		CA18/2/3/7919			
		SOUTH AFRICAN CIVIL AVIATION AUTHORITY ACCIDENT REPORT – EXECUTIVE SUMMARY			
Aircraft Registration	ZU-BZI	Date of Accident	16 February 2005	Time of Accident	1020Z
Type of Aircraft	Pietenpol Aircamper		Type of Operation	Private	
Pilot-in-command Licence Type	Private Pilot	Age	53	Licence Valid	Yes
Pilot-in-command Flying Experience	Total Flying Hours	355		Hours on Type	101
Last point of departure	Margate Aerodrome (FAMG)				
Next point of intended landing	Margate Aerodrome (FAMG)				
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)					
Margate Aerodrome					
Meteorological Information	Wind: South-easterly at 9 knots; Visibility: Good; Temperature: 28 °C; Clouds: Scattered at 3 000 feet				
Number of people on board	1 + 1	No. of people injured	1 + 1	No. of people killed	0
Synopsis	<p>The pilot and passenger were on a pleasure flight from Margate Aerodrome to Hibberdene, and back to Margate. According to the passenger, a pre-flight was carried out and the pilot demonstrated how to use the headset to the passenger and instructed him not to touch anything. An engineer was called to swing the propeller and after the fourth swing, the engine fired. Oil pressure and instruments were OK.</p> <p>According to the air traffic controller (ATC), the aircraft became airborne at 1011z at a point approximately abeam the windsock at a distance of 700 metres. Immediately after take-off, the aircraft was unable to gain further height and began to gradually lose height along the runway.</p> <p>Over the 04 threshold, the aircraft appeared to stall and go into a right-hand turn. The right wing struck the airport perimeter fence and the aeroplane crashed in a nose-down attitude. It was destroyed.</p> <p>The pilot and passenger sustained minor injuries.</p> <p>Humid air and recent rain were reported prior to the accident.</p> <p>The aircraft had a valid private operation Authority to Fly which was issued on 2 November 2004 and valid until 1 November 2005. The last annual inspection was carried out on 23 October 2004 at a total of 99 airframe hours. The aircraft had flown 5 hours since the last inspection.</p>				
Probable Cause					
<p>The aircraft stalled due to negative rate of climb during take-off.</p> <p>Contributory factors: humidity and centre of gravity.</p>					



AIRCRAFT ACCIDENT REPORT

Name of Owner/Operator : Norton R G
Manufacturer : Norton R G
Model : Pietenpol Aircamper
Nationality : South African
Registration Marks : ZU-BZI
Place : Margate Aerodrome
Date : 16 February 2005
Time : 1020Z

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

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 The pilot and passenger were on a pleasure flight from Margate to Hibberdene and back to Margate Aerodrome. According to the passenger, a pre-flight was carried out and the pilot demonstrated how to use the headset to the passenger and instructed him not to touch anything. An engineer was called to swing the propeller and after the fourth swing, the engine fired. Oil pressure and instruments were OK.
- 1.1.2 According to the air traffic controller (ATC), the aircraft became airborne at 1011Z at a point approximately abeam the windsock at a distance of 700 metres. Immediately after take-off, the aircraft appeared unable to gain further height and began to gradually lose height along the runway.
- 1.1.3 Over the 04 threshold, the aircraft seemed to stall and go into a right-hand turn. The right wing made contact with the airport perimeter fence and the aeroplane crashed in a nose-down attitude.

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 extensively damaged.

1.4 Other Damage

1.4.1 The airport perimeter fence was damaged.

1.5 Personnel Information

Nationality	South African	Gender	Male	Age	53
Licence Number	*****	Licence Type	Private pilot		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	None				
Medical Expiry Date	30 September 2005				
Restrictions	Corrective lenses				
Previous Accidents	None				

Flying Experience:

Total Hours	355 hours
Total Past 90 Days	8 hours
Total on Type Past 90 Days	6 hours
Total on Type	101 hours

1.6 Aircraft Information**Airframe**

Type	Pietenpol Aircamper	
Serial Number	RGN-01	
Manufacturer	Norton R G	
Date of Manufacture	1995	
Total Airframe Hours (at time of accident)	104 hours	
Last Annual Inspection(Date & Hours)	23 Oct 2004	99 hours
Hours since Last Annual Inspection	5 hours	
Authority to Fly (Issue Date) (Present Owner)	22 Oct 1999	
Operating Categories	Special (Experimental)	

Engine

Type	Continental A65
Serial Number	6651-101046
Hours since New	104

Propeller

Type	De Necker
Serial Number	N2229
Hours since New	104

1.6.1 Mass and Balance

ITEMS	WEIGHT (LBS)	ARM	MOMENT (LBS)
Certified aircraft empty weight mass	784.8457	11.82	9 276.8762
Pilot	205.0299	50.00	10 251.495
Passenger	182.9837	23	4 208.6251
Fuel	87.30306	-3.00	-261.90918
Maximum take-off mass	1 260.162	18.63	23 475.087

1.6.2 According to the Pilot's Operating Handbook (POH), the certified maximum take-off weight for this aircraft is 1 402.14 lbs. Take-off mass of the aircraft at time of the accident was 1 260.162 and therefore within the limit.

1.6.3 The CG, which is total moment / total weight = 18.63, was outside the limit. The POH states that at maximum weight, the CG is 18.8 and at minimum weight, it is 19.4.

1.7 Meteorological Information from the pilot

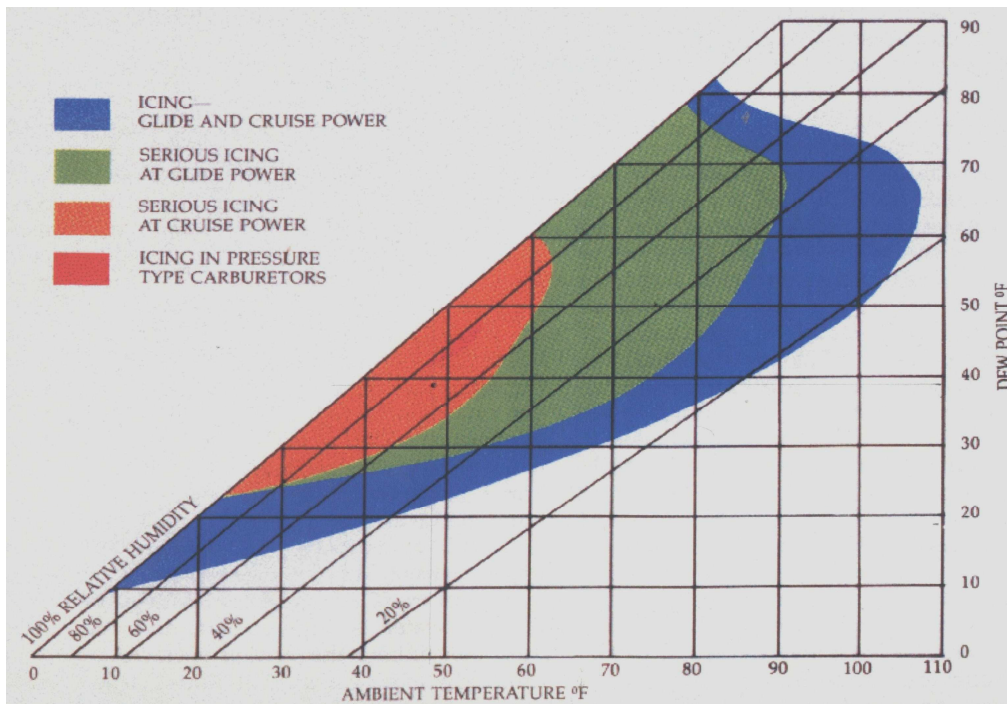
Wind direction	South-easterly	Wind speed	9 knots	Visibility	Good
Temperature	28°C	Cloud cover	Nil	Cloud base	3 000 feet
Dew point	Nil				

Meteorological Information from the weather office

Wind direction	135°	Wind speed	10 knots	Visibility	Good
Temperature	27.5°C	Cloud cover	SCT	Cloud base	2 000 feet
Dew point	24°C	QNH	1018	Humidity	95%

1.7.1 The above calculations (*refer to second text box only*), based on the official weather forecast report as supplied by the SA Weather Service (SAWS), depict serious icing conditions on any power setting. These were prevalent at the time of the accident.

Serious Icing at 27.2°C (81.5°F) and Dew Point Temperature of 24°C



1.7.2 Carburettor icing condition

The principles of carburettor icing are such that the aircraft is more likely to experience this condition during reduced power settings than at full power. This is simply because the position of the butterfly valve restricts the flow of air/fuel mixture inside the carburettor.

“The expansion of the air as it accelerates through the carburettor venturi causes it to drop in temperature. Quite warm air can cool to below zero and, if there is moisture in the air, ice can form. This will seriously degrade the functioning of the carburettor, even to the point of stopping the engine”. (The Air Pilots’ Manual; Edition 4; the aeroplane technical; page 176; by Trevor Thom)

It can thus be observed that the restriction of the fuel/air mixture in the carburettor is far greater at reduced power settings than at full power.

1.7.1 Density Altitude

Pressure Altitude	495 feet
Temperature	27.5°C
Density Altitude	2 500 feet

1.17.2 Recent rain and humid air were reported by the tower prior to the accident.

1.8 Aids to Navigation

1.8.1 The aircraft was fitted with standard navigation aids.

1.9 Communications

1.9.1 The pilot communicated with Margate Tower before departure on freq 122.7.

1.10 Aerodrome Information

Aerodrome Location	Margate Aerodrome
Aerodrome Co-ordinates	S30 51 00.0 E030 21 10
Aerodrome Elevation	495 ft
Runway Designations	22/04
Runway Dimensions	1 370 m x 30 m
Runway Used	22
Runway Surface	Tar
Approach Facilities	None

1.11 Flight Recorders

1.11.1 The aircraft was not fitted with a Cockpit Voice Recorder (CVR) or a Flight Data Recorder (FDR). Neither was required by regulations to be fitted to this type of aircraft.

1.12 Wreckage and Impact Information

1.12.1 The aircraft stalled, the right wing dropped, and the wing tip struck the ground. Due to the high impact forces, the wing broke in the middle. This resulted in the propeller hitting the ground, which stopped the engine. The aircraft crashed in a nose-down attitude and rolled over through the aerodrome perimeter fence. The aeroplane was destroyed.



Figure 1: The wreckage after impact.



Figure 2: The wreckage seen from the opposite angle.

1.13 Medical and Pathological Information

1.13.1 The pilot sustained minor injuries. The passenger was hospitalised and released the following day.

1.14 Fire

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

1.15 Survival Aspects

1.15.1 Not applicable.

1.16 Tests and Research

1.16.1 The engine was taken to a maintenance organisation for inspection and the findings were as follows:

- a) The sparkplugs, exhaust system, magnetos, HT harness and carburettor were inspected and appeared to be in satisfactory operating condition;
- b) The maintenance engineer concluded that the engine was in a satisfactory, operating condition at the time of the incident until the propeller impacted with the ground.

1.17 Organisational and Management Information

1.17.1 The pilot was the private owner of the aircraft.

1.18 Additional Information

1.18.1 The pilot took off without securing his passenger with a harness or safety belt as the passenger was not comfortable in the cockpit.

1.18.2 According to the witnesses' statements, the engine had been producing power prior to the impact but could not maintain a positive rate of climb.

1.18.3 The following effects of density altitude on engine and aircraft performance are extracted from *Meteorology for Pilots* by Mike K Wickson.

- a) *The effects of air density can considerably reduce the performance of an engine and airflow and at times up to as much as 30% because of the amount of air entering the engine.*
- b) *For airframes, the amount of lift from the wing is directly proportional to the density. For these reasons, for both take-off and landing, when density is very low, the pilot must either use a longer take-off and landing run or alternatively, reduce the aircraft weight (either fuel or pay load).*

- c) *Low density condition is most likely to occur where airfield's elevation is high, hence low pressure. Temperature is high and humidity is high.*

1.18.4 Seats, seat safety belts, harnesses and child restraint devices:

Part 91.04.14 states that no owner or operator of an aircraft shall operate the aircraft unless such aircraft is equipped, as applicable, with

- (a) a seat or berth for each person who is aged two years or more;*
- (b) a safety belt with or without a diagonal shoulder strap, or a safety harness, for use in each passenger seat for each passenger who is aged two or more;*
- (c) a restraining belt for each passenger berth;*
- (d) a child restraint device for each passenger who is less than two years of age;*
- (e) a safety harness for each flight crew member seat, incorporating a device which will automatically restrain the occupant's torso in the event of rapid deceleration; and*
- (f) a safety harness for each cabin crew member seat; provided that a safety belt with one diagonal shoulder strap is permitted if the fitting of a safety harness is not reasonably practical.*
- (g) If the pilot in-command cannot see all the passenger seats in the aircraft from his or her own seat, a means of indicating to all passengers and cabin crew members that seat belts should be fastened, shall be installed.*

1.18.7 The aircraft had a full fuel load prior to take off.

1.18.8 Aircraft collided with the perimeter fence.

1.19 Useful or Effective Investigation Techniques

1.19.1 None

2. ANALYSIS

2.1 According to witnesses of the take-off at the airport, the engine had been producing power prior to the accident but the aircraft could not maintain positive rate of climb.

2.2 If humid air condenses in the carburettor, it degrades engine performance. Considering that there had been recent rain and that the air was very humid, it is

possible that carburettor icing occurred with a consequential loss in engine power and as a result the aircraft could not maintain a positive rate of climb.

- 2.3 The mass of the aircraft was within limits. However, the centre of gravity was beyond the manufacturer's forward limit. It is possible that due to the forward CG, the aircraft could not perform optimally. The aircraft had a negative rate of climb and the indicated airspeed decayed during the pilot's attempt to maintain height. The aircraft stalled and the right wing tip struck the ground. Due to the high impact forces, the wing broke in the middle. This caused in the propeller to hit the ground, which stopped the engine.
- 2.4 It is the investigators' opinion, after taking into account the witnesses' statements and the report by the maintenance engineer that the engine had been operating normally at the time of the incident. The only factor that remains is the high percentage of humidity in the air: it is believed that the engine performance degraded due to the humid air that condensed in the carburettor.

3. CONCLUSION

3.1 Findings

- 3.1.1 The pilot was correctly licensed with a valid medical certificate and the aircraft type was endorsed in his logbook.
- 3.1.2 The aircraft was maintained in accordance with an appropriate maintenance schedule.
- 3.1.3 Recent rain and humid air were reported prior to the accident.
- 3.1.4 The passenger was not wearing his safety harnesses.
- 3.1.5 The aircraft could not climb and gradually lost height along the runway.
- 3.1.6 The engine produced power prior to the impact.
- 3.1.7 The centre of gravity was outside the limit.
- 3.1.8 The aircraft had a full fuel load prior to take off.
- 3.1.9 The aircraft collided with the perimeter fence.

3.2 Probable Cause/s

- 3.2.1 The aircraft had a negative rate of climb, the indicated airspeed decayed and the aircraft stalled during the pilot's attempt to maintain height.
- 3.2.2 Contributory factors: humidity and centre of gravity.

4. SAFETY RECOMMENDATIONS

4.1 Not applicable.

5. APPENDICES

5.1 Not applicable.

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Report reviewed and amended by office of the EM: AIID October 2009