

AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

					Reference:	CA18/2/3/9492	
Aircraft Registration	ZS-MRM	Date of Accident	16 October 2015		Time of Accident	Unknown	
Type of Aircraft	Beech Bonanza F33A		Type of Operation		Private (Part 91)		
Pilot-in-command Licence Type		Commercial Pilot	Age	22	Licence Valid	Yes	
Pilot-in-command Flying Experience		Total Flying Hours	unknown		Hours on Type	unknown	
Last point of departure		Wonderboom Aerodrome (FAWB), Gauteng Province					
Next point of intended landing		Wonderboom Aerodrome (FAWB), Gauteng Province					
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
Motlatse Canyon Provincial Nature Reserve in an area called Erasmushoek close to Bourkes Luck Potholes, Graskop, Mpumalanga (S24° 40.267 E030° 54.720 at 5207 feet elevation)							
Meteorological Information		Temperature: 12.2 °C; Dew point: 11.8; Wind 255°-264 ° /04 kt; Visibility: Reduced; Cloud cover: broken clouds.					
Number of people on board	1+0	No. of people injured	0	No. of people killed	1		
Synopsis		<p>On the morning of Friday, 16 October 2015 the pilot took off in a Beech Bonanza F33A aircraft from Wonderboom Airport on a private flight with the intention of landing back at Wonderboom Airport.</p> <p>Part of the flight was recorded by an on board VIRB action camera which indicated that the pilot intentionally flew in IMC conditions whilst it was a VFR flight. During the flight the aircraft impacted the plateau of the mountain with it is belly in a slight left wing low attitude.</p> <p>After no contact with the pilot and not reporting for duty at work on Friday, the South African Search and Rescue Organization initiated a search where after the wreckage was only found on Sunday afternoon, 18 October 2015 at approximately 1430Z.</p> <p>The pilot sustained fatal injuries during the accident.</p>					
Probable Cause		<p>The pilot's disregard of safe flying procedures whilst flying in low lying clouds and misjudgement of the aircraft's proximity to terrain, which resulted in a controlled flight into terrain.</p> <p><u>Contributory Factor/s:</u> Intentional flying in IMC conditions during a VFR flight.</p>					
SRP Date				Release Date			



AIRCRAFT ACCIDENT REPORT

Name of Owner : Intrax Investments 108 (PTY) LTD
Name of Operator : Private
Manufacturer : Beech Aircraft Corporation
Model : Beech Bonanza F33A
Nationality : South African
Registration Marks : ZS-MRM
Place : Motlatse Canyon Provincial Nature Reserve,
Graskop, Mpumalanga
Date : 16 October 2015
Time : Approximately 0815Z

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 (2011) 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

On the morning of Friday, 16 October 2015 at 0418Z the pilot took off in a Beech Bonanza F33A aircraft, ZS-MRM from Wonderboom Airport on a private flight with the intention of landing back at Wonderboom Airport. Wonderboom Airport air traffic control (ATC) indicated that the aircraft had 5 hours fuel endurance for the flight. After not reporting for duty at work on Friday and following no contact with the pilot, the South African Search and Rescue Organization (SASAR) was notified and a search was initiated. On Sunday afternoon, 18 October 2015 at approximately 1430Z the aircraft wreckage was spotted and at 1510Z members of the South African Police Service reached the wreckage by helicopter.

- 1.1 The wreckage of ZS-MRM was found to have crashed onto mountains in the Motlatse Canyon Provincial Nature Reserve in the Erasmushoek area close to Bourkes Luck Potholes, Graskop, Mpumalanga. The pilot sustained fatal injuries during the accident.



Figure 1: Google Earth view of accident site

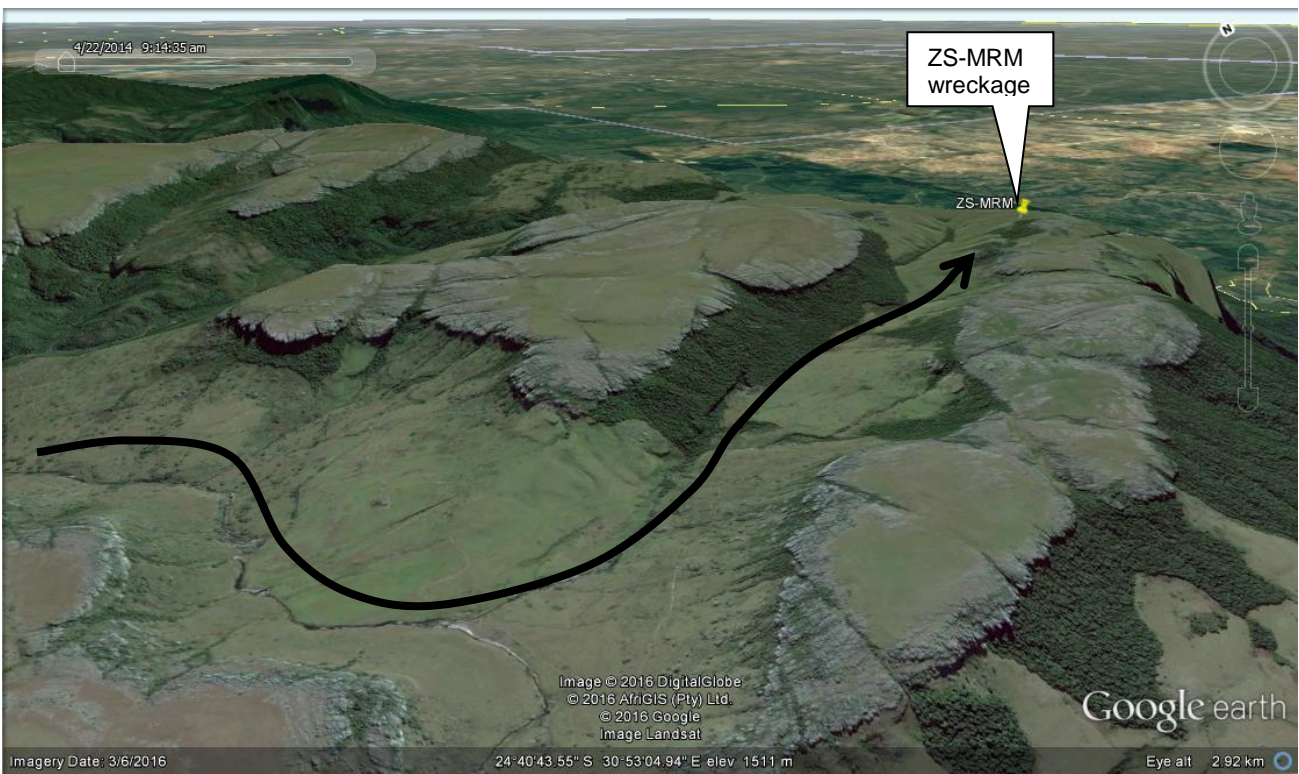


Figure 2: Google Earth view of accident site and canyon route

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.



Figure 3: View of aircraft wreckage

1.4 Other Damage

1.4.1 The aircraft crashed in a nature reserve and damage was limited to vegetation.

1.5 Personnel Information

Nationality	South African	Gender	Male	Age	22
Licence Number	0272415985	Licence Type	Commercial Pilot		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Night Rating, Instrument Rating, Multi Engine Piston				
Medical Expiry Date	31 May 2016				
Restrictions	Nil				
Previous Accidents	Nil				

Flying Experience:

Total Hours	225.3
Total Past 90 Days	unknown
Total on Type Past 90 Days	unknown
Total on Type	unknown

Note: 1. The pilot's logbook was unavailable at the time this report was compiled.
2. The last hours that were retrieved from SACAA records was dated 10 December 2014.
3. The pilot's last annual flight renewal test was done on 10 December 2014.

1.6 Aircraft Information

Beech Bonanza F33A

General Description

The Beech Bonanza F33A is a single-engine four-to-six-seat light touring aircraft produced by the US-American manufacturer Beech Aircraft Corporation, later Hawker Beechcraft Corporation, today Beechcraft a brand of Textron Aviation.



Figure 4: Photo of a similar aircraft as taken from http://www.classq.com/aircraft-performance-specs/Beechcraft-F33A_Bonanza-specs/439

1.6.1 Airframe:

Type	Beech Bonanza F33A	
Serial Number	CE-1484	
Manufacturer	Beech Aircraft Corporation	
Date of Manufacture	1990	
Total Airframe Hours (At time of Accident)	2302.2	
Last MPI (Hours &Date)	2205.8	16 October 2014
Hours since Last MPI	96.4	
Certificate of Airworthiness (Issue Date)	29 July 2015	
C of R (Issue Date) (present owner)	14 November 2012	
Operating Categories	Standard Part 91	
Previous Incidents	Landing incident at FALA on 10 September 2000	

Note: 1. The last flight that was recorded in the Flight Folio was on 15 October 2015.
2. The flight hours was calculated with the use of the tachometer reading.

1.6.3 Engine:

Type	Lycoming O-360-A1F6
Serial Number	L-15370-36A
Hours since New	2302.2
Hours since Overhaul	502.0

1.6.4 Propeller:

Type	Hartzell HC-F2YR-1F
Serial Number	CM1114A
Hours since New	2302.2
Hours since Overhaul	567.2

1.6.5 Fuel

The right and left wing tanks ruptured on impact with the ground. According to documented evidence, 270 litres of Avgas 100LL was uplifted on 15 October 2015 which would have been filled to capacity. The aircraft was then flown for 1.5 hours until the accident occurred. It was calculated that ZS-MRM thus had approximately 216 litres (57 gallons) of fuel in its tanks at the time of the accident. The fuel was enough to make the flight.

Note: The aircraft has a fuel capacity of 80 gallons of which 74 gallons are useable.

1.6.6 Weight and Balance

Basic Empty Mass	2356 lbs
Pilot	220lbs
Passenger	
Fuel	479 lbs
Cargo	22 lbs
Total Weight	3077 lbs
Maximum Take-off & Landing Weight	3500 lbs
Below Maximum Take-off Weight	423 lbs

The total weight of the aircraft was within limits for the flight and was determined to be 423 lbs below the maximum take-off weight limit and maximum landing weight limit of the aircraft.

1.7 **Meteorological Information**

1.7.1 The following information was obtained from the official report by the South African Weather Services (SAWS):

(i) Satellite image

A high pressure system was dominant to the south of South Africa, that pushed moisture and low clouds into eastern and north-eastern parts of South Africa (including KZN, Mpumalanga Lowveld and Highveld, Limpopo Lowveld and

Highveld, and as far as central Gauteng and eastern Freestate). With a surface inversion and weak surface winds over the Mpumalanga Highveld (840 hPa), the low clouds got trapped and covered the Drakensberg Mountains/Mpumalanga escarpment. IFR conditions lasted for most of the day and the escarpment remained closed.

(ii) Surface data

No cloud group was included in the Graskop SYNOP, but the Hoedspruit SYNOP showed an overcast layer (8/8 octas of clouds) at 300-599 m cloud base at 06:00 UTC. Precipitation was recorded at Graskop of 6.4mm and Hoedspruit 9.4mm.

The wind direction at Hoedspruit of 60o and 5 knots with the winds picking up in speed as the day progressed.

METARs

Station: Graskop

68287 16/// /2604 10122 20118 38614 48547 56015 60064 333 20121 91008 555 10216 20062 91023=

Station: Hoedspruit

68290 11460 80605 10157 20121 39228 48567 56020 60094 70522 885// 333 20151 91006 555 10221 20090 91023=

Station: Nelspruit

68289 36/// /0605 10174 20129 39200 48563 55000 333 20173 91009 555 10175 91022=

On the surface observation (METARs), the winds also showed NE component at 4-5 knots for Kruger/Nelspruit with a scattered cloud layer at 1000 feet and overcast layer at 1500 feet at 05:00 UTC. The cloud base settled as a solid overcast layer at 2000 feet at 09:00 UTC.

Looking at the Google Earth image below, with the Accident site indicated at 5495 feet and the cloud tops reaching around 7000 feet, which imply that the escarpment was covered in the low clouds.

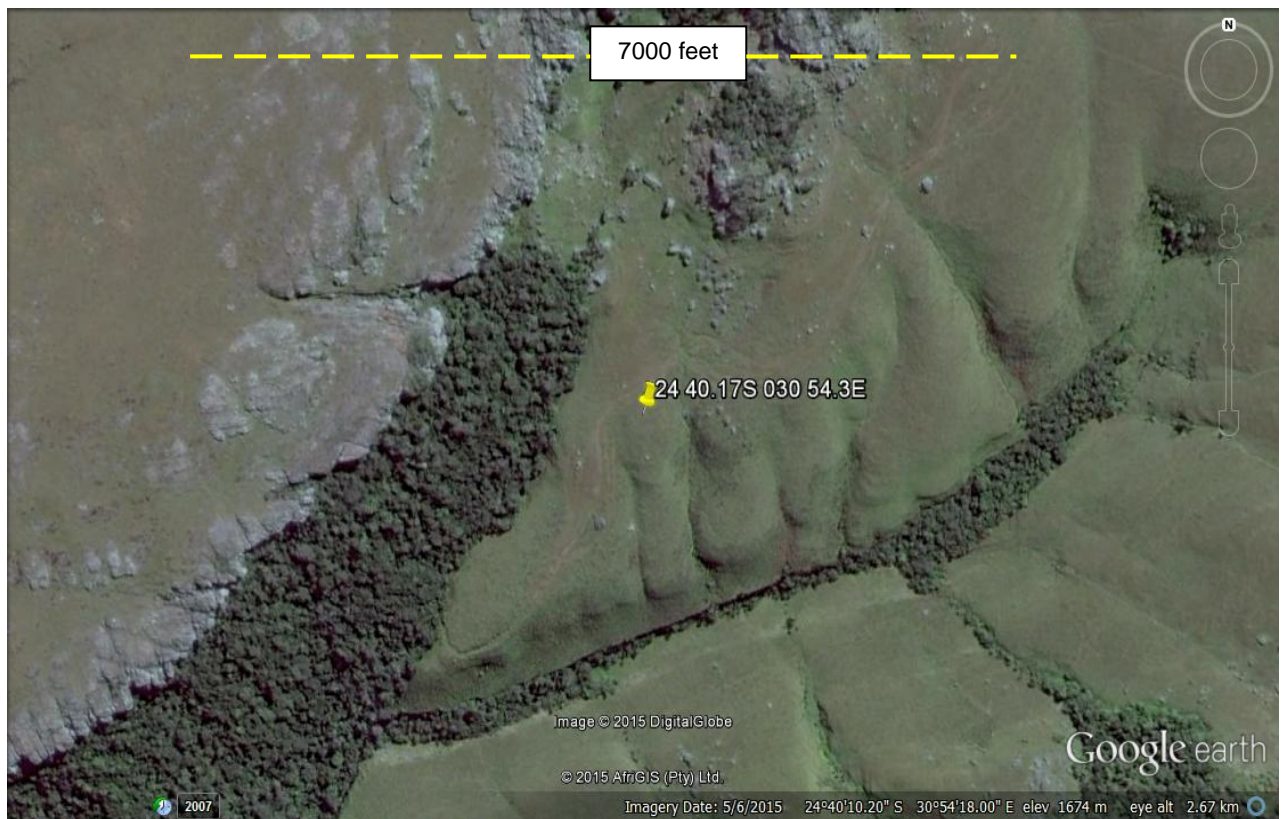


Figure 5: Google Earth image and cloud height in the area.

(iii) Vertical wind and temperatures profile

The Irene/Pretoria (68263) upper air ascent of 00:00 UTC showed an isotherm at 820-840 hPa, while King Shaka Intl. (68592) showed similar conditions with moisture up to 800 hPa. This 800 hPa was also the level at which the top of the clouds reached. Translating the 800 hPa to feet, one reach 7200 feet/above mean sea level.

The S to SE winds at King Shaka/Durban pushed the clouds from the coast, up the escarpment and onto the Highveld (with the low level winds at Irene/Pretoria also showing this component, with few/scattered clouds reported at 900 feet over OR Tambo Intl. at 04:00 UTC).

This also further proves the fact that that the escarpment was fairly closed with clouds on this particular day.

The clouds had an average base of 1500-2000 feet/above ground level throughout the day and went up to 7200 feet/above mean sea level. Earlier the morning, over the escarpment the clouds could have dropped to as low as 900-1000 feet/above ground level in the valleys and therefore obscuring the mountain tops.

1.8 Aids to Navigation

1.8.1 The aircraft was equipped with approved navigational aids. No defects to the navigational equipment were reported or recorded prior to the accident flight.

1.8.2 The aircraft had a Garmin Aera 500 GPS on board. The GPS was sent for downloading and it was found that the track log on the Garmin Aera 500 GPS was switched off a few of months ago, therefore no track log data were available. The

pilot used an Apple tablet for navigation purposes but it was destroyed during to the accident.

1.9 Communications

1.9.1 The aircraft was equipped with the approved communications equipment. No defects to the communication equipment were reported or recorded prior to the accident flight.

1.10 Aerodrome Information

1.10.1 The aircraft accident occurred outside the boundaries of an aerodrome on the Motlatse Canyon Provincial Nature Reserve in Graskop, Mpumalanga. The GPS coordinates of the accident site position are S24° 40.267 E030° 54.720 at 5207 feet elevation.

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.

1.11.2 The aircraft was also fitted with a VIRB action camera which recorded part of the flight.

The following video and audio footage was observed:

- The aircraft flew in IMC conditions whilst it was a VFR flight.
- The pilot made multiple changes in direction and altitude without declaring his intentions on the airways (radio).
- When entering IMC, he did not attempt to cancel VFR and contact Lowveld Area for IFR instructions.
- The pilot was at all times during the recording, in control of the aircraft.
- The pilot did not fly around the clouds for the sake of maintaining VFR flight.

1.12 Wreckage and Impact Information

1.12.1 The wreckage path indicated that the aircraft impacted the ground in a left wing low attitude where after the right wing impacted the ground and part of it broke off. The main wreckage location was approximately 160m from the first point of impact.

1.12.2 The following damage was found:

- The damage sustained to the propeller indicated that the engine had power at the time of the impact sequence. The propeller broke from the engine and was found approximately 58 metres from the main wreckage.
- The engine broke from the fuselage and was found approximately 15 metres away.
- The fuselage including the cabin was destroyed.
- The cockpit area and forward part of the cabin was completely destroyed.
- Both wings of the aircraft were destroyed during the impact sequence. The outboard part of the right wing broke away from the wing.

- Both wing tanks disintegrated during the crash.
- The nose landing gear broke from the fuselage and both main landing gear sustained severe damage.



Figure 6: View of aircraft wreckage

1.13 Medical and Pathological Information

1.13.1 The post mortem report was not available at the time of submitting this report. Should the result indicate that medical reasons was a factor, the results will be considered and this report will be reviewed.

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 magnitude of the deceleration forces experienced when the aircraft impacted the ground.

1.15.2 Although the pilot on board the aircraft was secured by the aircraft's seatbelts the seats broke out of their attachments during the impact sequence.

1.16 Tests and Research

1.16.1 None

1.17 Organizational and Management Information

1.17.1 The last mandatory periodic inspection (MPI) was carried out by an approved AMO

1.17.2 This was a privately owned aircraft and was privately operated.

1.18 Additional Information

1.18 1 None

1.19 Useful or Effective Investigation Techniques

1.19.1 Not required.

2. ANALYSIS

2.1 On the morning of Friday, 16 October 2015 the pilot took off in a Beech Bonanza F33A aircraft, ZS-MRM from Wonderboom Airport on a private flight with the intention of landing back at Wonderboom Airport. The pilot indicated to ATC that the aircraft had 5 hours fuel endurance for the flight.

2.2 Part of the flight was recorded by an on board VIRB action camera which indicated that whilst flying through the Blyde River Canyon, the pilot intentionally flew in IMC conditions whilst it was a VFR flight. He did not fly around the clouds for the sake of maintaining VFR flight. He made multiple changes in direction and altitude without declaring his intentions on the airways (radio) and was in control of the aircraft at all times during the recording. When entering IMC, he did not attempt to cancel VFR and contact Lowveld Area for IFR instructions. The recording unfortunately stopped minutes before the accident.

2.3 The investigator is of the opinion that the objective of the pilot was to get great video footage of the clouds and the Blyde River Canyon. Whilst he was enjoying the flight and scenery, he lost any situational awareness of the terrain when the aircraft impacted the plateau of the mountain with the aircraft's belly in a slight left wing low attitude.

2.4 After no contact with the pilot and not reporting for duty to work on Friday, the South African Search and Rescue Organization initiated a search where after the wreckage was only found on Sunday afternoon, 18 October 2015 at approximately 1430Z. The pilot sustained fatal injuries during the accident.

3. CONCLUSION

3.1 Findings

3.1.1 The pilot was the holder of a valid commercial pilot licence and had the aircraft type endorsed on his licence.

3.1.2 The pilot was the holder of a valid aviation medical certificate issued by an approved medical examiner.

3.1.3 There was sufficient fuel on board the aircraft at the time of the accident.

- 3.1.4 The weight and balance of the aircraft were below the maximum allowable limits for the aircraft.
- 3.1.5 All control surfaces were accounted for, and all damage to the aircraft was attributable to the severe impact forces.
- 3.1.6 There was no evidence of any defect or malfunction in the aircraft that could have contributed to the accident.
- 3.1.7 Propeller blade damage was consistent with the engine producing power at impact.
- 3.1.8 Low lying clouds were prevalent in the area where the accident occurred consequently weather conditions played a significant role in the accident.
- 3.1.9 The pilot flew in IMC conditions whilst it was a VFR flight. The pilot did not fly around the clouds for the sake of maintaining VFR flight.
- 3.1.10 The pilot made multiple changes in direction and altitude without declaring his intentions on the airways (radio).
- 3.1.11 When entering IMC, he did not attempt to cancel VFR and contact Lowveld Area for IFR instructions.
- 3.1.12 The pilot was at all times in control of the aircraft whilst the video recording was activated.

3.2 Probable Cause/s

- 3.2.1 The pilot's disregard of safe flying procedures whilst flying in low lying clouds and misjudgement of the aircraft's proximity to terrain, which resulted in a controlled flight into terrain.

3.3 Contributory Factor/s:

- 3.3.1 Intentional flying in IMC conditions during a VFR flight.

4. SAFETY RECOMMENDATIONS

- 4.1 None

5. APPENDICES

- 5.1 None.

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