



AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/8999	
Aircraft Registration	ZS-NBW	Date of Accident	07 January 2012		Time of Accident	0730Z
Type of Aircraft	Cessna 150		Type of Operation		Private (Hire & Fly)	
Pilot-in-command Licence Type		Private Pilot	Age	35	Licence Valid	Yes
Pilot-in-command Flying Experience		Total Flying Hours	167.3		Hours on Type	62.4
Last point of departure		Port Elizabeth Aerodrome (FAPE), Eastern Cape				
Next point of intended landing		Port Elizabeth Aerodrome (FAPE), Eastern Cape				
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)						
On Syfergat Farm, approximately 8km North of Uitenhage, Eastern Cape (GPS S33°44.651 E025°19.271)						
Meteorological Information		Fine weather conditions; Temperature: 17 °C with no cloud; Wind 060°/04kt; Visibility CAVOK.				
Number of people on board	1 + 1	No. of people injured	0	No. of people killed	2	
Synopsis						
<p>The pilot accompanied by a passenger (his brother), departed Port Elizabeth Aerodrome (FAPE) on a private flight to the general flying area (GFA) with the intention of accumulating flying hours towards his commercial pilot's license.</p> <p>A witness, which is the owner of the farm where the accident occurred, stated that the aircraft appeared to have entered into a spin and then impacted the flat grassy surface. The wreckage information corresponded with the information of that of the witness.</p> <p>Evidence found showed that the aircraft was substantially damaged on impact with the ground surface as a result of the spin from which the pilot was unable to recover.</p>						
Probable Cause						
<p>The aircraft entered a spin at low altitude from which the pilot was unable to recover.</p>						
ASP Date				Release Date		



AIRCRAFT ACCIDENT REPORT

Name of Owner/Operator : Madiba Bay School of Flight CC
Manufacturer : Cessna Aircraft Company
Model : Cessna150L
Nationality : South Africa
Registration Marks : ZS-NBW
Place : On Syfergat farm, 8km north of Uitenhage
Date : 07 January 2012
Time : 0730Z

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 On 7 January 2012 at approximately 0656Z, the pilot accompanied by a passenger (his brother), departed Port Elizabeth Aerodrome (FAPE) on a private flight to the general flying area (GFA) with the intention of accumulating flying hours towards his commercial pilot's license.
- 1.1.2 An eyewitness, which is the owner of the farm where the accident occurred, observed the aircraft flying over his farm and noticed the aircraft exhibited characteristics that the investigation team identified as a spin. Shortly thereafter, the aircraft impacted the flat grassy surface.
- 1.1.3 The aircraft was substantially damaged during impact with the ground surface.
- 1.1.4 The pilot and the passenger were fatally injured during the impact sequence whilst still secured by the safety harnesses installed in the aircraft.



Figure 1: Google Earth photo shows the location of the wreckage

1.2 Injuries to Persons

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

1.3 Damage to Aircraft

1.3.1 The aircraft was extensively damaged during the accident sequence.



Figure 2: Damage caused to the aircraft

1.4 Other Damage

1.4.1 There was no other damage caused to properties on the ground.

1.5 Personnel Information

1.5.1 Pilot-in-command:

Nationality	South African	Gender	Male	Age	35
Licence Number	0271045890	Licence Type	Private		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	None				
Medical Expiry Date	31 December 2012				
Restrictions	Corrective lenses				
Previous Accidents	None				

1.5.2 Flying Experience:

Total Hours	167.3
Total Past 90 Days	41.3
Total on Type Past 90 Days	23.0
Total on Type	62.4

1.6 Aircraft Information

1.6.1 Airframe:

Type	Cessna C150	
Serial Number	150-73899	
Manufacturer	Cessna Aircraft Company	
Date of Manufacture	1973	
Total Airframe Hours (At time of Accident)	6979.9	
Last MPI (Hours & Date)	6957.3	15 December 2012
Hours since Last MPI	22.6	
Certificate of Airworthiness (Issue Date)	28 June 2011	
C of R (Issue Date) (Present owner)	11 August 2010	
Operating Categories	Standard Part 135	

1.6.2 Engine:

Type	Continental O-200-A
Serial Number	205781-70A
Hours since New	6979.3
Hours since Overhaul	122.6

1.6.3 Propeller:

Type	McCauley 1A101/HCM 6948
Serial Number	G6525
Hours since New	Unknown
Hours since Overhaul	906.6

1.6.4 Fuel:

During the investigation, approximately 20 litres of fuel was found in the right hand fuel tank. The left hand wing tank ruptured, causing the fuel to leak onto the ground. According to available evidence, the fuel in the tanks was sufficient for the planned flight.

1.6.5 Weight and Balance:

The total mass of the aircraft with the two occupants on board the aircraft, including the fuel and baggage, was determined to be approximately 509 kg. The maximum limit for the aircraft is 560 kg. The weight of the aircraft at the time of the accident was thus 51kg below the maximum limit of the aircraft.

1.6.6 General Description:

The Cessna 150 aircraft is a high wing, two-seater, single-engine aircraft, equipped with a fixed tricycle landing gear. The aircraft was designed for flight training, touring and personal use. The engine installed on the aircraft was a 100 horsepower (HP) (75 kW) Continental O-200-A engine with a two-bladed McCauley propeller.



Figure 3: Typical Cessna 150 Aircraft

1.7 Meteorological Information

1.7.1 The South African Weather Services (SAWS) at FAPE reported the weather conditions near the accident site as follows:

Wind direction	160°	Wind speed	04 kt	Visibility	CAVOK
Temperature	17°C	Cloud cover	FEW 023	Cloud base	SCT 023
Dew point	Nil				

1.7.2 A high pressure system dominated the entire southern and south east coast of the country, leaving surface divergence and light winds over the area of the accident site. The satellite image (Figure 4) indicated clear skies over the area. The Meteorological Aerodrome Reports (METARS) from Port Elizabeth weather station indicated light wind on the ground and relative dry conditions close to the ground over the surrounding areas.

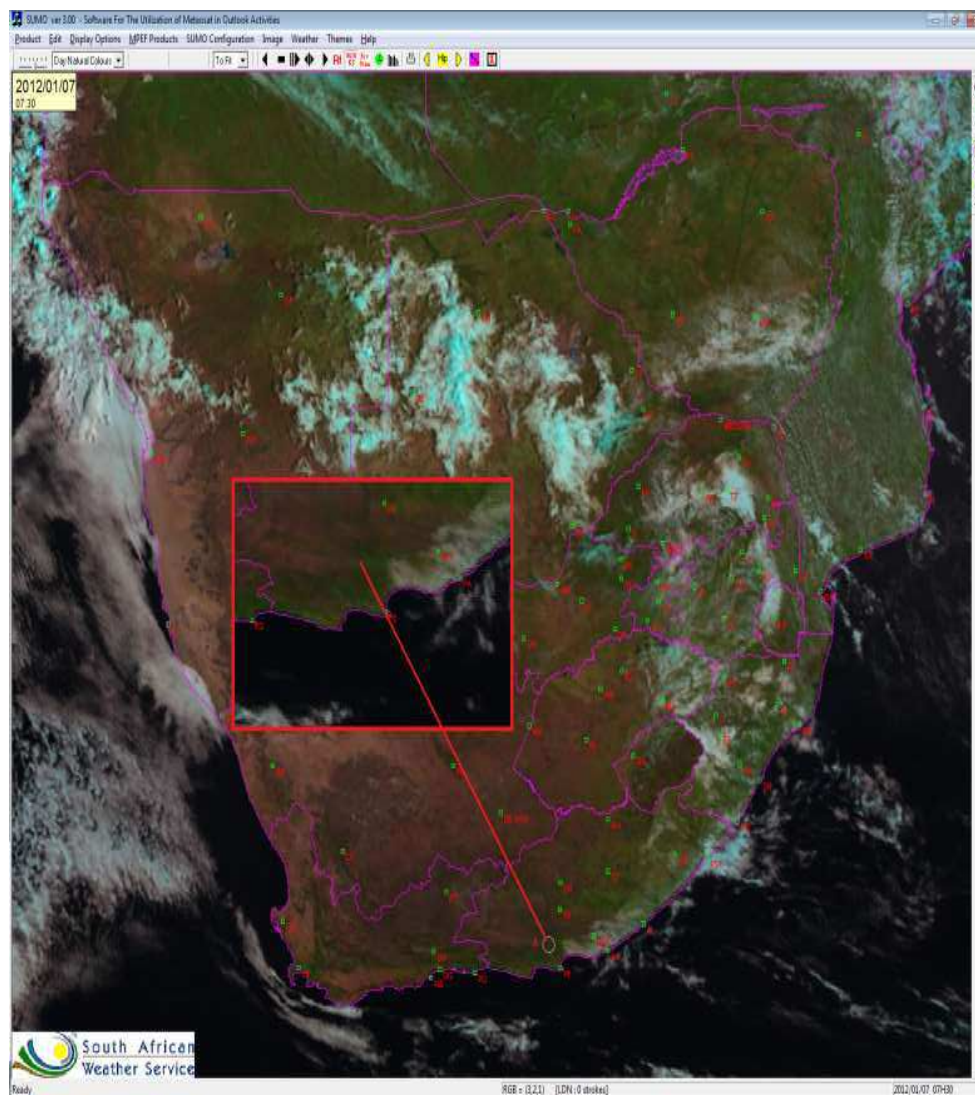


Figure 4: Satellite image of the weather in the area

1.8 Aids to Navigation

- 1.8.1 The aircraft was equipped with the approved Navigational aids. The Navigational equipment was serviceable at the time of the accident.

1.9 Communications.

- 1.9.1 The aircraft was equipped with the approved communication equipment installed on the aircraft. The communication equipment was serviceable at the time of the accident.

1.10 Aerodrome Information

- 1.10.1 The aircraft accident occurred outside the boundaries of an aerodrome on a private farm Syfergat, approximately 8km north of Uitenhage. The GPS coordinates of the accident site position: S33°44.651, E 025°19.271.

1.11 Flight Recorders

1.11.1 The aircraft was not fitted with a Cockpit Voice Recorder (CVR) or a Flight Data Recorder (FDR) nor was this required by regulations.

1.12 Wreckage and Impact Information

1.12.1 The aircraft was observed to be in a spin and impacted the flat grassy surface during the vertical descent. The aircraft was substantially damaged during the impact sequence.

1.12.2 The aircraft sustained damage to both wings which bent downwards as a result of the impact forces. The cockpit area was substantially damaged. The nose landing gear collapsed and the main landing gear sustained damage. The rudder, horizontal stabilizer and elevators were also damaged. The trailing edge root of the left high wing exhibited compression. Compression was evident to the left side of the fuselage and to the leading edge root of the right high wing. The engine was pushed to the right, tension was evident to the trailing edge root of the right high wing and impact damage to trailing edge right wingtip.

1.12.3 The witness marks on the propeller indicated that the engine was at a low/idle power setting at the time of the impact sequence. The throttle was found in the idle position and the right rudder pedal was fully depressed.



Figure 5 & 6: Damage to the aircraft, propeller blades and the wing support struts



Figure 7: Damage to the aircraft



Figure 8: Damage to the aircraft

1.12.3 The damage that ZS-NBW sustained, exhibited a wreckage pattern that can be compared with a typical spinning aircraft similar to the one illustrated in Aircraft Accident Investigation Book - Second Edition by Richard H. Wood and Robert W. Sweginnis (See Figure 9).

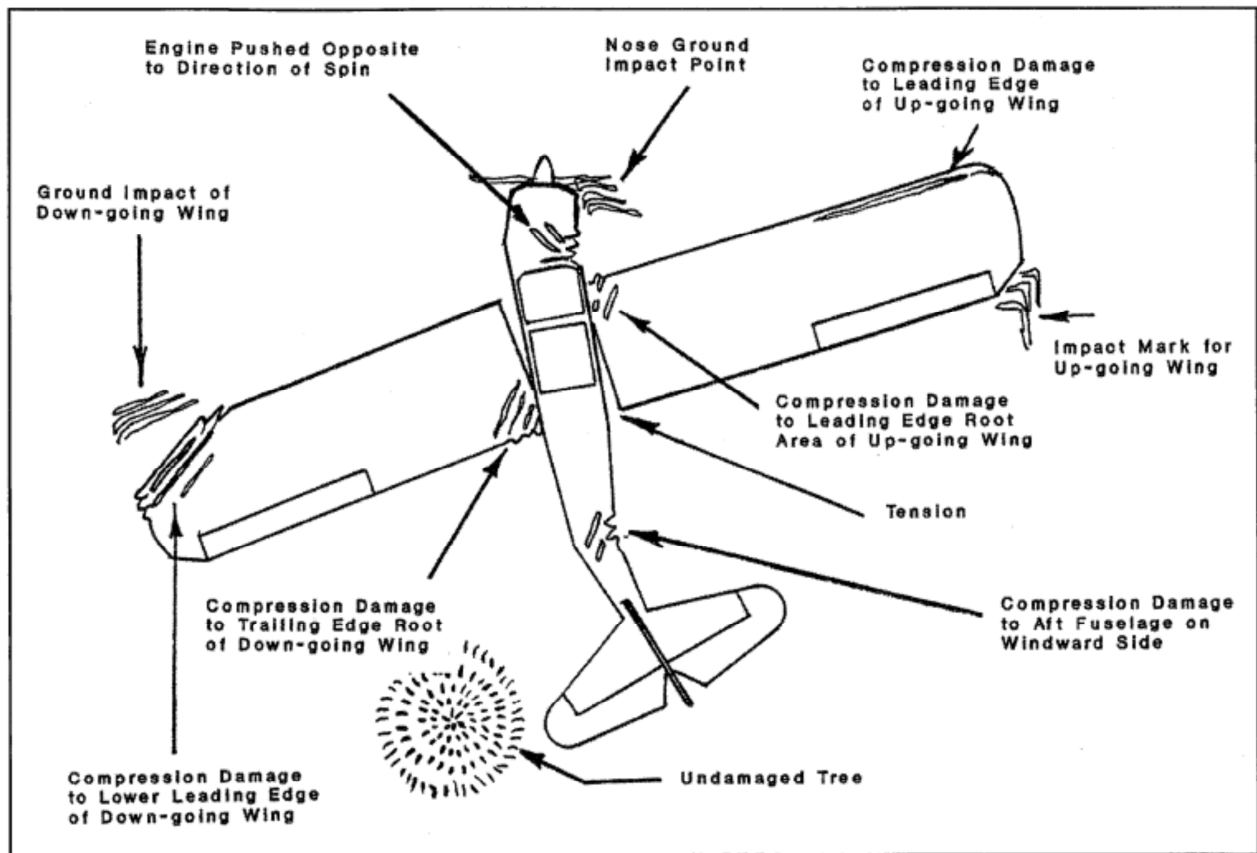


Figure 9: Wreckage pattern of a spinning airplane

(Reference: Aircraft Accident Investigation - Second Edition by Richard H. Wood and Robert W. Sweginnis)

1.13 Medical and Pathological Information

1.13.1 According to the Post-Mortem Autopsy Report, the cause of death of the pilot was determined to be Multiple Injuries.

1.13.2 The concentration of the alcohol in the blood specimen was 0.00 grams per 100millilitres. The concentration of the sodium fluoride in the blood specimen was <0.8 grams per millilitres and the carbon monoxide content of the blood specimen was 3% saturation of the total haemoglobin.

Note: Carbon monoxide content of the blood specimen less than 10% have no symptoms.

1.13.3 The results of the toxicology tests were not available at the time this report was compiled. Should any of the results indicate that medical aspects may have affected the performance of the pilot, this will be considered as new evidence and the investigation will be re-opened.

1.14 Fire

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

1.15 Survival Aspects

1.15.1 The accident was not considered survivable due to the high vertical impact forces experienced when the aircraft impacted the ground surface during the spin.

1.16 Tests and Research

1.16.1 The engine was recovered to an approved AMO at the Eastern Cape for further investigation purposes.

The following findings were made:

- The engine sump, exhaust, magnetos, starter and the alternator was substantially damaged during impact.
- The propeller was turning and there was compression on all the cylinders. The spark plugs were in a satisfactory condition and the magnetos were firing satisfactory. According to the witness marks on the propeller, the engine was operating at idle power on impact with the ground surface.

1.17 Organizational and Management Information

1.17.1 The pilot operated the aircraft in a private capacity (Hire and Fly) in order to accumulate flying hours towards his commercial pilot's licence.

1.17.2 The last mandatory periodic inspection (MPI) was carried out by an approved Aircraft Maintenance Organisation (AMO) No 151 on 15 December 2012.

1.18 Additional Information

1.18.1 According to the logbook of the pilot, spin avoidance in the Cessna 150 was practised on 24 April 2011, approximately 8 months prior to the accident flight. The pilot's logbook stated that his intention for the accident flight was to practise stalling, advanced turning, forced landings without power (simulated) and precautionary landings in the Cessna 150.

1.18.2 The following information was taken from the Air Pilot's Manual Volume 1: Flying Training

What is a developed spin?

A spin is a condition of stalled flight in which the aeroplane describes a spiral descent. As well as the aeroplane being in a stalled condition, one wing is producing more lift than the other (caused by a roll at low speed). Greater drag from the stalled lower wing results in further yaw, roll, etc.

In a spin the aircraft is:

- *stalled, rolling, yawing, pitching, sideslipping and rapidly losing height*

Recognition of a spin

- steep nose down attitude
- continuous rotation
- buffeting
- constant low airspeed
- rapid loss of height

1.18.3 Spin recovery

According to the Cessna 150 Pilot's Operating Handbook (POH) Section IV, Spins are approved in this airplane. For recovery from an inadvertent or intentional spin, the following procedures should be used:

- Retard throttle to idle position.
- Apply full rudder opposite to the direction of rotation.
- After one-fourth turn, push the control wheel forward of neutral in a brisk motion.
- As the rotation stops, neutralize rudder and make a smooth recovery from the resultant dive.
- Application of aileron in the direction of the spin will greatly increase the rotation rate and subsequently delay the recovery. The ailerons should be held in a neutral position throughout the spin and the recovery.
- Intentional spins with flaps extended are prohibited.

1.18.4 Stalls during Manoeuvres

Reference: Air Pilot's Manual
Flying Training – Volume 1

To turn or pull out of a dive, the wings must produce more lift. This is achieved by the pilot using back pressure on the control column to increase the angle of attack. The relative air flow striking the wings at a greater angle causes the stalling angle to be reached at a higher indicated airspeed. For example, the stalling speed increases by 7% at 30° bank angle and by 40% when pulling 2g in a 60° banked turn or dive recovery.

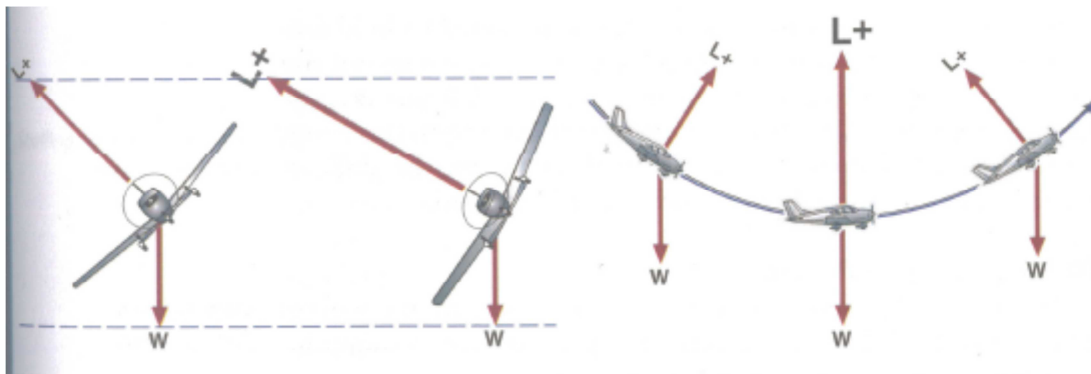


Figure 10: Increased wing loading (g-factor) means increased stall speed

You can physically recognise an increased load factor by the increased g-loading, so any time your apparent weight is increased in manoeuvres, the stall speed is increased.

When the aeroplane approaches a stall in manoeuvres (say in a steep turn or pulling out of a dive), releasing back pressure is usually sufficient to prevent the stall occurring.

1.18.5 Stalling in a turn

Reference: Air Pilot's Manual
Flying Training – Volume 1

Back pressure on the control column increases the angle of attack and may cause a stall. Since the load factor is increased in a turn, the stall will occur at a higher speed than in straight and level flight – by how much depends on the g-loading. Stalls at higher speed than normal are called accelerated stalls.

Follow the standard recovery of moving the control column centrally forward (relaxing the back pressure may be sufficient), and when the wings are unstalled, use coordinated rudder and ailerons to roll the wings level. Apply power as required and resume the desired flight path.

1.19 Useful or Effective Investigation Techniques

1.19.1 Not required.

2. ANALYSIS

- 2.1 The pilot's intention for the flight was to accumulate flying hours towards his commercial pilot's license. Evidence suggests that the pilot intended to practise stalling, advanced turning, forced landings without power and precautionary landings during the accident flight. According to available evidence, the pilot last practised spin avoidance in the Cessna 150, approximately 8 months prior to the accident flight.
- 2.2 The wreckage pattern of the aircraft wreckage exhibited compression to the trailing edge root of the left wing, compression to the left side of the fuselage and compression to the leading edge root of the right wing. It also revealed tension to the trailing edge root of the right wing, that the engine was pushed to the right and impact damage to trailing edge of the right wingtip. The wreckage pattern is indicative of damage sustained by an aircraft in a typical left spin.
- 2.3 The investigator is of the opinion that during the practise session, the aircraft at a low altitude, inadvertently entered into a stall condition with the right wing producing more lift, than the left wing. Witness marks on the propeller and evidence from the engine investigation indicated that there was compression on all the cylinders, the propeller was turning and the engine was operating at idle power.
- 2.4 With the aircraft rolling to the left, further yawing, pitching and side slipping occurred whilst the aircraft was rapidly losing height. Continuous left rotation of the aircraft occurred at a low airspeed which was also observed by the witness. With the throttle found in the idle position and the right rudder pedal fully depressed, indicates that the pilot attempted spin recovery. Whilst in the spin the aircraft was rapidly losing height and as the altitude of the aircraft was too low, recovery from the spin was not possible. The aircraft then impacted the ground and the occupants onboard sustained fatal injuries. The aircraft was substantially damaged during the impact sequence.

3. CONCLUSION

3.1 Findings

- 3.1.1 The pilot was the holder of a valid private pilot's licence and had the aircraft type endorsed in his logbook. He accumulated a total of 167.3 flying hours which included 62.4 on type. At the time he was accumulating flying hours towards his commercial pilot's licence.
- 3.1.2 The pilot was the holder of a valid aviation medical certificate issued by an approved medical examiner.
- 3.1.3 The aircraft was in possession of a valid Certificate of Airworthiness.
- 3.1.4 There was sufficient fuel on board the aircraft at the time of the accident.
- 3.1.5 Fine weather conditions prevailed, which were not considered to have had any bearing on the accident.
- 3.1.6 The aircraft, with the pilot and a passenger on board was flying low over the trees when a witness noted the aircraft in a spin in which the pilot was unable to recover from. Both occupants were fatally injured during the impact sequence with the ground.
- 3.1.7 The weight and balance of the aircraft was well below the maximum allowable limits for the aircraft.

3.2 Probable Cause/s

- 3.2.1 The aircraft entered a spin at low altitude from which the pilot was unable to recover.

4. SAFETY RECOMMENDATIONS

- 4.1 None

5. APPENDICES

- 5.1 None.