AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/9278		
Aircraft Registration	**ZS-NDY**	**Date of Accident**	24 January 2014		**Time of Accident**	1258Z	
Type of Aircraft	Cessna A188 (Aeroplane)		**Type of Operation**		Private		
Pilot-in-command Licence Type	Private Pilot License		**Age**	24	**Licence Valid**	Yes	
Pilot-in-command Flying Experience	Total Flying Hours		109.7		**Hours on Type**	15.5	
Last point of departure	Wonderboom aerodrome (FAWB): Gauteng province.						
Next point of intended landing	Warmbaths aerodrome (FAWA): Limpopo province.						
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
Petronella plot number 79 at GPS coordinates determined to be (S 25° 28.986´ E 028° 11.638´) at an elevation of approximately 3 860 feet above mean sea level (AMSL).							
Meteorological Information	Dry bulb temperature, 34˚C: Dew point temperature, 7˚C: Wind Speed@ 03 Knots.						
Number of people on board	1 + 0	**No. of people injured**	0		**No. of people killed**	1	

Synopsis

On Friday 24 January 2014, a certified private pilot licence (PPL) holder took off from FAWB aerodrome on a ferry flight destined for FAWA aerodrome under visual flight rules (VFR) after a mandatory periodic inspection (MPI) had been conducted on the Agwagon aircraft. With the departure aerodrome control tower clearance, the aircraft taxied towards runway 29 threshold where after it took off uneventfully. The aircraft was observed in the Petronella area, West of Hammanskraal, Northern Gauteng region, flying near the pilot's parents' home, approximately 2 nautical miles (NM) off its intended route, where it performed a low level flight. The aircraft was ultimately pulled to a vertical nose up attitude "aerobatic type of manoeuvre", headed in the same direction and subsequently crashed, fatally injuring the pilot. The investigation revealed that the aircraft had entered an inadvertent acceleration stall at low height from which the pilot was unable to recover.

Probable Cause

Failed to maintain flying speed/stall.

Contributing factor/s:

Disregard for Standard/Safe/Regulatory operating procedures
The pilot displayed poor airmanship.

IARC Date		Release Date	

AIRCRAFT ACCIDENT REPORT

Name of Owner/Operator : Dirk Zeilinga
Manufacturer : Cessna Aircraft Company
Model : Cessna A188
Nationality : South African
Registration Marks : ZS-NDY
Place : Petronella
Date : 24 January 2014
Time : 1258Z

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 produced without prejudice to the rights of the CAA, which are reserved.

1. FACTUAL INFORMATION:

1.1 History of Flight:

1.1.1 On Friday 24 January 2014, ZS-NDY, a Cessna A188 Agwagon aircraft took off from FAWB aerodrome on a ferry flight destined for FAWA aerodrome under visual flight rules (VFR) after a mandatory periodic inspection (MPI) had been conducted. Early that morning the pilot drove to FAWB aerodrome where he reported at the aircraft maintenance organisation (AMO) that conducted maintenance on the aircraft. At the AMO he was introduced to one of the senior aircraft maintenance engineers (AME) who took part in the maintenance and was appropriately rated on the aircraft series.

1.1.2 Firstly the AME brought the aircraft technical documentation and they both went through the documentation with the intention to show each other what was done and whether all the tasks were appropriately signed out by all relevant AME's as required. All was normal and appropriately signed out and the two gentlemen went to the aircraft which was parked on the apron just outside the hangar. The pilot conducted a thorough pre-flight inspection. According to the AME all appeared to be normal and the pilot boarded the aircraft and started the engine. The engine ran-up for few minutes and the pilot carried out his checks with no abnormalities being

reported.

1.1.3 According to the AME, all appeared to be normal and the pilot gave the thumbs up which is in aviation a common hand signal achieved by a closed fist held with the thumb extended upward in approval, which respectively means all is well. The AME further made sure that all was clear around the aircraft and the taxi way and thumbed up back to the pilot. With the aerodrome control tower clearance the aircraft taxied towards runway 29 threshold and took off uneventfully. According to the air traffic controller (ATC), five minutes after take-off the pilot reported out bound, which was acknowledged. The aircraft was later observed by farm workers in the Petronella, West of Hammanskraal, Northern Gauteng region, flying near the pilot's parents' home, approximately 2 nautical miles (NM) off its intended route, where it performed a low level flight.

1.1.4 The other eyewitness, who appeared to be the owner of plot number 79 (where the accident occurred), reported that she was in the house when the aircraft approached. She immediately went out to have a look. She saw a small single engine yellowish aircraft approaching from her neighbour's site, plot number 78, which was in this case the direction of the pilot's parents' home approaching very low at a height of approximately 30 metres above ground. She reported that the aircraft almost clipped the top of a tree, shown in "figure 1" below located at the back of her house where after a few seconds the pilot pulled the aircraft in a vertical nose-up attitude "aerobatic type of maneuverer" and headed back in the same direction.

Figure1: The tree on the aircraft flight path.

1.1.5 The aircraft then pitched down and the eyewitness said to herself “what are you doing?” and hoped that the pilot would recover the aircraft in time, “because it looked so unlikely”. The aircraft then disappeared from her view after which a loud band was heard. The witness immediately rushed to the site and found that the pilot was conscious but seriously injured. The witness informed the investigator in charge (IIC) that because she is not a qualified health care professional, she found it difficult to stabilise the injured pilot and instantly on her mobile telephone notified the emergency medical services (EMS) and the South African police services (SAPS) who came to the accident scene in time. The pilot later succumbed to his injuries and was officially declared dead by the medical personnel. His body was retrieved from the wreckage and transported to a nearby state mortuary for medical analysis.

1.1.6 The aircraft impacted the ground in a nose down attitude and was destroyed. No fire was reported. During the on-site investigation, the IIC tried to establish the approximate height of the aircraft before it went down. It was, however, not possible to make an accurate assessment of the height the aircraft was at, but from what could be gathered the aircraft was most probably flying not higher than 500 feet above ground level (AGL). This witness also stated that, other than approaching or flying “very low,” the aircraft did not appear to be in distress. The certificate of airworthiness (C of A) revealed that the aircraft was certified to operate under the provisions of Part 135 of the South African Civil Aviation Regulations which permitted the aircraft to operate predominantly on agricultural flights with in Southern Africa.

1.1.7 The accident happened during day light conditions within the boundaries of plot number 79 at GPS coordinates determined to be S 25° 28.986 ´ E 028° 11 .638´ at an elevation of approximately 3 860 feet above mean sea level (AMSL).

Figure 2: Google earth view showing the accident site and plot No 78.

1.2 Injuries to Persons:

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

1.3 Damage to Aircraft:

1.3.1 The aircraft was destroyed during the accident sequence.

Figure 3: Side view of the aircraft as found at the accident site.

1.4 Other Damage:

1.4.1 Minor environmental damage was caused. However, because the accident took place on a private owned property, the accident site was subjected to a thorough clean-up by the owner of the aircraft afterwards.

1.5 Personnel Information:

Nationality	South African	Gender	Male	Age	24
Licence Number	0272271248	Licence Type	Private Pilot license		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Nil				
Medical Expiry Date	31 January 2014				
Restrictions	None				
Previous Accidents	None				

Experience:

Total Hours	109.7
Total Past 90 Days	7.6
Total on Type Past 90 Days	2.1
Total on Type	15.5

*NOTE: The pilot profile revealed no accident or incident history, enforcement history. Examination of the SA CAA pilot file revealed that the pilot was rated on the aircraft type but not to conduct aerobatic flying. During the investigation the IIC requested the pilot's family to submit the pilot's logbook should they locate it, which they agreed to. The pilot's logbook was handed over to the IIC by a family member who appeared to be an aviator as well. The logbook was examined and all entries were found to have been accurately logged as required. The table above reflects the hours the pilot had accumulated up to the date of the accident.

1.6 Aircraft Information:

1.6.1 The Cessna A188-300 Agwagon is a conventional single-seat, piston-powered, strut-braced low-wing agricultural aircraft equipped with a 280 gallons fibre glass chemical hopper. The fuselage is a semi-monocoque construction and is pressurized on later models "using the dynamic pressure resulting from the aircraft's

forward speed" to reduce induction of chemicals into the airframe. The aircraft is also equipped with a dusting or spraying equipment and powered by a Continental IO-520 D engine.

Figure 4: The aircraft photographed during a crop spraying detail.

Airframe:

Type	Cessna A188	
Serial Number	188-0238	
Manufacturer	Cessna Aircraft Company	
Date of Manufacture	1966	
Gross weight	4 000lbs	
Chemical Hopper Capacity	280 Gallons	
Service Ceiling	11,100 ft	
Total Airframe Hours (At time of Accident)	2516.66	
Last MPI (Hours & Date)	2516.05	24 January 2014
Total Hours Flown	0.61	
C of A (Issue Date)	15 August 2005	
C of A (Expiry Date)	14 August 2014	

C of R (Issue Date) (Present owner)	03 April 2009
Recommended fuel used	Avgas LL 100
Operating Categories	Standard Part 135

*****NOTE: The AMO that performed the last maintenance on the aircraft prior to the accident flight was in possession of a valid AMO Approval certificate No 142. All relevant aircraft documentation such as the Certificate of Registration “C of R”, the Certificate of Airworthiness “C of A”, the mass and balance certificates were inspected during the investigation and were found to be valid. The aircraft maintenance documentation such as Airframe logbooks, Engines logbooks, and propeller log books were obtained from the aircraft maintenance organisation “AMO” and inspected. All maintenance entries made in the logbooks were appropriately certified in terms of applicable regulations CAR, Part 43.

Engine:

Type	Continental IO-520-D
Serial Number	567907
Hours since New	1 421.85
Hours since Overhaul	313.75

Propeller:

Type	Hartzell PHC-C3YF-1RF
Serial Number	QG461B
Hours since New	72.05
Hours since Overhaul	TBO not reached

1.7 Meteorological Information:

1.7.1 Weather information as obtained from the SA Weather Services indicated few to scattered clouds in the vicinity of the aircraft accident site.

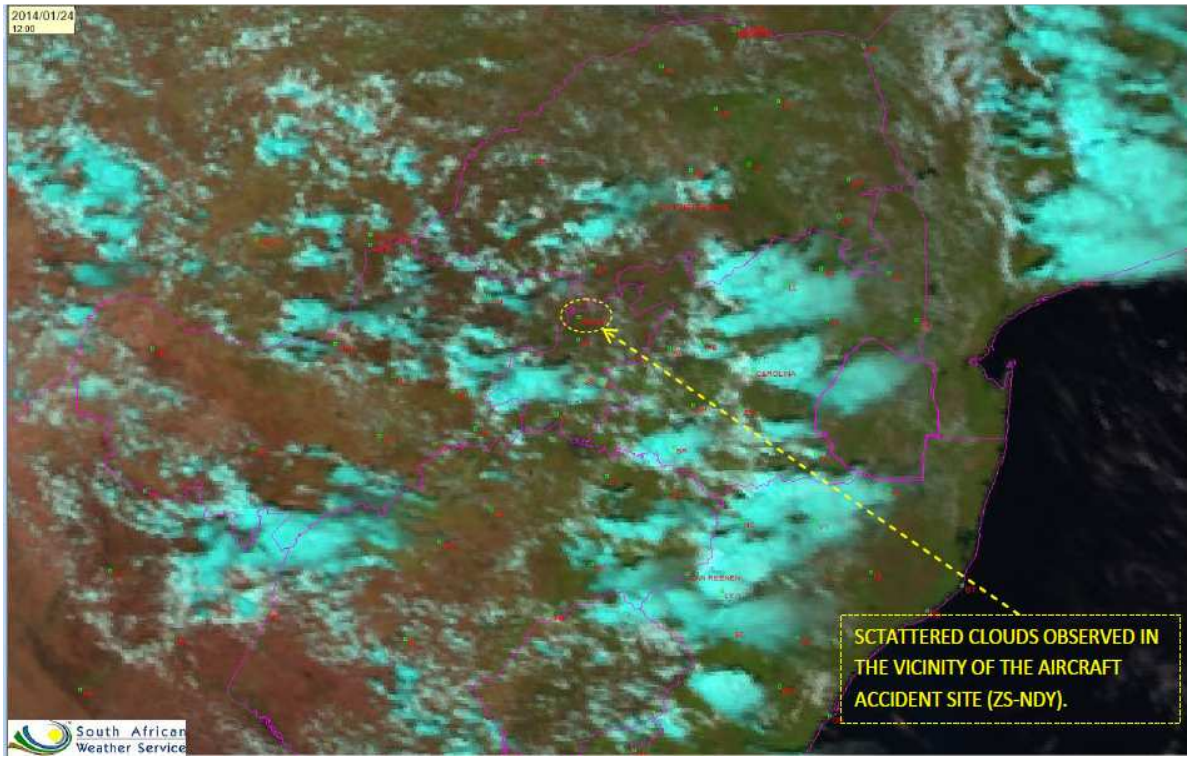

Figure 5: Satellite image taken on 24 January 2014.

(i) Surface data:

- Dry bulb Temperature: 33˚C.
- Dew point temperature: 13˚C.
- Wind direction and speed: Calm.
- Weather phenomenon: Nil
- Cloud amount and height: No cloud of operational significance

1.8 Aids to Navigation:

1.8.1 The aircraft was equipped with basic navigational aids, which consisted of a magnetic compass, altimeter, vertical speed indicator, turn co-ordinator, speed indicator and heading indicator. According to available information, the pilot had a portable Gamin GPS on board, however it was not used during the flight.

1.9 Communications:

1.9.1 The aircraft was equipped with a very high frequency (VHF). There appears to have been no problems with communication between the pilot and FAWB ATC before the accident.

1.10 Aerodrome Information:

1.10.1 The accident happened within the boundaries of plot number 79 during day light conditions at GPS coordinates determined to be South 25° 28.98 ´ East 028° 11 .63´ at an elevation of approximately 3 860 feet above mean sea level (AMSL).

1.11 Flight Recorders:

1.11.1 The aircraft was not equipped with a flight data recorder (FDR) or a cockpit voice recorder (CVR) nor was it required by the regulation to be fitted to this aircraft type.

1.12 Wreckage and Impact Information:

1.12.1 The impact sequence indicates that the aircraft was in a wings level, nose-down attitude when it crashed. Both wings were still found attached to the fuselage at the main spar attachment, but extensively deformed. The undercarriage/main gear failed from overload. The flight controls were substantially damaged with the spray boom mounted under the wings being destroyed. One propeller blade was embedded onto the ground. The propeller instantly detached from the engine severing the crank. The oil sump, oil cooler, fuel tank, fibre glass chemical hopper and the aircraft battery were crushed.

Figure 6: Front view of the aircraft.

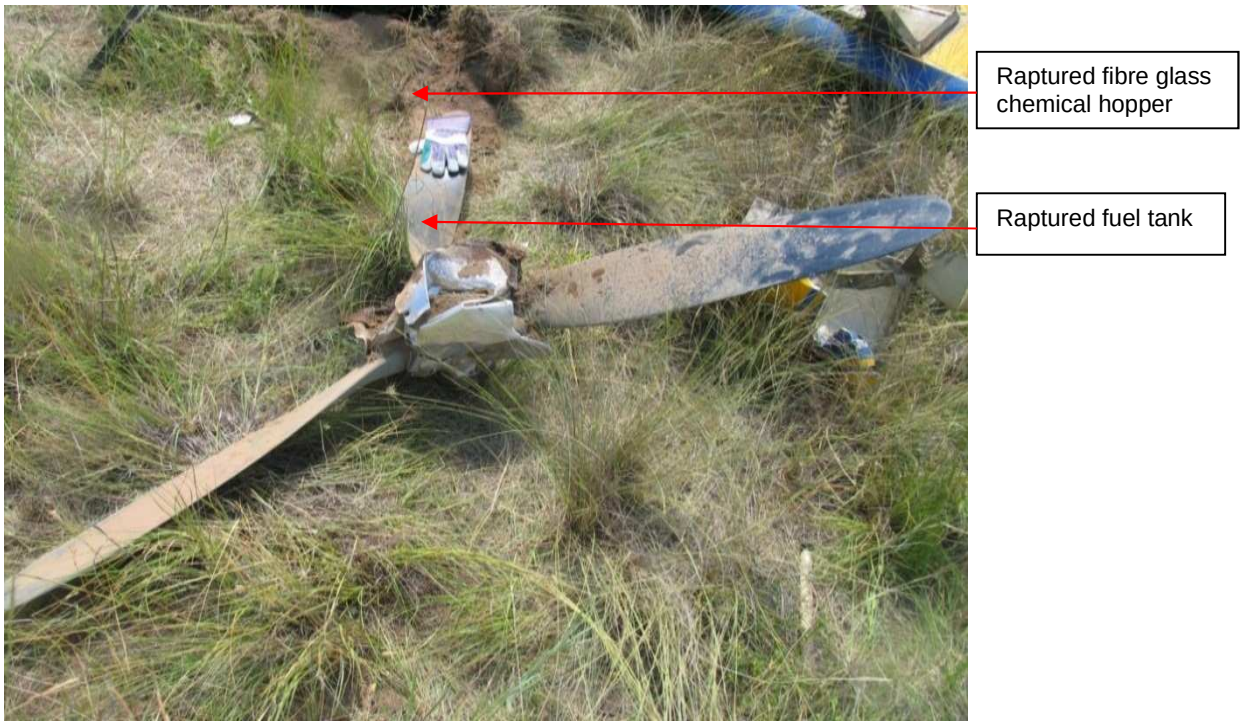

Figure 7: View of the propeller as found at the accident site.

Figure 8: Severed crank.

1.12.2 There was still a strong smell of fuel at the accident site although there was rain in the area after the accident. The Perspex windscreen glass had shattered into substantial pieces and the cockpit cabin area was destroyed. The position of the throttle and the fuel/air condition mixture controls could not be confirmed with accuracy due to damage. Some of the instruments broke and some survived the crash however they provided nothing relevant to the accident. There was evidence that the magnetos and the battery were ON during the flight and subsequent accident.

1.12.3 The control columns and the rudder pedals were disturbed during the extraction of the deceased from the wreckage following the accident rendering the control cables hanging free or loose. The aircraft aft fuselage/tail section crumpled due to impact forces. The seat was still secured to its anchor inside the cockpit and there was evidence {safety harness cut possibly made by the EMS personnel during the extraction of the deceased from the wreckage} that the pilot was still secured to his seat by the aircraft safety harness. Mechanical damage to the cockpit door latch was consistent with the door being in a closed position before impact. There was no evidence of an in-flight structural failure and flight control continuity could not be established due to loose cables and damaged control surfaces.

1.13 Medical and Pathological Information:

1.13.1 According to the post- mortem report, the cause of death was determined to be multiple injuries to the chest and the head during the accident sequence.

1.13.2 The blood toxicology report was still outstanding at the time of compiling this report. Should any of the results have a bearing on the circumstances leading to this accident; it will be treated as new evidence that will necessitate the reopening of this investigation.

1.14 Fire:

1.14.1 No fire was reported.

1.15 Survival Aspects:

1.15.1 The accident was regarded to be a non-survivable accident due to impact forces associated with it, which resulted in the complete destruction of the cockpit/cabin area.

1.16 Tests and Research:

1.16.1 The Investigation revealed no communication or any distress call made by the pilot and on-site examination revealed that the aircraft had impacted the ground in a nose down attitude. On 04 February 2014, a (Continental IO-520L engine, serial number 567907) and a Hartzell propeller, serial number QG461B propeller were recovered from the accident site to an approved maintenance overhaul facility in FAWB aerodrome for examination and tear down inspection under the supervision of the investigating team. Attached is the engine photo shot during the recovery.

Figure 9: The engine at the accident site.

1.16.2 During the investigation, the engine was set up together with the propeller to determine the position of propeller blades relative to the engine at the moment of impact when the propeller detached from the engine. The fracture faces of the fractured crank and the propeller were positioned to fit as closely as possible into each other. At this stage no attempt was made to rotate the crank in the engine, however during the engine strip, it was evident that the crank could still rotate and no anomalies were detected. The severed crank showed evidence that the propeller was still turning on impact however the amount of power it was producing couldn't be determined by visual inspection. Examination of the propeller also suggests that the oil pressure was in fact available to activate the constant speed mechanism as this is the function of the throttle and the other cockpit settings. See figure 10 below.

Figure 10: View of the propeller.

- All crushed wires, pipes and baffles were removed. Due to the extent of damage on all sides of the engine it was not possible to investigate the fuel induction and ignition systems.
- Oil pump was removed: Internally no abnormalities could be found. The oil pump gears were turning freely and no overheat or dry run evidence could be found.
- The damaged starter gearbox was removed. No internal abnormalities could be found.
- The spark plugs were removed and visually investigated. No evidence could be found that they were not operating normally.
- The rocker shafts and valve rockers were removed. No abnormalities could be found.
- Pushrod tubes and pushrods were removed. No abnormalities could be found.
- Cylinder base nuts were removed and torque on all the nuts were found to be normal.
- Cylinders were removed one at a time, checking the condition of pistons and position of the ring gaps. No abnormalities could be found.
- The piston pins were all checked for free rotational movement and were then removed with the pistons. No anomalies were found.

- The connecting rods were checked for normal movement on the big end bearings of the crankshaft and were found to be normal.
- Crankshaft rotation was then checked and was found to be able to rotate normally.
- The crank case was then split and the crank with connecting rods was removed to expose the main crank bearings. No abnormalities could be found with the main bearings.
- The cam shaft was removed and inspected. No abnormalities could be found with the camshaft and camshaft bearings.
- Cam shaft gear drive train was removed and inspected. No abnormalities were found.
- The constant speed unit (CSU) model 80ATG210760, serial number 102026689 was bench tested as per parameters in manual AT1431299 Rev 1 dated 01/10/2006 and all specifications were met.
- The left hand Slik 6210 magneto, serial number 1030057 could not be bench tested due to excessive accident damage, however it was dismantled and inspected and no fault was found.
- Right hand Slik 6210 magneto, serial number 1030053 was bench tested and found to be working, delivering weaker than normal spark which could be caused by the slightly worn cam affecting the internal timing. No fault found when the mag was stripped and inspected. No fault found when the mag was stripped and inspected.
- Fuel float divider part number 631351-5, serial number C1781100 could not be bench tested due to accident damage. It was dismantled for inspection and no apparent faults found.
- Throttle body part number 629703-2, serial number C178114A was excessively damaged in the accident and could not be bench tested.
- Fuel pump part number 646212-1, serial number B078642RB was visually inspected and no fault found. Due to accident damage it could not be bench tested. The engine was further dismantled and visually inspected and no fault found on parts or defective workmanship. The investigation did not reveal any abnormalities or defects with neither the airframe nor the engine.

1.17 Organizational and Management Information:

1.17.1 This was a private flight.

1.17.2 The last annual inspection carried out on the aircraft was certified on the day of the accident 24 January 2014 by an aircraft maintenance organisation (AMO).

1.17.3 The Aircraft Maintenance Organisation (AMO) that performed the annual inspection on the aircraft was in possession of a valid AMO Approval certificate No 142.

1.18 Additional Information:

1.18.1 None.

1.19 Useful or Effective Investigation Techniques:

1.19.1 None

2. ANALYSIS:

2.1 Available information indicated that fine weather conditions prevailed in the area at the time of the flight. Weather conditions were therefore considered not to have had any bearing on the accident. At the time of the accident, the pilot was in possession of a valid private pilot's license as well as a valid aviation medical certificate that was issued by a SA CAA accredited medical examiner. The pilot was appropriately rated on the aircraft type and fit to undertake the flight on the day of the accident. Taking the eye-witness observations into account, the aircraft approached very low from the direction of the pilot parents' home (plot number 78), after which it climbed to an altitude not higher than 500 feet AGL. The aircraft then pitched down and impacted the ground on the nose, fatally injuring the pilot.

2.2 Available aircraft technical documentation showed that the aircraft was properly maintained in accordance with the manufacture's approved procedures and was believed to be airworthy prior to the accident. The investigation suggests that the pilot was most probably demonstrating or displaying his flying skills to onlookers on the ground after which the aircraft entered an inadvertent acceleration stall at low height from which he was unable to recover, resulting in a fatal crash. In brief aerobatic maneuvers are not recommended below 1 500 feet AGL and demand a broader set of piloting skills. Additionally, because aerobatic maneuverers subjects pilots to gravitational effects (G's) that can impair their ability to safely manoeuvre

the aircraft, pilots who participate in aerobatics, or those who would take up such activities, should better understand G's and some of their physiological effects.

2.2 This is mainly because pilots as human beings are made to live within the atmosphere of earth, and a certain amount of oxygen is required in the air they breathe. The minimum concentration of oxygen that they can tolerate is 16 kilopascal “kPa” (0.16 bars). While airborne they are then exposed to risks such as limited vision to loss of consciousness or dying from hypoxia or reduction of oxygen supply below psychological levels. In conclusion, pilots who understand these gravitational effects will then be able to cope with them so that they continue preforming those maneuverers. The maneuver is quite easy if the pilot is appropriately trained, but if mishandled it could indeed be catastrophic.

3. CONCLUSION:

3.1 Findings:

3.1.1 The pilot was a holder of a valid private pilot’s licence and had the aircraft type endorsed in his logbook.

3.1.2 The pilot’s medical was valid with no restrictions.

3.1.3 The pilot was fatally injured as a result of the accident when he suffered from multiple blunt force injuries.

3.1.4 All control surfaces were accounted for, there was no evidence of any defect or malfunction on the aircraft that could have contributed or have caused the accident.

3.1.5 The flight was operated as a general aviation flight under VFR rules.

3.1.6 Fine weather condition prevailed at the time and was not considered to have any bearing on the accident.

3.1.7 The aircraft was in possession of a valid Certificate of Airworthiness (C of A) and Certificate of Registration (C of R).

3.1.8 The Aircraft Maintenance Organisation (AMO) that performed the last maintenance inspection on the aircraft prior to the accident flight was in possession of a valid AMO Approval certificate No 142.

3.1.9 Examination of the aircraft technical logbooks revealed no anomalies or deficiencies with the aircraft.

3.1.10 The engine was dismantled and visually inspected and no fault or defective workmanship found.

3.1.11 The accident was considered not survivable.

3.2 Probable Cause/s:

3.2.1 Failed to maintain flying speed/stall.

3.3 Contributing factor/s:

3.3.1 Disregard for Standard/Safe/Regulatory operating procedures
The pilot displayed poor airmanship.

4. SAFETY RECOMMENDATIONS:

4.1 None.

5. APPENDICES:

5.1 Stalls:

Reference: Aeroplane Flight Training Manual 4th edition, Transport Canada, Pg. 75:

A stall is a loss of lift and increase in drag that occurs when an aircraft is flown at an angle of attack greater than the angle for maximum lift. Stall training will allow you to recognize the symptoms of an approaching stall early enough to take action to prevent a stall from happening. You will also learn how to recover positively and smoothly with a minimum loss of altitude should a stall occur.

Why does a wing stall?
The lift generated by a wing is dependent upon a smooth accelerated airflow over a wing. At moderate angles of attack the airflow near the trailing edge of the wing becomes turbulent. As the angle of attack increases, the turbulent air progresses forward towards the leading edge of the wing until the stalling angle is reached. At the point the downwash and the pressure differential are greatly reduced, and a loss of lift results. Due to the loss of lift and increase in drag, the remaining lift is insufficient to support the aeroplane, and the wing stalls. It is basic in recognizing stalls to remember that, unlike angle of incidence, angle of attack is a relative factor.

Therefore you cannot rely upon aircraft attitude entirely to indicate the possibility of a stall. Angle of attack may be simply defined as the angle between the mean

chord of an aerofoil and its direction of motion relative to the airflow (relative airflow). In this manual, the term “relative airflow,” is used to describe the direction of the airflow with respect to an aerofoil in flight. An aircraft may be stalled in practically any attitude and at practically any airspeed.

Stalling speeds:

Regardless of airspeed, an aircraft always stalls when the wings reach the same angle of attack. Remember, angle of attack and aircraft attitude are not consistently related. Although stalling speeds may be given for a specific type of aircraft, stalling speed for each aircraft may vary with the following factors:

Weight: Since weight opposes lift, a lightly loaded, properly balanced aircraft will have a lower stalling speed than a similar aircraft operating at its maximum permissible weight.

Balance: The position of the Centre of Gravity (CG) will also affect the stalling speed of an aircraft. A forward CG location will cause the stalling angle of attack to be reached at a higher airspeed while a rearward CG will cause the stalling angle of attack to be reached at a lower airspeed. An improperly loaded aircraft may display undesirable stalling characteristics. This is particularly true of an aircraft loaded beyond the aft CG limits.

Power: Because of the additional upward thrust and other lift contributing factors of a power-on stall, the stalling speed will be lower than the power off.

Flaps: When flaps are extended the camber of the wing ifs effectively increased. This deflects more of the airflow downward for a given airspeed, thereby increasing lift. This factor allows the aircraft to be flown at a lower speed before the stall occurs.

Pitch: When an aircraft is pitched upward abruptly, the load factor is increased correspondingly and a higher stalling speed is introduced for the duration of change in pitch attitude.

Angle of Bank: The greater the bank angle, in co-ordinated flight, the higher the stalling speed.

Aircraft Condition: A clean, well-maintained, properly rigged aircraft will invariably have better stalling characteristics and lower stalling speeds than a similar aircraft

in poor general condition.

Retractable Landing Gear: Extended the landing gear increases drag. The effect on stalling speed varies from aircraft to aircraft, but generally in the classic wings level nose-up attitude a slightly lower stalling speed will be noted, especially in the power-on configuration.
With altitude, the density of the air in which an aircraft is flying decreases. Although the true airspeed at which the aeroplane stalls is higher at altitude, the airspeed indicator, which itself functions by the effect of the air density, will record the same speed when the aircraft stalls at altitude as it did at or near ground level. Therefore, indicated stalling speeds will remain the same ay all altitudes.

Stalls during turns:

When an aircraft is stalled during a level or descending turn, the inside wing normally stalls first, and the aircraft will roll to the inside of the turn. In a level turn, the inside wing is travelling more slowly than the outside wing and obtains less lift, causing it to sink and increase its angle of attack. Under the proper conditions, this will produce a stall. During a descending turn, the path described by the aircraft is a downward spiral; therefore, in the inside wing is meeting the relative airflow at a steeper angle of attack and is the one to stall first and drop lower. However, during a climbing turn, the path described by the aircraft is an upward spiral; therefore, the outside wing is meeting the relative airflow at a steeper angle of attack than the lower wing. As a result, the higher wing will normally stall first and drop abruptly when the stalled condition occurs.

5.2 Part 91.02.8, Duties of pilot-in-command regarding flight operations:

"(1) The PIC (pilot-in-command) of an aircraft shall, whether manipulating the controls or not, be responsible for –

(a) the operation, safety and security of the aircraft, crew members, passengers and cargo in accordance with these regulations while he or she is in command;

(b) operational control of the aircraft unless otherwise provided for in terms of part 93, 121, 127 or 135 under an approved operational control system;

(c) the conduct of crew members and passengers carried; and

(d) the maintenance of discipline by all persons on board."