AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/9340		
Aircraft Registration	**ZU-FSO**	**Date of Accident**	31 July 2014		**Time of Accident**	1045Z	
Type of Aircraft	Bantam B22J (Aeroplane)		**Type of Operation**		Commercial		
Pilot-in-command Licence Type	Airline Transport Pilot licence (ATPL)		**Age**	29	**Licence Valid**	Yes	
Pilot-in-command Flying Experience	Total Flying Hours		2 400,0		**Hours on Type**	45,0	
Last point of departure	Mimosa private aerodrome: Eastern Cape						
Next point of intended landing	Mimosa private aerodrome: Eastern Cape						
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
En route in flight to Mimosa aerodrome							
Meteorological Information	Cloud base, nil; visibility, 10 kilometers; temperature, 15 ºC; wind speed, 05 knots; dew point, 12.						
Number of people on board	1 + 1	**No. of people injured**	0		**No. of people killed**	0	

Synopsis

The aircraft was conducting a conservation flight to co-ordinate anti-poaching runs at Addo Elephant National Park when the accident occurred. Fine weather conditions prevailed in the area and the flight was planned to last for 20 minutes. The aircraft took off uneventfully and headed towards the western part of the park. All went well until the engine started running rough and subsequently stopped turning after approximately 17 minutes, when the aircraft was flying back to the aerodrome. Attempts were made to restart the engine, but without success. The pilot took firm control of the aircraft and continued straight ahead. Since there was no suitable area to execute a forced landing, the pilot glided the aircraft and mushed it onto some trees, approximately 5.2 nautical miles (NM) from the aerodrome. The aircraft was substantially damaged, but no one was injured. The engine was examined, but no anomalies were detected. The investigation concluded that the accident was the result of fuel exhaustion.

Probable Cause

Disregard of Standard/Safe/Regulatory operating procedure.

IARC Date		Release Date	

AIRCRAFT ACCIDENT REPORT

Name of Owner/Operator : South African National Parks
Manufacturer : Micro Aviation New Zealand Ltd
Model : Bantam B22J
Nationality : South African
Registration Marks : ZU-FSO
Place : Addo Elephant National Park
Date : 31 July 2014
Time : 1045Z

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 Thursday 31 July 2014, the pilot as the sole occupant of the aircraft took off from Mimosa private aerodrome in the Eastern Cape on a conservation flight destined for Addo Elephant National Park. Fine weather was reported and visual meteorological conditions prevailing in the area. The aircraft took off uneventfully and the flight lasted 30 minutes, after which an uneventful landing was carried out at Mimosa aerodrome. The pilot disembarked and was later introduced to a pilot newly appointed by the South African National Parks.

1.1.2 The aircraft was later prepared for another flight, which was planned not to exceed twenty minutes, with the intention to familiarise the newly appointed pilot with the company's standard operating procedures (SOPs), thus co-ordinating anti-poaching runs within the borders of Addo Elephant National Park. According to the pilot statement, the aircraft had 30 litres of Avgas LL 100 fuel remaining on departure. The long-serving company pilot was the pilot flying (PF) while the newly appointed pilot was observing and not involved in any flying activity. The aircraft took off and headed to the western side of the park with the intention to check for animals and game poaching syndicates.

1.1.3 The flight proceeded normally. In approximately 17 minutes flying time, while the aircraft was routing back to the aerodrome at 500 ft above ground level (AGL), the aircraft engine started running rough and the engine revolutions per minute (RPM) dropped. Ten to fifteen seconds later the engine stopped. The pilot instantly followed the company's operating procedures as contained in the quick reference handbook (QRH) and attempted to restart the engine, but without success. He then took firm control of the aircraft and continued straight ahead as the best option he had. Since there was no suitable area to execute a forced landing, the pilot glided the aircraft and mushed onto some trees approximately 5.2 NM from the aerodrome. The aircraft was substantially damaged during the process, but no one was injured. The pilot immediately notified the operator on his cell phone, who promptly dispatched a rescue team to the accident site. The flight was conducted under the provisions of Part 94 of the Civil Aviation Regulations of 1997, as amended for the aircraft to carry out general aerial work within the South African national parks.

1.1.4 The accident happened in daylight conditions at GPS co-ordinates determined to be South 33° 28 ″.32´ East 25° 46 ″.10´ at an elevation of 768 ft above mean sea level (AMSL).

Figure 1: Location of Addo Elephant National Park

1.2 Injuries to Persons:

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

1.3 Damage to Aircraft:

1.3.1 The aircraft was substantially damaged during the accident.

Figure 2: The aircraft as found at the accident site

1.4 Other Damage:

1.4 Damage was limited to the trees in the national park.

1.5 Personnel Information:

1.5.1 Pilot flying:

Nationality	South African	Gender	Male	Age	29
Licence Number	027 101 8582	Licence Type	Airline transport pilot		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Night, Instrument (A) and Instructor Ratings				
Medical Expiry Date	31 May 2015				
Restrictions	None				
Previous Accidents	Nil				

*NOTE: The pilot's flying profile revealed no accident or incident history, enforcement actions, pilot certificate or rating failure or retest history.

Pilot flying's experience:

Total Hours	2 400,0
Total Past 90 Days	45,0
Total on Type Past 90 Days	3,0
Total on Type	25,0

1.6 Aircraft Information:

1.6.1 The Bantam B22J is a high-wing, non-aerobatic, ultra-light two-seater aircraft designed for recreational flying and primary training under daylight visual flight rules (VFR) from grass or hard runways. It is powered by a 2,2-litre air-cooled four-stroke 80 horse power Jabiru engine running on Avgas LL100 or Mogas fuel. The aircraft is made from aluminium tubing bolted together and its flying surfaces are covered with Dacron sail cloth. The wings are supported by V-struts and jury struts. The engine is mounted above the cockpit on the forward end of the main keel tube. The undercarriage consists of a steerable nose wheel and 14-inch main wheels, all fitted with hydraulic disc brakes. The Bantam does not rely on pilot weight shift for control. Twin seats are positioned side by side for full dual control and both occupants are well protected from the weather by an aerodynamic fiberglass pod and large wrap-around windshield.

Figure 3: A Bantam B22J aircraft photo

Airframe:

Type	Bantam B22J	
Serial Number	11-0356	
Manufacturer	Micro Aviation New Zealand Ltd	
Date of Manufacture	2011	
Maximum certified mass	948 lbs	
Empty Weight	474 lbs	
Total Airframe Hours (At time of Accident)	214,5	
Last Annual (Hours & Date)	141,0	23 October 2013
Hours flown before the accident	73,5	
Authority to fly (Issue Date)	25 October 2013	
Authority to fly (Expiry Date)	22 October 2014	
C of R (Issue Date) (Present owner)	04 April 2012	
Recommended fuel	Avgas LL 100/ Mogas	
Fuel used	Avgas LL 100 (50 litres)	
Operating categories	Standard Part 94	

*****NOTE: The aircraft maintenance organisation (AMO) that performed the last annual inspection on the aircraft prior to the occurrence was in possession of a valid AMO approval certificate No 274. All applicable or relevant aircraft documentation such as the certificate of registration, the authority to fly, the radio station licence and the mass and balance certificates were scrutinised during the investigation and all were found to be valid in accordance with the existing regulations. Further examination of the technical documentation was done by the aircraft maintenance organisation and all entries made were appropriately certified in terms of general maintenance rules.

Engine:

Type	Jabiru 3300A
Serial Number	33A 2459
Hours since New	214,5
Hours since Overhaul	T B O not reached

Propeller:

Type	Laminated wood
Serial Number	395 64 x 41
Hours since New	No record
Hours since Overhaul	No record

Weight and balance calculation of the aircraft as per the pilot (2nd sortie):

Items	Weight (lbs)	Arm (inches)	Moment (in.lb)
A/C empty weight	474	22,80	10 807,2
Pilot (72 kg)	158,73	49,5	7 857,13
Passenger (72 kg)	158,73	49,5	7 857,13
Fuel main tank (30L) 1L of Avgas = 1,59 lb	47,7	106,0	5 056,2
Total T/O Weight	**839,16**	**37,63**	**31 577,66**

*NOTE: The gross weight at take-off was calculated to be 839,16 lb, meaning that the aircraft was under its maximum allowable weight of 948 pounds.

1.7 Meteorological Information:

1.7.1 Weather information as per the pilot questionnaire.

Wind direction	Unknown	Wind speed	05 knots	Visibility	10 km
Temperature	15 ℃	Cloud cover	Nil	Cloud base	Nil
Dew point	12 ℃				

1.8 Aids to Navigation:

1.8.1 The aircraft was fitted with standard navigational aids certified for this aircraft type and none were reported unserviceable prior to the accident.

1.9 Communications:

1.9.1 The aircraft was fitted with standard communication equipment certified for the aircraft type. The aircraft was equipped with a very high frequency (VHF) receiver which was serviceable at the time of the occurrence.

1.10 Aerodrome Information:

1.10.1 The accident happened in daylight conditions within Addo Elephant National Park borders at GPS co-ordinates determined to be South 33° 28 ″.32′ East 25° 46 ″.10′ at an elevation of 768 ft above mean sea level (AMSL).

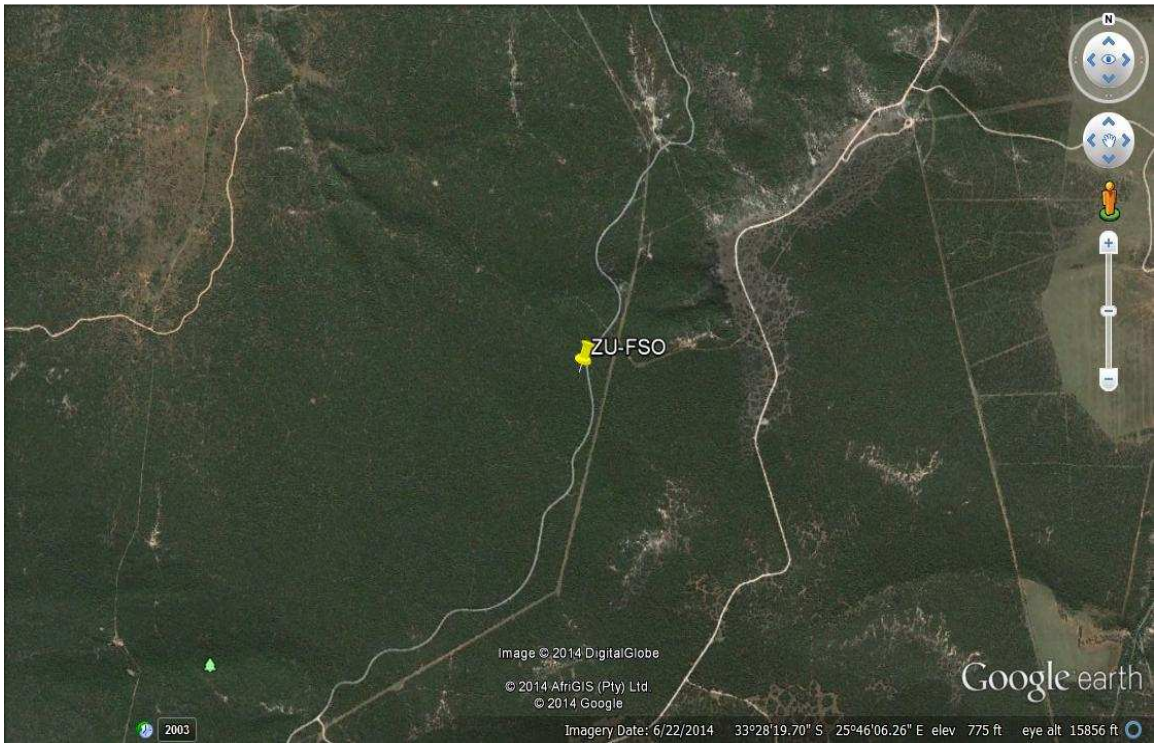

Figure 4: Google Earth map depicting the accident site

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 either required by the regulations to be fitted to this aircraft type.

1.12 Wreckage and Impact Information:

1.12.1 The aircraft came to rest in a nose-low attitude, damaging the wings. The aircraft throttle was in the closed position and the choke was off. Examination of the engine revealed damage consistent with the engine not turning before impact. The landing gear broke, the wings and wing support bars were damaged and the cabin was damaged.

Figure 5: The aircraft from the front

Figure 6: Top side view of the wings and the cabin

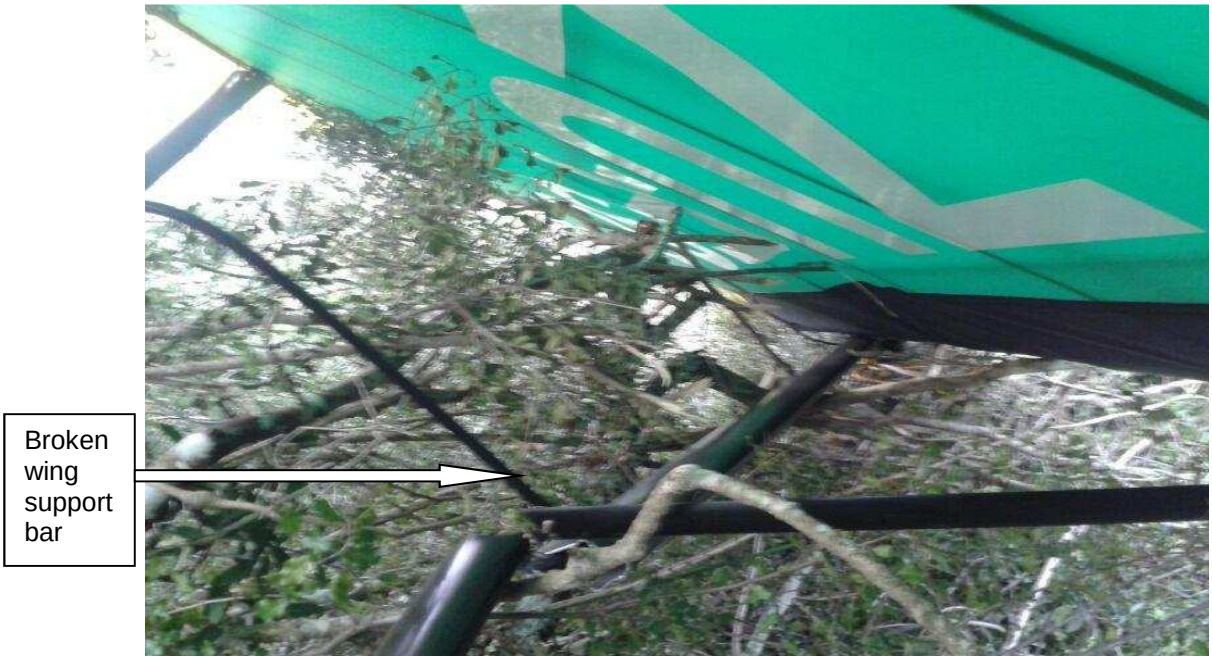

Figure 7: Broken wing support bar

1.13 Medical and Pathological Information:

1.13.1 None.

1.14 Fire:

1.14.1 No pre- or post-impact fire was reported.

1.15 Survival Aspects:

1.15.1 The accident was considered to be survivable due to the fact that all occupants were wearing the aircraft safety harnesses and that the aircraft was gliding at a relatively low speed prior to the occurrence.

1.16 Tests and Research:

1.16.1 On-site inspection of the aircraft revealed no structural or airframe failure. All associated engine controls showed evidence of normal operation prior to the accident. Inspection of the fuel system revealed a detached fuel supply line rubber pipe connecting to the electric fuel pump, with the clamp missing. The fuel pipe was inspected and nothing abnormal was found. There was a sign of a pipe support clamp on the pipe, suggesting that it was in place and was removed. The aircraft fuel tank was empty and there was no indication of any fuel leakage at the accident site. The fuel filter was pulled and examined and no fuel was observed. Spark plugs were pulled out and they displayed a greyish colour, an indication of normal engine

operation.

1.16.2 The aircraft was recovered to Nelspruit, after which the Jabiru engine, 3300A, serial number 33A2459, was removed from the wreck and placed on a test bench. The propeller was first tested for the correct toque and the engine was later started. The engine ran smoothly and no anomalies or run out were detected on the propeller flange. The engine temperature and the oil pressure were monitored and found to be well within limits. At no time did the engine malfunction. The fuel gauge was removed from the wreck and tested. No anomalies were noted. The investigation revealed that the engine ceased operating as a result of fuel exhaustion. The pilot statement of fuel amounting to 30 litres on departure was found to be erroneous and was eliminated. Below are pictures of the location of a fuel tank on the aircraft and a disconnected fuel pipe.

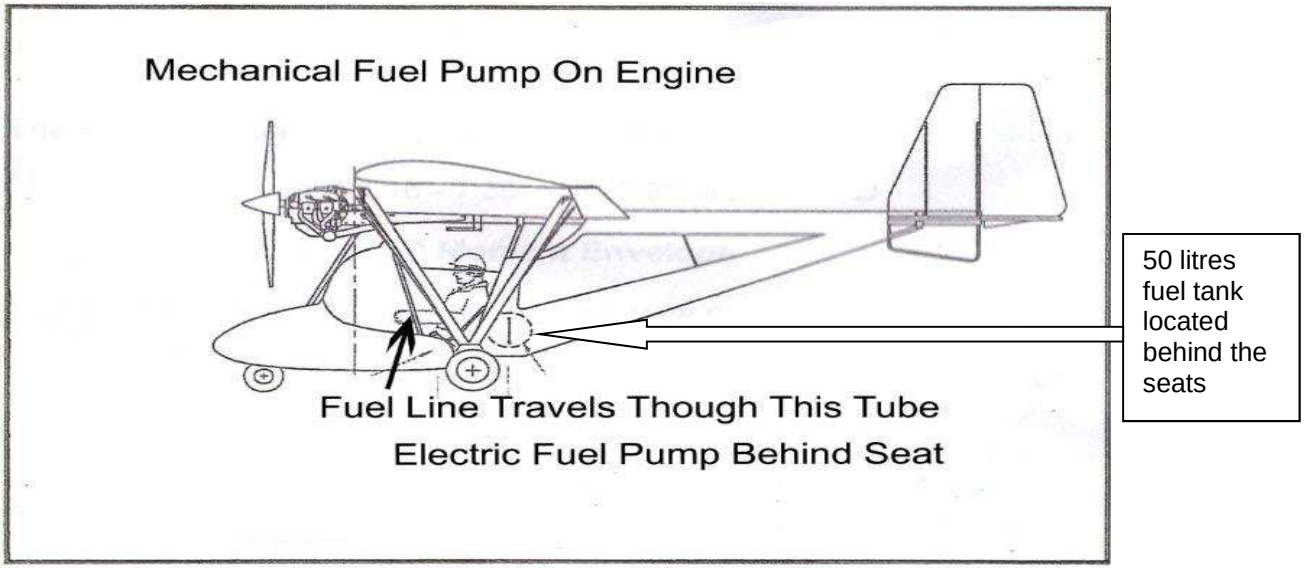

Figure 8: The location of the fuel tank

Figure 9: A separated arrangement

1.17 Organisational and Management Information:

1.17.1 This was a commercial flight.

1.17.2 The AMO that performed the last annual inspection on the aircraft prior to the accident flight was in possession of a valid approval certificate No 274.

1.18 Additional Information:

1.18.1 None.

1.19 Useful or Effective Investigation Techniques:

1.19.1 None.

2 ANALYSIS:

2.1 The weather information obtained from the pilot questionnaire indicated that fine weather conditions prevailed at the time of the flight and subsequent accident. The investigation further proved that the aircraft was well maintained in accordance with the manufacturer's specification and that it was airworthy prior to the accident flight. The pilot was properly certificated and qualified under the South African civil aviation regulations to perform the flight and had 2 400,0 flight hours, of which 25,0 were on type. There was no indication of any medical or behavioral conditions that might have affected the pilot's performance during the flight and subsequent accident. The investigation concluded that the accident was the result of fuel exhaustion.

3. CONCLUSION:

3.1 Findings:

3.1.1 The pilot had the aircraft type endorsed on his licence.

3.1.2 The pilot medical was valid, with no restrictions.

3.1.3 The pilot responded appropriately to the unusual or emergency situation.

3.1.4 The aircraft had a valid authority to fly.

3.1.5 The aircraft weight was within its limit and it had flown a total of 73.5 hours since the last annual maintenance inspection was certified.

3.1.6 Available information indicated that fine weather conditions prevailed in the area at the time of the flight and subsequent accident.

3.1.7 Examination of the aircraft technical logbooks revealed no evidence of anomalies or deficiencies.

3.1.8 The accident was considered survivable.

3.1.9 The accident was the result of fuel exhaustion in flight.

3.2 Probable Cause/s:

3.2.1 Disregard of Standard/Safe/Regulatory operating procedure.

4. SAFETY RECOMMENDATIONS:

4.1 None.

5. APPENDICES:

5.1 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.