The airport is located at an elevation of 5 300 ft and the temperature at the time of the accident was measured at 29°C. Using the density altitude chart, the density altitude was determined to be approximately 8 300 ft.

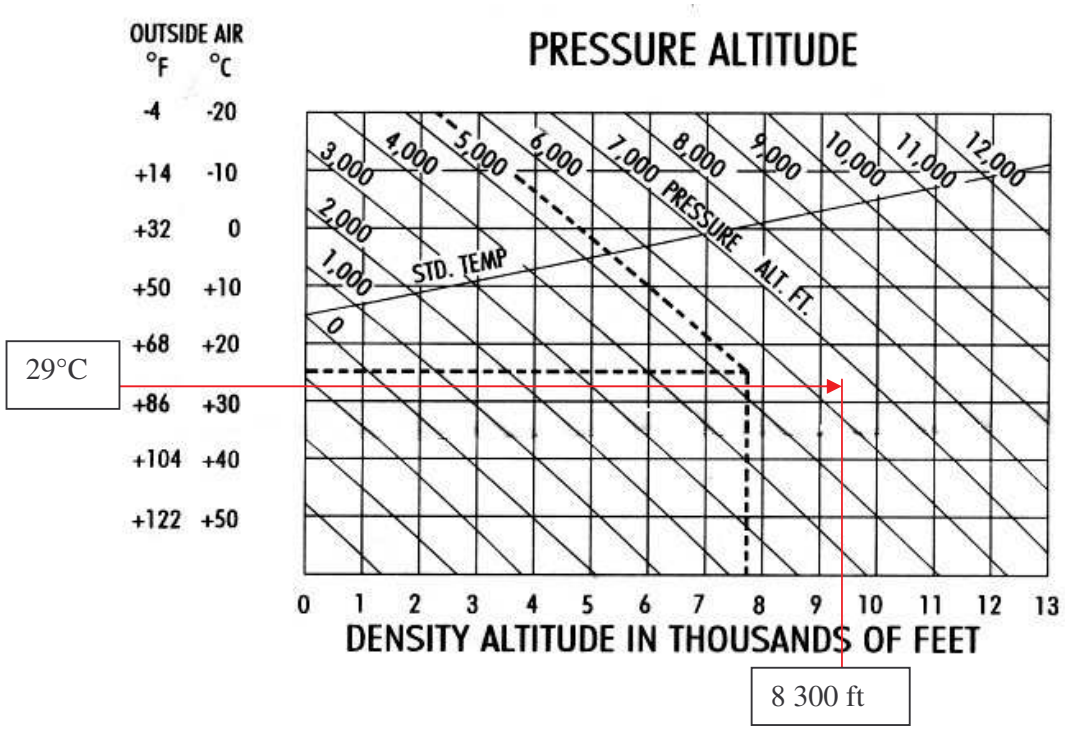

Figure 3: Density altitude chart

1.17 Organisational and Management Information

1.17.1 This was a training flight operated by an approved aviation training organisation (ATO).

1.17.2 The ATO responsible for the training flight was in possession of a valid CAA ATO Approval.

1.18 Additional Information

1.18.1 High density altitude – effect on take-off/landing performance (adapted from an extract from Aviation Meteorology, www.auf.asn.au/groundschool):

High density altitude conditions at an airfield, particularly in summer, are severely hazardous conditions for any aircraft where the difference between power required and power available is small. This concerns most general aviation and all ultra-light aircraft engaged in take-off or landing.

The calculation of density altitude involves estimating the density of air. At a density altitude of 6 000 ft AMSL, the air density will be about 1.0 kg/m^3 (about 20% less than sea-level standard). So the weight of the charge delivered to the cylinders in a normally aspirated engine will be only 80% of the standard sea-level density. Thus, only 80% of the engine's rated power can be supplied at the propeller shaft for take-off and climb out, or for a go-around. Furthermore, the lower air density directly reduces the thrust performance of the propeller by 10%, therefore the thrust performance will be 90% of 80%, or about 72% of the rated sea-level performance.

The maximum possible lift that can be generated will be reduced by 10% and the ground roll speed related to indicated airspeed/calibrated airspeed (IAS/CAS) prior to take-off will be higher. That is, during take-off at MSL in international standard atmosphere (ISA) conditions, true airspeed (TAS) is equal to IAS/CAS, but in high density altitude conditions, TAS is greater than IAS/CAS. Thus, the ground roll speed prior to reaching IAS/CAS for rotation must be higher than that at sea-level, and both the time and distance needed to acquire take-off lift and to clear obstacles at the end of the strip must be increased. Furthermore, the effect of reduced engine/propeller performance on take-off distance must be taken into account.

There are many conditions that exist, or might exist, at high density altitude that, though they may be individually slight, all affect the airframe and engine performance adversely. For instance, attempting take-off with a combination of some of the following may cause some difficulty; attempting take-off when most conditions exist may be disastrous:

- Elevated airfield
- High surface temperature
- Short strip with unslashed, wet grass
- Maximum weight
- Incorrect flap settings
- Light and variable winds
- Departing into rising terrain and a sinking air environment.

1.19 Useful or Effective Investigation Techniques

1.19.1 None.

2. ANALYSIS

2.1 On-site and subsequent examination of the wreckage revealed no pre-impact defect or condition in either the engine or propeller and airframe, which could have led to the accident. Similarly, there was no indication of any pre-accident condition affecting the pilot.

2.2 The weight and balance calculations revealed that although the aircraft was operated within its maximum take-off weight of 2 150 lbs, the aircraft's take-off weight was only 86 lbs below the maximum take-off weight.

2.3 The prevailing environmental conditions at the time of the accident were considered to have been a factor in this accident, with the reported temperature at 29℃ and the density altitude calculated to be approximately 8 300 ft.

2.4 The relatively high density altitude on the day, and the aircraft gross weight (which was just below the maximum take-off weight) combined to adversely affect the aircraft's acceleration and climb performance. As a result, the aircraft's climb performance was inadequate for the aircraft to clear all obstacles (namely Eskom power lines).

3. CONCLUSION

3.1 Findings

3.1.1 The pilot was a holder of a valid commercial pilot licence with the aircraft type endorsed in his licence.

3.1.2 The aircraft had been maintained in accordance with the requirements of Civil Aviation Regulations, and had a valid airworthiness certificate.

3.1.3 The last mandatory periodic inspection (MPI) was certified on 12 October 2007 at 12 197.7 airframe hours. The aircraft had flown a further 71.6 hours since.

3.1.4 There was no evidence that the aircraft had suffered any mechanical problem that may have contributed to the accident.

3.1.5 The incident happened in daylight conditions.

3.1.6 The accident happened as a result of inadequate aircraft power during climb.

3.2 Probable Cause/s

3.2.1 Poor aircraft climb performance due to high density altitude resulted in aircraft inability to clear obstacles.

4. SAFETY RECOMMENDATIONS

4.1 None.

5. APPENDICES

5.1 None.

Submitted through the office of the SM for the Panel, November 2009.