



AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/8622	
Aircraft Registration	ZS-SVM	Date of Accident	3 March 2009		Time of Accident	0410Z
Type of Aircraft	Beechcraft B36TC		Type of Operation		Private	
Pilot-in-command Licence Type		Private	Age	58	Licence Valid	Yes
Pilot-in-command Flying Experience		Total Flying Hours	1 070.9		Hours on Type	8.6
Last point of departure		FAKM (Kimberley)				
Next point of intended landing		FALY (Ladysmith)				
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)						
FAKM (Kimberley)						
Meteorological Information		According to the official weather report, fine weather conditions prevailed at the time and place of the accident				
Number of people on board	1 + 1	No. of people injured	0	No. of people killed	2	
Synopsis						
<p>On 3 March 2009, the pilot, accompanied by a passenger, intended to depart from Kimberley aerodrome to Ladysmith aerodrome as per his flight plan submitted to Kimberley ATC.</p> <p>It would appear that the engine lost power or failed during take-off and the pilot failed to maintain flying speed, resulting in the aircraft stalling and crashing.</p> <p>Both pilot and passenger were fatally injured.</p> <p>Investigation revealed no technical defects that could have caused the aircraft to crash.</p> <p>The aeroplane was destroyed during the accident sequence and minor damage was caused to the airport perimeter fence and surrounding vegetation.</p>						
Probable Cause						
<p>Did not maintain flying speed after the engine failed as a result of an over-rich mixture setting.</p>						
IARC Date				Release Date		

AIRCRAFT ACCIDENT REPORT

Name of Owner/Operator : S. de Jager
Manufacturer : Raytheon
Model : B36TC
Nationality : South Africa
Registration Marks : ZS-SVM
Place : Kimberley Aerodrome, Northern Cape Province
Date : 3 March 2009
Time : 0410Z

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 interests 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 3 March 2009 at approximately 0410Z, the pilot, accompanied by a passenger, took off from Kimberley aerodrome in the Northern Cape on a private flight to Ladysmith aerodrome in KwaZulu-Natal.
- 1.1.2 During take-off, the aircraft was observed to perform abnormal manoeuvres after which it nose-dived into the ground.
- 1.1.3 One occupant sustained burn injuries and died at the scene of the accident. The other sustained multiple injuries and died on 18 March 2009.

1.2 Injuries to Persons

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

1.3 Damage to Aircraft

- 1.3.1 In addition to the impact damage, the aircraft also sustained extensive fire damage after the impact and was destroyed.



Figure 1. The wreckage after the accident.

1.4 Other Damage

- 1.4.1 The airport perimeter fence sustained minor damage when it was struck by the tail section of the aircraft. In addition, minor damage was caused to the surrounding vegetation in the immediate area of the impact point due to the post-impact fire.

1.5 Personnel Information

Pilot-in-Command

Nationality		South African			
Licence No.		Gender	Male	Age	58
Licence valid		Yes	Type Endorsed	Yes	
Ratings		Nil			
Medical Expiry Date		31 December 2009			
Restrictions		Corrective lenses			
Previous Accidents		Nil			

Flying Experience*

Total Hours	1 070.9
Total Past 90 Days	8.6
Total on Type Past 90 Days	8.6
Total on Type	8.6

* The pilot's logbook could not be obtained. However, he did his conversion during November 2008. A copy of his logbook was given to the instructor responsible for his conversion. This information was used to determine the pilot's hours flown up to 9 December 2008.

1.6 Aircraft Information

Airframe

Type	B36TC
Serial #	EA610
Manufacturer	Raytheon
Year of Manufacture	1989
Total Airframe Hours @ last Mandatory Inspection (MPI)	464.60 on 4 November 2008
Hours since Last MPI	4.6
C of A (Issue date)	11 September 1998
C of R (Issue Date)	11 April 2005

Engine

Type	Teledyne Continental TSIO 520 UB
Ser #	527335
Hours since New	464.60
Hours since Overhaul	TBO not reached

Propeller

Type	McCauley 3A32C406-C
Ser #	972007
Hours since New	464.60
Hours since Overhaul	TBO not reached

1.7 Meteorological Information

- 1.7.1 According to the official weather report from the South African Weather Service, fine weather conditions prevailed at the time of the accident.

1.8 Aids to Navigation

- 1.8.1 The aircraft was equipped with standard navigational equipment for the aircraft type and there were no recorded defects prior to or during the flight.

1.9 Communications

- 1.9.1 The aircraft was equipped with standard communication equipment for the aircraft type. The ATC (air traffic controller) reported to the pilot that the transmissions from the aircraft were intermittent.
- 1.9.2 According to the ATC, the pilot transmitted a Mayday call, but was unable to state the nature of the problem before the accident occurred. However, the transcript of the communication with the tower does not reflect a Mayday call.

1.10 Aerodrome Information

Aerodrome Location	Kimberley
Aerodrome Co-ordinates	S28°48.1' E024°45.5'
Aerodrome Elevation	3 949 ft
Runway Designations	10/28 and 02/20
Runway Dimensions	2 439 m x 46 m & 3 000m x 46 m
Runway Used	28
Runway Surface	Tar

1.11 Flight Recorders

- 1.11.1 The aircraft was not equipped with any data recorders, nor were these required by regulation.

1.12 Wreckage and Impact Information

- 1.12.1 The aircraft struck the ground approximately 50 m beyond the threshold of Runway 10 in a nose-down and left-wing-low attitude. It then swung around to face in a direction of approximately 100°M.
- 1.12.2 The tail section of the aircraft made contact with the airport perimeter fence.

1.13 Medical and Pathological Information

1.13.1 Pilot-in-Command

- 1.13.1.1 The pilot perished on 18 March 2009. The cause of death was complications due to multiple injuries.
- 1.13.2.2 No toxicological report was available at the time of compiling this report.

1.13.2 Passenger

- 1.13.2.1 According to the medico-legal autopsy report, the cause of death of the passenger was consistent with burns and the consequences thereof.
- 1.13.2.2 No toxicological report was available at the time of compiling this report.
- 1.13.2.3 The passenger perished at the scene.

1.14 Fire

- 1.14.1 The aircraft erupted in fire during the initial impact and was destroyed as a result of the post-impact fire. There were no indications of any in-flight fire.

1.15 Survival Aspects

- 1.15.1 The impact with the terrain was not severe enough to cause fatal injuries to the occupants, and both survived the impact itself.
- 1.15.2 However, the passenger was stuck in the aircraft and perished as a result of burn injuries and the consequences thereof.
- 1.15.3 The pilot managed to escape from the wreckage but also died two weeks later as a result of burn injuries and the consequences thereof.
- 1.15.4 No toxicological reports had been received for the passenger or the pilot at the time of compiling this report.
- 1.15.5 No autopsy report for the pilot had been received at the time of compiling this report.

1.16 Tests and Research

1.16.1 Aircraft Airworthiness Status

- 1.16.1.1 According to available information the aircraft was correctly maintained and airworthy at the time of the accident.

1.16.2 Engine(s) Examination

- 1.16.2.1 On 4 May 2009, the engine, Continental TSIO-520 UB serial number 527335 from ZS-SVM, was taken to an approved maintenance centre for complete dismantling and inspection. Close attention was paid to parts that could have failed and prevented the engine from delivering the required power. No such problem was encountered during engine and component disassembly.
- 1.16.2.2 The spark plugs, RHB 32E, were all intact and appeared to have been in a proper working condition prior to the accident. They were tested using a spark plug tester and all twelve appeared to be firing.

- 1.16.2.3 The oil pump was inspected and no internal damage was found on the body and oil pump gears.
- 1.16.2.4 The magnetos – serial numbers 96072032 (R/H) and 96072035 (L/H) – were inspected for internal timing and met the manufacturer's specifications. No broken parts were found internally. The right-hand magneto showed accident-related base damage.
- 1.16.2.5 The fuel pump – part number 649368-9 serial number D 229705B – was dismantled to check for broken internal components and none were found. Fuel-pump blades appeared to be in normal condition and the fuel pump aneroid was not punctured or damaged. The fuel-pump driveshaft was not sheared.
- 1.16.2.6 The governor could not be bench-tested due to severe accident and fire damage, but it still rotated freely.
- 1.16.2.7 The flow in all fuel nozzles was checked and found to be within the manufacturer's specifications. No obstructions were found in the fuel nozzles.
- 1.16.2.8 Further engine dismantling was carried out but no broken or failed parts were found.
- 1.16.2.9 **Conclusion:** On the parts and accessories that could be inspected or bench-tested, no mechanical defects were found that could have caused the engine to fail in flight.

1.16.3 Propeller Examination

- 1.16.3.1 The propeller was recovered to an approved maintenance facility where it was dismantled and inspected to determine a possible failure during flight. The result of the investigation was that there had been no propeller failure and the damage to the propeller was accident-related.

1.16.4 Engine runs

- 1.16.4.1 On 7 May 2009, certain engine runs were performed on another B36TC with the following results:

ZS-SVM				
Engine run tests performed on 7 May 2009 @ 09h30 at FALA				
	Full Rich Mixture Setting			was started and allowed to heat up to normal working temperature and then the electric fuel pump was switched ON to determine the effect on the running of
	@1000 RPM	@1500 RPM	@2600 RPM (Full Power)	
Manifold Pressure in INCHES	Manifold Pressure 14	Manifold Pressure 15	Manifold Pressure33	
EGT	Normal	Normal	Normal	
Fuel Flow in US Gal/Hr	3	6	30	
Seconds to DEAD engine from time of switching Electric Fuel Pump "ON"	6	5	11	
	Lean Mixture Setting			

	@ 1000 RPM	@ 1500 RPM	@ 2600 RPM (Full Power)
Manifold Pressure in INCHES	Manifold Pressure 15	Manifold Pressure 15	Manifold Pressure 33
EGT	EGT Drops slightly	EGT Drops slightly	EGT Drops slightly
Fuel Flow in US Gal/Hr	3	4	19
Seconds to DEAD engine from time of switching Electric Fuel Pump "ON"	5	6	Engine keep on running
NOTE during TAXI	At 1600 RPM, the RPM drops to 1200 RPM when mixture is leaned		

1.16.5 Auxiliary Fuel Pump

- 1.16.5.1 The auxiliary fuel pump switch is located to the left and next to the green lights indicating when the landing gear is down and locked. The landing gear selector lever is located to the right, below the green lights.
- 1.16.5.2 The photograph from the accident aircraft clearly shows the auxiliary fuel pump switch in the "HI" position and the landing gear selector in the DOWN position.
- 1.16.5.3 Inspection of the auxiliary fuel pump switch did not reveal any damage apart from fire damage.



Figure 2. The auxiliary fuel pump switch in the OFF position.

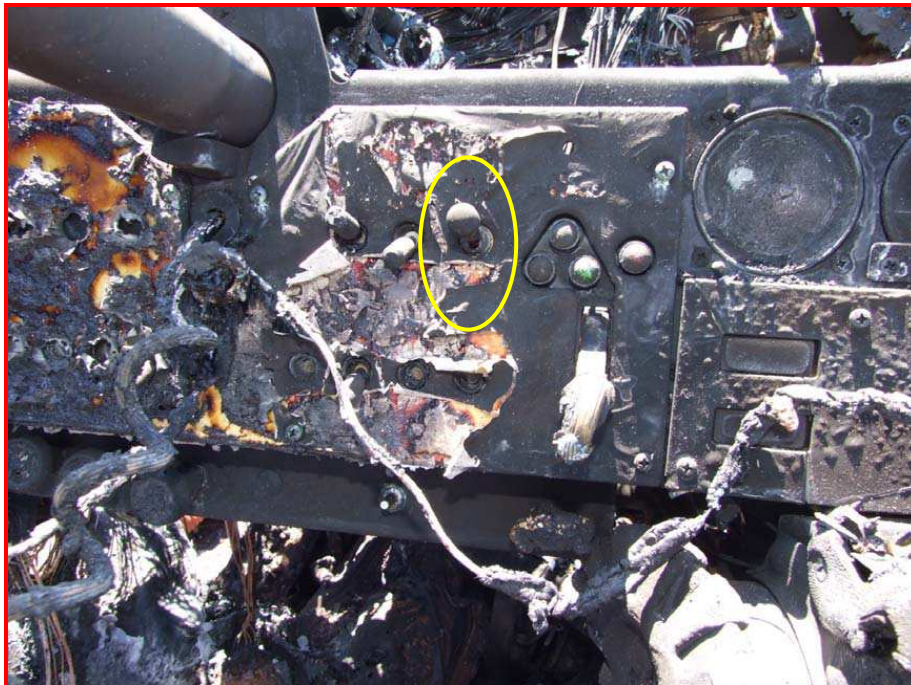


Figure 3. The auxiliary fuel pump switch in the HI position on the accident aircraft.

1.16.6 The on-site investigation revealed no abnormalities that could have caused the aircraft to crash.

1.17 Organisational and Management Information

1.17.1 Not applicable as this was a private flight.

1.18 Additional Information

1.18.1 According to a witness, (ATC dispatching the aircraft), the aeroplane routed inbound from Kuruman earlier on the morning of the accident.

1.18.2 After refuelling, the pilot requested taxi clearance for a flight to Ladysmith. During this time, the radio transmissions were intermittent and the pilot was informed accordingly.

1.18.3 After taxi clearance was issued, the pilot taxied the aircraft to the holding point of Runway 28. He was instructed to report when ready for take-off.

1.18.4 After the pilot reported that he was ready for take-off, clearance was issued but the radio transmission was still intermittent. The read-back by the pilot was incorrect and the clearance was given again, but again the read-back was incorrect.

1.18.5 A simpler clearance was then issued and the pilot was advised to spend a few minutes at the holding point to sort out the intermittent transmissions. The pilot responded that it was sorted out and that he was ready for departure.

1.18.6 Departure clearance was issued at 0611Z.

- 1.18.7 The aircraft rotated before the intersection of Runway 02/20. Passing west of the intersection (approximately 50 m), still on the runway heading, the pilot called "Mayday, Mayday!".
- 1.18.8 Airports Company South Africa (ACSA) were alerted and the ATC observed the aircraft sinking towards the runway. The aircraft regained altitude to about 200 ft but the left wing dropped by 45°. The pilot recovered the aircraft to straight and level flight.
- 1.18.9 After reaching the upwind threshold of Runway 28, the aircraft crashed left to the centreline of Runway 28 and exploded on impact.
- 1.18.10 The fire and rescue services were on the scene at 0612Z, a mere 1 minute after being alerted of the emergency.
- 1.18.11 The pilot submitted a flight plan at Kimberley Aerodrome for a flight from Kimberley to Ladysmith.

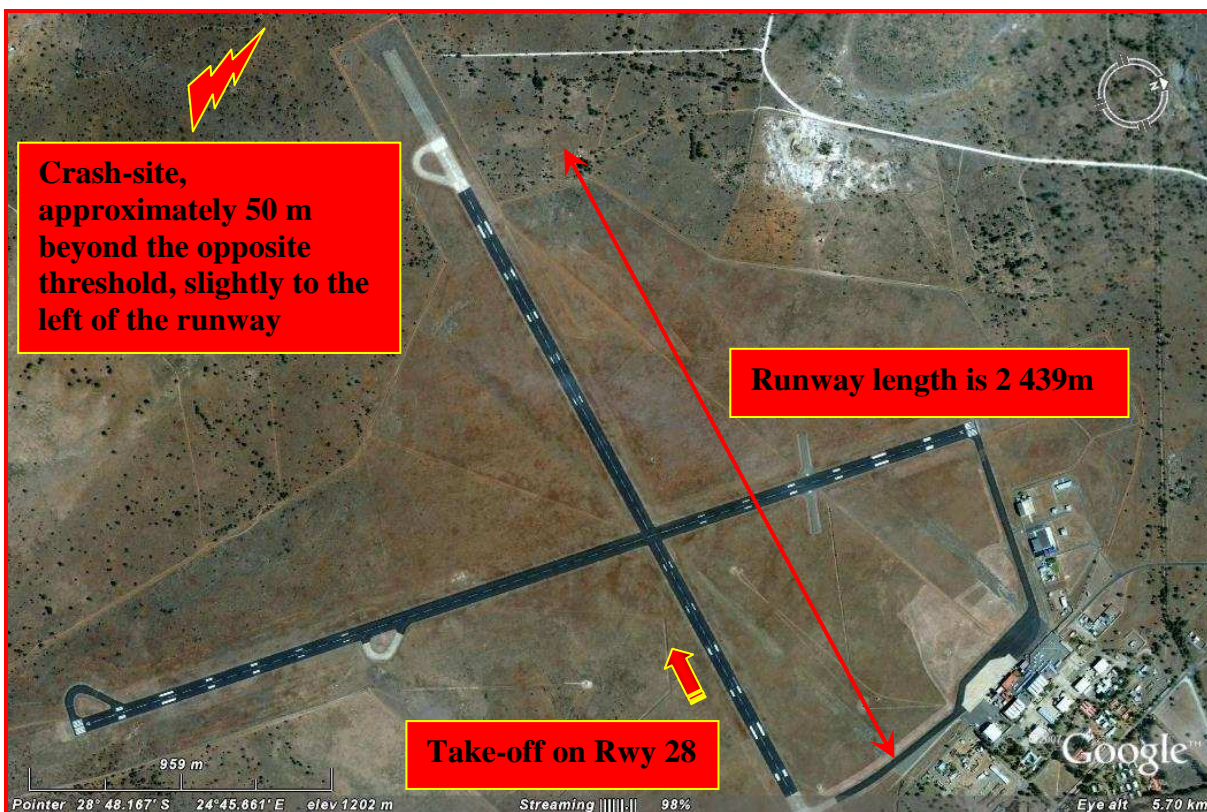


Figure 4. The runway used for take-off and the position of the accident site.

1.19 Useful or Effective Investigation Techniques

1.19.1 Not applicable

2. ANALYSIS

- 2.1 On 3 March 2009, the pilot, accompanied by a passenger, intended to depart from Kimberley aerodrome to Ladysmith aerodrome as per his flight plan submitted to Kimberley ATC.
- 2.2 During take-off, the engine either lost power or failed and the aircraft crashed. The impact with the terrain was not severe enough to cause fatal injuries to the occupants and both occupants survived the impact itself. However, the passenger was stuck in the aircraft and perished as a result of burn injuries and the consequences thereof. The pilot managed to escape from the wreckage but died approximately two weeks later as a result of multiple injuries sustained during the accident sequence.
- 2.3 During follow-up testing, it was determined that the engine had failed 11 seconds after the electric auxiliary fuel pump was switched onto high at maximum power and with the mixture setting on full rich. The auxiliary fuel pump switch is located to the left and next to the green lights indicating when the landing gear is down and locked. The landing gear selector lever is located to the right, below the green lights. During the take-off, the aircraft was observed to perform abnormal manoeuvres before it nose-dived into the ground. With the above in mind, it is the opinion of the investigator-in-charge that the pilot intended to retract the landing gear after rotation but accidentally switched the auxiliary fuel pump on to the high position. This would have resulted in the engine losing power or even failing as a result of an over-rich mixture setting. At the time, the pilot most probably attended to the reason for the engine power-loss and failed to maintain flying speed, which resulted in the aircraft stalling. All of the above occurred at low altitude and the pilot had insufficient time to effect a recovery.
- 2.4 Except for fire damage, there was no indication of any other damage to the auxiliary fuel pump switch. This is a “gated” switch, i.e. it must be pulled out before it can be switched into a different position. Bumping it upwards would cause damage to the switch. Since there was no damage evident, other than fire damage, it can be assumed that the switch was accidentally switched on by the pilot.
- 2.5 In addition to the impact damage, the aircraft also sustained extensive fire damage on the ground after impact. There were no indications of in-flight fire that could have caused a loss of control.
- 2.6 During the accident sequence, the tail section of the aircraft struck the airport perimeter fence, causing minor damage to it.
- 2.7 The pilot was correctly licensed and rated on the aircraft type and was in possession of a valid medical certificate at the time of the accident.
- 2.8 The aircraft was correctly maintained with a valid Certificate of Airworthiness at the time of the accident.
- 2.9 Fine weather conditions prevailed at the time and the weather was not considered a factor in this accident.
- 2.10 The aircraft was equipped with standard navigational and communication equipment for the aircraft type. The ATC reported that the radio transmissions were intermittent.

- 2.11 The aircraft was not equipped with any CVR (cockpit voice recorder) or FDR (flight data recorder) as neither was required by regulation.
- 2.12 No mechanical defects were found during the on-site investigation or the subsequent examination of the engine and propeller that could have caused the loss of power or engine failure.

3. CONCLUSION

3.1 Findings

- 3.1.1 On 3 March 2009, the pilot, accompanied by a passenger, intended to depart from Kimberley aerodrome to Ladysmith aerodrome as per his flight plan submitted to Kimberley ATC.
- 3.1.2 It would appear that the engine lost power or failed during take-off and the pilot did not maintain flying speed, resulting in the aircraft stalling.
- 3.1.3 Investigation revealed no technical defects that could have caused the aircraft to crash.
- 3.1.4 The aircraft was destroyed during the accident sequence and minor damage was caused to the airport perimeter fence and surrounding vegetation.
- 3.1.5 The pilot was correctly licensed and rated on the aircraft type and was in possession of a valid medical certificate at the time of the accident.
- 3.1.6 The aircraft was correctly maintained with a valid Certificate of Airworthiness at the time of the accident. It was equipped with standard navigational and communication equipment for the aircraft type and the only problem recorded was that the radio transmissions from the aircraft were intermittent. The aircraft was not equipped with any CVR (cockpit voice recorder) or FDR (flight data recorder) as these were not required by regulation.
- 3.1.7 Fine weather conditions prevailed at the time of the accident.

3.2 Probable Cause/s

- 3.2.1 The pilot did not maintain flying speed after the engine failed as a result of an over-rich mixture setting.

4. SAFETY RECOMMENDATIONS

- 4.1 Although it is already part of the syllabus for flying training, instructors should be stricter on procedures followed after an engine failure. In fact, not complying with the correct procedures should perhaps be considered a reason for immediate failure

5. APPENDICES

5.1 None

Report reviewed and amended by the Advisory Safety Panel on 18 May 2010
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