

AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference	CA18/2/3/8956	
Aircraft Registration	ZS-WYC	Date of Accident	09 August 2011		Time of accident	1530Z
Type of Aircraft	Atlas C4M (KUDU)		Type of Operation	Private		
Pilot-in-command Licence Type		Commercial	Age	31	Licence Valid	Yes
Pilot-in-command Flying Experience		Total Flying Hours	860.7		Hours on Type	139.3
Last point of departure		The Ranch private aerodrome:FAPP, (Limpopo province).				
Next point of intended landing		Rustenburg aerodrome: FARG, (North West province).				
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)						
On a farm next to Rustenburg aerodrome at GPS co-ordinates determined to be: S 25°33.169' E 027°08.145' at an elevation of 3 892 feet AGL.						
Meteorological Information	Surface wind 340°, temperature 20°C, visibility +10 km.					
Number of people on board	1 + 2	No. of people injured	0	No. of people killed	0	
Synopsis						
<p>The pilot accompanied by two passengers departed the Ranch private aerodrome bound for Rustenburg under visual flight rules (VFR). After take-off, the aircraft routed for Rustenburg (FARG), went outbound Lowveld Air space and was handed over to Johannesburg air space control. Approximately after 1.4 hours flight time, the pilot descended and positioned the aircraft for runway 34. The pilot reported that traffic to the extended side of runway 34 and Oliphant Nek dam made him to rejoin runway 16. He then applied more power and executed a go around. During a go around process at a height of approximately 1 200 feet altitude above ground level (AGL) the fuel warning light came on in the cockpit and a few seconds later the engine started to splutter and immediately started to turn towards the aerodrome. The passengers were immediately notified of the situation. The pilot experienced the second noise and the engine torque simultaneously dropped. He further commenced with the ISOL procedure (Emergency fuel control unit override), had no response and initiated an emergency landing on a farm. Touchdown on a grass covered area was normal and the aircraft entered into a ploughed field. The aircraft suddenly impacted the ground on its nose, flipped over facing the direction it came from. The aircraft suffered substantial damages and all the occupants exited the aircraft unharmed.</p>						
Probable Cause						
Unsuccessful forced landing following fuel exhaustion in-flight.						
IARC Date			Release Date			

AIRCRAFT INCIDENT REPORT

Name of Owner/Operator : Angels Way Trust
Manufacturer : Atlas Aircraft Corporation
Model : Atlas C4M Kudu
Nationality : South African
Registration Marks : ZS-WYC
Place : On a farm next to Rustenburg aerodrome.
Date : 09 August 2011
Time : 1530Z

All times given in this report is 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 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 09 August 2011 the pilot accompanied by two passengers departed the Ranch private aerodrome bound for Rustenburg (FARG) under visual flight rules (VFR). After take-off the aircraft climbed to flight level (FL) 10500 feet altitude above ground level (AGL) and everything was normal. The aircraft later went outbound Lowveld air space and was handed over to Johannesburg air space control. Approximately after 1.4 hours flight time, the pilot descended and positioned the aircraft for downwind runway 34.
- 1.1.2 The pilot reported that traffic to the extended side of runway 34 and Oliphant Nek dam made him to rejoin runway 16. He then applied more power and executed a go around. During a go around process at a height of approximately 1 200 feet altitude above ground level (AGL) the fuel warning light came on in the cockpit and a few seconds later the engine started to splutter and immediately started to turn towards the aerodrome. The passengers were immediately notified of the situation. The pilot experienced the second noise and the engine torque simultaneously dropped. He further commenced with the ISOL procedure (Emergency fuel control unit override), had no response and initiated an emergency landing.
- 1.1.3 To his right was R565 road and because of traffic he couldn't land on it and he immediately spotted an open field to his left on a farm. Touchdown on a grass covered area was normal and the aircraft entered into a ploughed field. The aircraft suddenly impacted the ground on its nose, flipped over facing the direction it came from. The aircraft suffered substantial damages and all the occupants exited the aircraft unharmed.

- 1.1.4 Accident and Incident Investigation Division (AIID) was informed and the following day the investigator was dispatched.
- 1.1.5 The accident happened during day light conditions, approximately 9.5 nautical miles (NM) from Rustenburg aerodrome at GPS position determined to be S 25°33.169' E 027°08.145' at an elevation of 3 892 feet AGL.

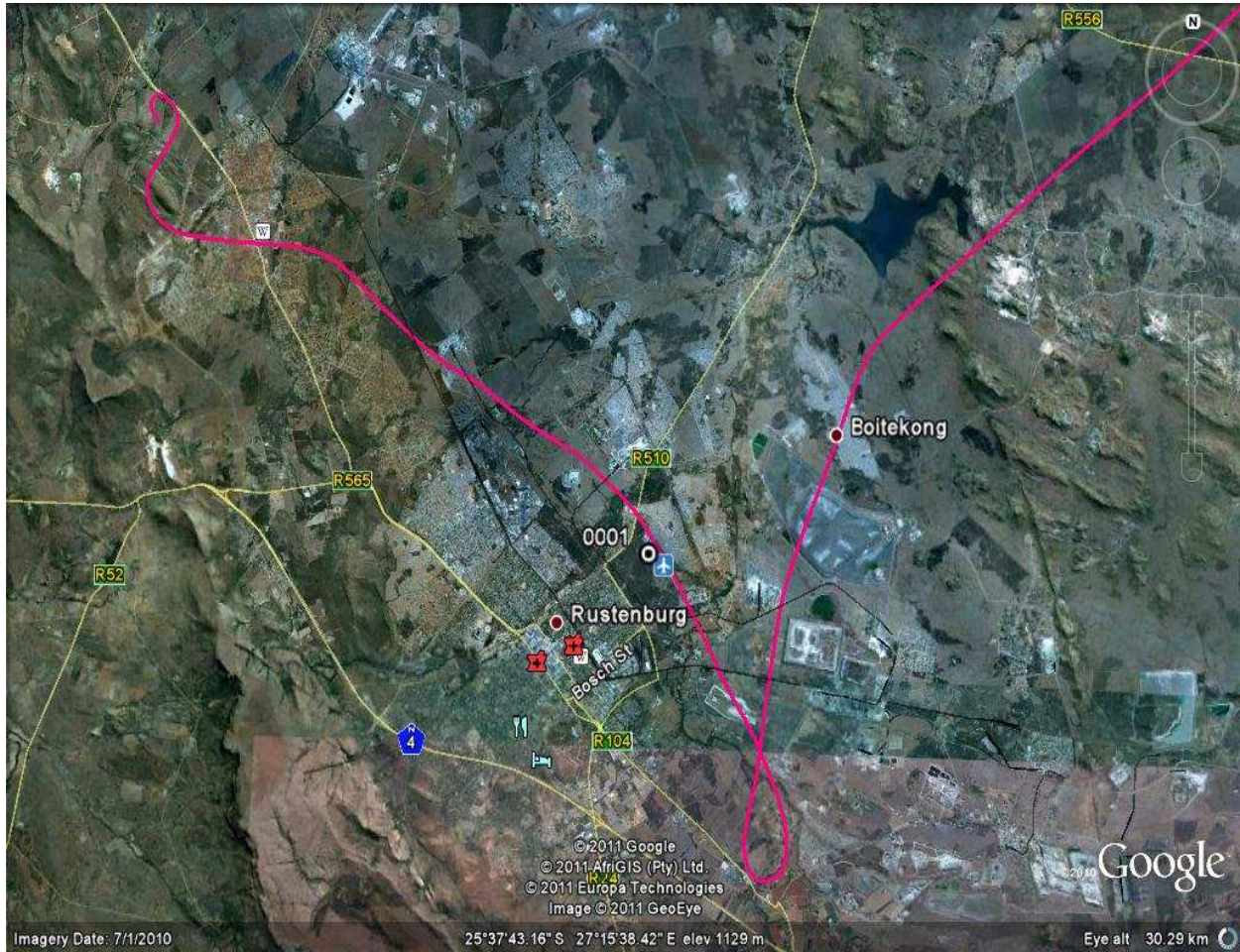


Figure 1: ZS-WYC flight path from the Ranch in pink.

1.2 Injuries to Persons:

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

1.3 Damage to Aircraft:

1.3.1 The aircraft was substantially damaged.



Figure 2: View of the aircraft at the accident site.

1.4 Other Damage:

1.4.1 No other damage was caused.

1.5 Personnel Information:

Nationality	South African	Gender	Male	Age	31
Licence Number	*****	Licence Type	Commercial		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Instrument Rating and Night Rating				
Medical Expiry Date	30 April 2012				
Restrictions	None				
Previous Accidents	Nil				

Flying Experience:

Total Hours	860.7
Total Past 90 Days	94.1
Total on Type Past 90 Days	51.4
Total on Type	139.3

1.6 Aircraft Information:

Airframe:

Type	Atlas C4M	
Serial Number	973	
Manufacturer	Atlas aircraft Corporation	
Date of Manufacture	Unknown	
Total Airframe Hours (At Time of Accident)	3005.2	
Last Annual (Date & Hours)	2964.6	04 March 2011
Hours Since Last MPI	40.6	
C of R (Issue Date)	02 March 2010	
Authority to fly (Issue Date)	03 May 2011	
Authority to Fly (Expiry Date)	04 March 2012	
A'D and S'B Status	Complied	
Maximum take off mass	2600 kg	
Operating Categories	Standard	
Fuel Type used	Jet A1	

*Note: The last annual inspection that was carried out on the aircraft prior to the accident was certified on 04 March 2011 at 2964.6 airframe hours by an aircraft maintenance organisation (AMO). The operating category as specified on the aircraft Authority to fly was indicated as private, which only allow skydiving operations. This was a South African Air Force (ex military) aircraft. It was fitted with a Lycoming engine of which the serial number was not available. The aircraft is now fitted with Walter M601D turbine engine, serial number 854032-D.

Engine:

Type	Walter M601D
Serial Number	854032-D
Hours since New	1758.3
Hours since Overhaul	336.6

Propeller:

Type	Avia (V508D/7)
Serial Number	330661966
Hours Since New	2339.6
Hours Since Overhaul	333.6

1.7 Meteorological Information:

1.7.1 The following weather information was obtained from the pilot questionnaires.

Wind direction	340°	Wind speed	Light	Visibility	10km
Temperature	20°C	Cloud cover	None	Cloud base	No Clouds
Dew point	None				

1.8 Aids to Navigation:

- 1.8.1 The aircraft was fitted with standard navigation equipment for the aircraft type as approved at the time of certification.
- 1.8.2 The aircraft was also fitted with Gamin global positioning system (GPS). The GPS data was down loaded as it cab seen on figure 1.

1.9 Communication:

- 1.9.1 No difficulties with communications were known or reported prior to the accident. No malfunction of any of the equipment was reported at the time of the accident.
- 1.9.2 There was no communication with air traffic control (ATC) as the aircraft was operated outside of controlled space.

1.10 Aerodrome Information:

- 1.10.1 The accident happened next to Rustenburg aerodrome on farm at GPS co-ordinates determined to be: S 25°33.169' E 027°08.145' at an elevation of 3 892 feet AGL.

1.11 Flight Recorders:

- 1.11.1 The aircraft was not fitted with a flight data recorder (FDR) or a cockpit voice recorder (CVR), neither was it required in terms of the South African Civil Regulations to be fitted to this aircraft type.

1.12 Wreckage and Impact Information:

- 1.12.1 Touch down on a grass covered area was normal and the aircraft further went into a ploughed field where it nosed over facing the direction it came from. The wings, rear spar, antennas, propeller and the vertical fin were damaged. The cockpit/ cabin area was still intact with all the seats attached to their mountings. The wing flaps lever was on 33% and the propeller showed signs of the engine operating at a low power setting at the time of the accident.



Figure 3: First point of impact and final position of the wreckage.

1.13 Medical and Pathological Information:

1.13.1 The pilot was a holder of a valid aviation medical certificate without any restrictions.

1.14 Fire:

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

1.15 Survival Aspects:

1.15.1 This was regarded as a survivable accident. The pilot and the passengers were properly restrained and secured by safety harness.

1.16 Test and Research:

1.6.1 On site investigation did not reveal any anomalies with the aircraft flight controls and that the IIC could smell fuel from the wreckage. The fuel selector handle was found on closed position and there was no evidence of any fuel leak. The aircraft battery was disconnected and the amount of fuel in the aircraft couldn't be confirmed. A thorough inspection was carried out on the fuel system and no anomalies were found except that there was evidence of vapour in the airframe fuel filter.

- 1.6.2 According to a person who refueled the aircraft at the Ranch aerodrome prior departure, 152.2 liters of Jet A1 fuel was uplifted during the absence of the pilot. There was no recorded fuel data and the aircraft fuel consumption is approximately 220 liters per hour. The total amount of fuel in the tanks after the aircraft was refueled and how much fuel was in the tanks prior refueling couldn't be confirmed.
- 1.6.3 With the help of the aircraft maintenance organization (AMO), the aircraft wings were removed to allow the wreckage to be transported to an examination facility at Wonderboom, Pretoria. Fuel lines had to be disconnected to accomplish that removal. After fuel lines were disconnected a thorough inspection was carried out on the fuel lines and no foreign objects or blockages were found. Attempts were made to drain the fuel from the tanks but were unsuccessful. There was less fuel in the tanks (Unused fuel not drainable).
- 1.6.4 At Wonderboom a damaged propeller was removed and a serviceable one was fitted as per aircraft maintenance manual. Aviation gasoline (Jet A1) was gravity fed from the two containers (Left and Right) as it can be seen on the picture below and engine run was carried out.



Figure 4: View of the aircraft on the run up bay.

- 1.6.5 The engine was started. Fuel was selected and all parameters were met. The engine operated normally, and power was increased in stages until it was evident that it was capable of operating at full power.

1.7 Organisational and Management Information:

1.17.1 This was a private flight.

1.17.2 The last annual inspection that was carried out on the aircraft prior to the accident was certified on 04 March 2011 at 2964.6 airframe hours by an aircraft maintenance organisation (AMO).

1.18 Additional information.

1.18.1 Atlas C4M (KUDU) Fuel system.

- Fuel is stored six bag type tanks which are grouped in threes in the inboard sections of each wing a filler cap on the middle tank. Each group of three tanks is interconnected, thus forming, in effect, one tank. A collector tank, provided in the delivery line from each tank group, ensures adequate fuel supply under negative conditions occasioned by any permissible flight manoeuvre.
- From the collector boxes, fuel is fed to a three way cock which is manually controlled by a fuel selector handle on the centre console labelled L.H TANK ON/OFF/ R.H TANK ON. A booster pump, provided as a standby in the event of failure of the engine driven pump and also used in certain phases of flight, is controlled by a FUEL PUMP ON/OFF switch.

1.18.2 Atlas C4M (KUDU) extract from owner's manual.

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WARNING

IF POSSIBLE, LAND STRAIGHT AHEAD. CHANGE DIRECTION ONLY IF REQUIRED TO AVOID OBSTACLES AND PROVIDING SUFFICIENT HEIGHT IS AVAILABLE. DO NOT EXCEED 30° OF BANK.

4.5 ENGINE (NON-MECHANICAL) FAILURE

The most common cause of engine failure is mismanagement or malfunction of the fuel system. Therefore, the first step to take after engine failure is to move the fuel selector valve to the tank not being used. This may keep the engine running even if there is no apparent reason for the engine to stop on the tank being used.

If an engine failure other than mechanical occurs in flight and if sufficient altitude is available, proceed as follows:

1. Establish glide at 80 Kts with flaps UP
2. Select best available forced landing terrain
3. FUEL SElector control Ensure selected to tank with sufficient fuel
4. Fuel pump ON
5. IGNITION SWITCH ON
6. FUEL condition lever Idle cut-off
7. Proceed with normal engine start

CAUTION

ENSURE THAT ENGINE OIL PRESSURE, OIL TEMPERATURE AND FUEL PRESSURE ARE ALL WITHIN LIMITS BEFORE ADVANCING THE POWER LEVER.

IF A FUEL CONTROL UNIT FAILURE (FCU) IS SUSPECTED, OPERATE THE EMERGENCY FCU OVERRIDE AS FOLLOWS:

8. FUEL condition lever Idle
9. TORQUE LEVER Idle
10. PROPELLER control Fine
11. ISOL switch On
12. FUEL condition lever Advance as required

OPERATION

ENSURE THAT ENGINE OIL PRESSURE, OIL TEMPERATURE AND FUEL PRESSURE ARE ALL WITHIN LIMITS BEFORE ADVANCING THE FUEL CONDITION LEVER. EXERCISE CAUTION TO NOT EXCEED ANY OF THE ENGINE PARAMETERS.

1.18.3 Fuel and oil supply

According to CARS Chapter 91.07.12:

- The pilot-in-command of an aircraft shall not commence a flight unless he or she is satisfied that the aircraft carries at least the planned amount of fuel and oil to complete the flight safely, taking into account operating and meteorological conditions and the expected delays.
- The pilot-in-command shall ensure that the amount of usable fuel remaining in-flight is not less than the fuel required to proceed to an aerodrome or, in the case of a helicopter, a suitable landing place, where a safe landing can be made.
- If the usable fuel on board the aircraft is less than the final reserve fuel, the pilot-in-command of such aircraft, shall –
 - (a) In the case of an aeroplane, declare an emergency; or
 - (b) In the case of a helicopter, land as soon as possible.

1.18.4 A go around is an aborted landing of an aircraft that is on final approach.

1.19 Useful or Effective Investigation Techniques:

1.19.1 None.

2. ANALYSIS:

2.1 The aircraft was properly maintained and no documented evidence was found indicating any defect or malfunction of it prior the flight that could have contributed to or caused the accident. The aircraft had flown a total of 40.6 hours since the last annual inspection was certified. Available information indicated that fine weather conditions prevailed in the area at the time of the flight and subsequent accident. The prevailing weather conditions were therefore not considered to have had any bearing on the accident. The pilot held a valid pilot licences as well as a valid aviation medical certificates that were issued by a SA CAA accredited medical examiner. After the accident the aircraft was recovered to a facility at Wonderboom, Pretoria (Gauteng province) where various tests and analysis were carried out.

2.2 Investigation revealed that the aircraft didn't have sufficient fuel to carry out a level flight and that has contributed to fuel pump cavitation (when the pump sucks air instead of fuel and ultimately the igniters causing hesitation). The sound is a sign of cavitation and requires correcting (adequate fuel) for proper operation. In this case the accident began well before the aircraft left the ground because the pilots are expected to visually check the amount of fuel in the tanks before the flight.

3. CONCLUSION:

3.1 Findings:

- i. The pilot was a holder of a commercial licence and the aircraft type was endorsed in his logbook.
- ii. The pilot's medical was valid prior to the accident.
- iii. The pilot was involved in a private flight.
- iv. The operator did not have a record of fuel upliftments for the aircraft.
- v. The flight folio was not kept in an updated condition.
- vi. The last annual inspection that was certified on the aircraft prior the accident was certified on 04 March 2011 at 2964.6 airframe hours.
- vii. Fine weather conditions prevailed at the time and were not considered to have had a bearing on the accident.

3.2 Probable cause/s:

3.2.1 Unsuccessful forced landing following fuel exhaustion in-flight.

3.3 Contributing factor/s:

3.3.1 Incorrect assessment of fuel quantity.

3.3.2 Miscalculation of fuel required.

4. SAFETY RECOMMENDATIONS:

4.1 None.

5. APPENDICES

5.1 None.

Compiled by:

Frans Motaung

Date:

for Commissioner for Civil Aviation

Investigator-in-charge:

Date:

Co-investigator:

Date: