AIRCRAFT ACCIDENT REPORT SUMMARY

				Reference:	CA18/2/3/8194		
Aircraft Registration	**ZS-JYB**	**Date of Accident**	10 October 2006		**Time of Accident**	1316Z	
Type of Aircraft	Beech Bonanza V35B		**Type of Operation**		Private		
Pilot-in-command Licence Type	Commercial		**Age**	44	**Licence Valid**	Yes	
Pilot-in-command Flying Experience	Total Flying Hours		1493.9		Hours on Type	1493.9	
Last point of departure	Cato Ridge Aerodrome						
Next point of intended landing	New Tempe Aerodrome						
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
Drakensberg mountain in Underberg area at altitude of approximately 8878 ft at GPS position: S29˚ 40” 00’ E029˚ 10” 00'							
Meteorological Information	Temperature 4˚C. Wind: 090˚ / 4kts. Cloud: 8 Oktas. Cloud base: 500 feet AGL						
Number of people on board	1 + 2	**No. of people injured**	0	**No. of people killed**	1 + 2		

Synopsis

On 09 October 2006, the pilot, accompanied by a passenger, flew from New Tempe to Bethlehem, landed and then took off again with destination Cato Ridge where they landed at 0800Z. Although cloudy conditions prevailed at the aerodrome, the pilot intended to fly back to Bloemfontein shortly after he landed at Cato Ridge but was advised by a person (witness who is also a pilot) not to fly back as at that stage the weather conditions were deteriorating. The pilot advised the witness that the aircraft was IFR-equipped but nevertheless agreed not to fly back.

The next day, on 10 October 2006, the pilot re-activated an IFR flight plan for the flight back from Cato Ridge to Bloemfontein. The pilot accompanied by 2 passengers, departed from Cato Ridge at approximately 1030Z. According to the same witness mentioned above, the weather conditions had improved but scattered clouds were still observed towards the Drakensberg area.

The aircraft failed to arrive at New Tempe Aerodrome at Bloemfontein and a Search and Rescue was coordinated by the South African Search and Rescue Organisation (SASAR).

The aircraft wreckage was located in the Drakensberg, north of Underberg on 11 October 2006. The aircraft was destroyed during the high impact forces and the post-impact fire that erupted. All the occupants were fatally injured during the accident.

Probable Cause

Controlled flight into terrain by the pilot flying a direct course with destination as New Tempe at an altitude insufficient to ensure adequate terrain clearance, notwithstanding last-minute attempts to remain clear of terrain.

IARC Date		Release Date	

AIRCRAFT ACCIDENT REPORT

Name of Owner/Operator	**:** R H Glemius
Manufacturer	**:** Beech
Model	**:** V35B
Nationality	**:** South African
Registration Marks	**:** ZS-JYB
Place	**:** Drakensberg mountain in Underberg-area at altitude of approximately 8878 ft at GPS position: S29˚ 40” 00’ E029˚ 10” 00'
Date	**:** 10 October 2006
Time	**:** 1316Z

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 SACAA, which are reserved.

1. FACTUAL INFORMATION

1.1 History of Flight

1.1.1 On 09 October 2006, the pilot, accompanied by a passenger, flew from New Tempe to Bethlehem. At Bethlehem two aircraft maintenance engineers joined the flight to Cato Ridge. The aircraft then took off again with destination Cato Ridge, where they landed at approximately 0800Z. According to witnesses, cloudy conditions prevailed at Cato Ridge at the time of the landing. The pilot intended to fly back to Henneman later the day.

1.1.2 At 1234Z the pilot filed a VFR flight plan with the filter centre at the Air Traffic and Navigation Services (ATNS) for a flight initially to Henneman, but then changed the destination to Welkom. The flight level was filed for FL080.

1.1.3 Family members who collected the pilot and his friend from the aerodrome brought them back to the aerodrome in the afternoon and the pilot, his mother and a friend boarded the aircraft. The witnesses describe the weather at the time as being overcast with low cloud in the vicinity of the aerodrome.

1.1.4 A witness, who is a microlight aircraft instructor, informed the investigators that he was in his office the afternoon of 9 October 2006 when he heard the engine of the aircraft started. Concerned about this, he proceeded to the aircraft to see who would attempt to fly in such poor weather conditions. Reaching the aircraft, he saw the pilot and passengers in the aircraft ready for the flight. He proceeded onto the

aircraft's wing and opened the door. He warned the pilot that the cloud base was far too low to even perform a safe take-off from the runway, as only part of the runway was visible. The pilot responded that he was the holder of an instrument-rating and that the aircraft was equipped for IFR-conditions. The witness nevertheless warned him that it was not safe for flight and closed the door. The witness told the investigators that he returned to his office and heard the engine stop a while later. The pilot and his passengers then stayed overnight with family members.

1.1.5 The next morning, on 10 October 2006 at 0458Z, the pilot refilled the flight plan, changing the destination to New Tempe Aerodrome and the time of departure to 0530Z. The pilot and his two passengers were again taken to the aerodrome by family members and they boarded the aircraft. The family members said that some concerns were discussed about the weather conditions over the mountains in the distance, but the conditions at the aerodrome were fine with scattered cloud cover towards the mountains in the North-West. The pilot assured them that the conditions would be fine for the flight. The aircraft then taxied out and the take-off appeared to be normal by the observation of the family members, however it appeared to them that the undercarriage did not retract, but they were not sure about this. The aircraft turned onto a Southerly heading and they lost sight of it.

1.1.6 The aircraft was identified on radar at 1032Z at 3300 ft as it was joining the Durban Terminal Movement Area (TMA) on a heading of 210°M. The aircraft was initially routed towards the South of the Pietermaritzburg control area and at 1039Z the controller cleared the pilot to route directly to his destination as per the flight plan. The aircraft was tracked on radar as maintaining an altitude of approximately 7700 feet and at 1053Z the pilot was instructed to contact Johannesburg ACC East.

1.1.7 According to the radar recording and a GPS–download, the aircraft maintained the altitude and flight path from when it was established on it, until the last few minutes of the flight when the GPS- download indicated a turn to the right. It would appear that at that time the pilot had sight of terrain and had deviated from his IFR flight plan to remain clear of terrain. The flight path indicated a flight up a valley which was the followed by a left turn with initiation of a high rate of climb. Shortly thereafter the aircraft impacted the mountainside.

1.1.8 The aircraft failed to arrive at New Tempe Aerodrome at Bloemfontein and a Search and Rescue was coordinated by the South African Search and Rescue Organisation (SASAR). The aircraft wreckage was eventually located at the Drakensberg, North of Underberg on 11 October 2006. It was destroyed during the severe impact forces and the post impact fire that erupted. All the occupants were fatally injured during the accident.

1.1.9 The accident happened during daylight conditions at a time when the mountainside was covered with clouds.

1.2 Injuries to Persons

Injuries	Pilot	Crew	Pass.	Other
Fatal	1	-	2	-
Serious	-	-	-	-
Minor	-	-	-	-

None	-	-	-	-

1.3 Damage to Aircraft

1.3.1 The aircraft was destroyed during the impact forces and post-impact fire.

1.4 Other Damage

1.4.1 Negligible damage was caused to the environment.

1.5 Personnel Information

Nationality	South African	Gender	Male	Age	44
Licence Number	**********	Licence Type	Commercial		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Instrument and Night Rating				
Medical Expiry Date	31-01-2007				
Restrictions	Hearing aid requirement				
Previous Accidents	None				

Flying Experience: The information does not include hours flown on the day of the accident.

Total Hours	1493.9
Total Past 90 Days	67.7
Total on Type Past 90 Days	46.7
Total on Type	1493.9

1.6 Aircraft Information

Airframe:

Type	Beech V35B	
Serial Number	D9975	
Manufacturer	BEECH	
Year of Manufacture	1977	
Total Airframe Hours (At time of Accident)	1520.8	
Last MPI (Date & Hours)	02-02-2006	1427.5
Hours since Last MPI	93.3	
C of A (Issue Date)	17-02-1977	
C of R (Issue Date) (Present owner)	05 –01-2006	
Operating Categories	Standard	

Engine :

Type	Continental IO-520-BA
Serial Number	562610
Hours since New	1427.5

Hours since Overhaul	N/A

Propeller:

Type	McCauley 3A32C76-S-M
Serial Number	768219
Hours since New	574.10
Hours since Overhaul	N/A

1.7 Meteorological Information

1.7.1 The South African Weather Services' Meteorological Report provided the following information:

1.7.1.1 Weather Conditions at time of the accident:

Surface Analysis (1200Z) on 10 October 2006
A frontal system was present just north of Maputo and the high pressure system behind it was feeding moist air into the Eastern Cape and KwaZulu-Natal.

Upper Air Analysis
At 500hpa winds were south-westerly over KwaZulu-Natal with a high pressure system over the central part of the country.

1.7.1.2 Weather Conditions in the vicinity of the accident site:

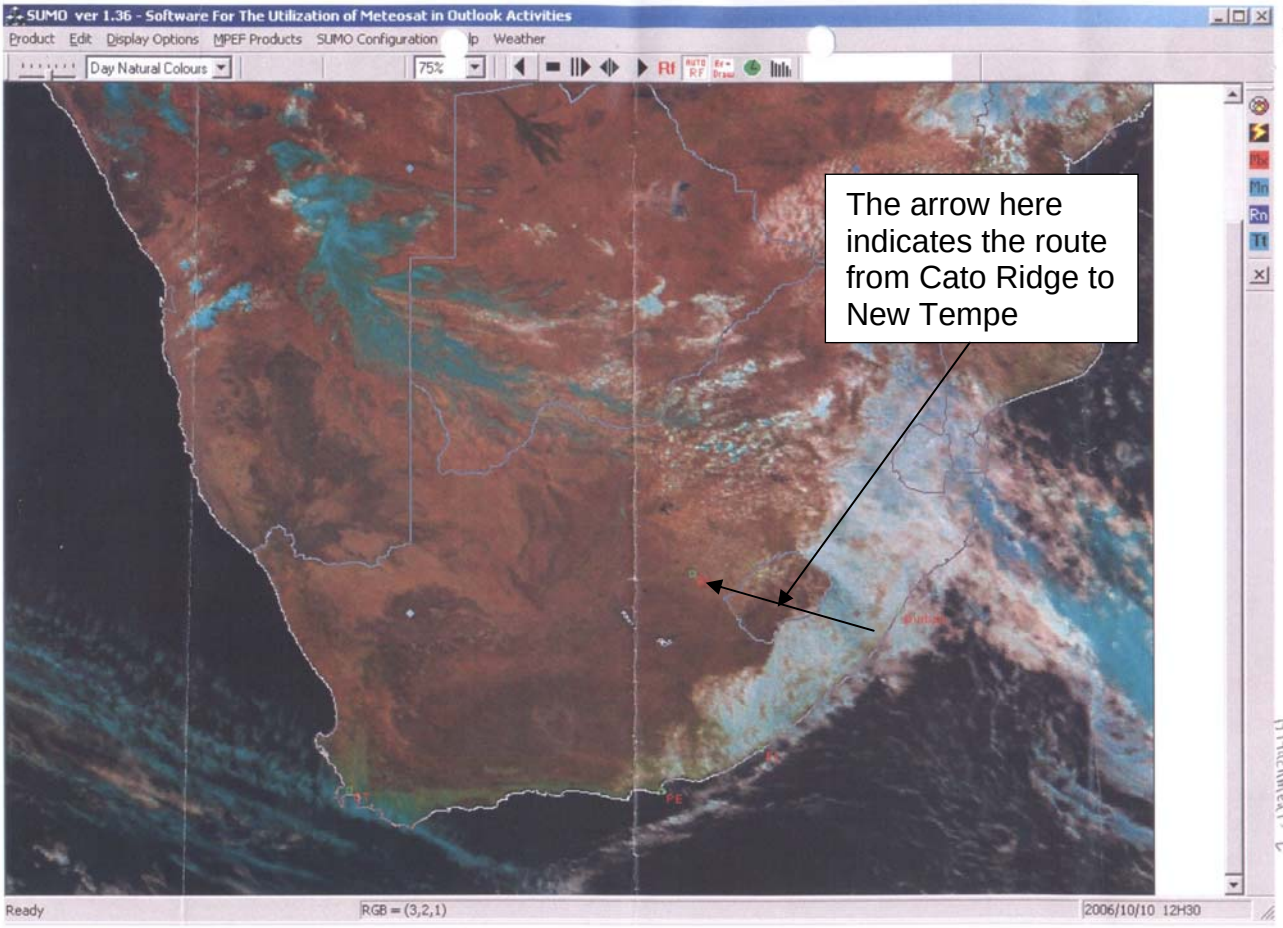
The high pressure system behind the cold front was feeding moist air in over KZN, causing cloudy conditions over the province. The 1200Z TAF for Durban indicate moist air up to 11 700 ft above sea level. The general weather over KZN was cloudy with a very low cloud base.

No official observations are available at the time and place of the accident. The most likely conditions at the place of the accident were:

Time : 1230Z
Temperature: 4.0 °C
Wind Direction and speed: 090 TN 05KT
Cloud (AGL): 8 Oktas of Cloud base 500 ft AGL.

1.7.1.3 Satellite Imagery:

The satellite imagery indicates cloudy conditions over KZN.



One can observe from the image above and the track inserted that the area to the East of the Drakensberg where the accident scene was, was covered with cloud to approximately the same altitude as the mountain tops.

1.7.2 Witnesses interviewed in the Drakensberg area at the foot of the mountains where the accident site was, all indicated low cloud conditions during most of the day of the accident.

1.8 Aids to Navigation

1.8.1 The aircraft was fitted with standard navigational equipment certified for this type of aircraft and suitably equipped for IFR-flights. There were no ground-based navigational stations in the area of the accident site, either. It appeared that the pilot used the GPS-unit to navigate as no aeronautical maps were recovered from the accident scene, however several approach charts were recovered of the aerodromes he would likely have visited (Bloemfontein, Durban, etc).

1.9 Communications.

1.9.1 Prior to takeoff, the pilot was given a telephonic clearance and once airborne communicated with the ATC on frequency 119.1 MHz.

1.9.2 However, the approach frequency, 119.1 MHz, was giving problems with ATC unable to transmit at times. Technicians were tending to the problem.

1.9.3 To maintain separation with other traffic, ZS-JYB was vectored by ATC to route south of FAPM before being cleared to assume a direct heading to destination and was advised “no reported traffic at FL080”.

1.9.4 ZS-JYB was handed to FAJS ACC East on 129.1MHz and on establishing contact was advised “No reported traffic FL080, report the Maseru TMA”.

1.9.5 Monitoring of the progress of ZS-JYB ceased with the aircraft 32nm on R275 from PMV.

1.9.6 There was no further contact with the ATC and no distress messages were received by ATC or any other traffic.

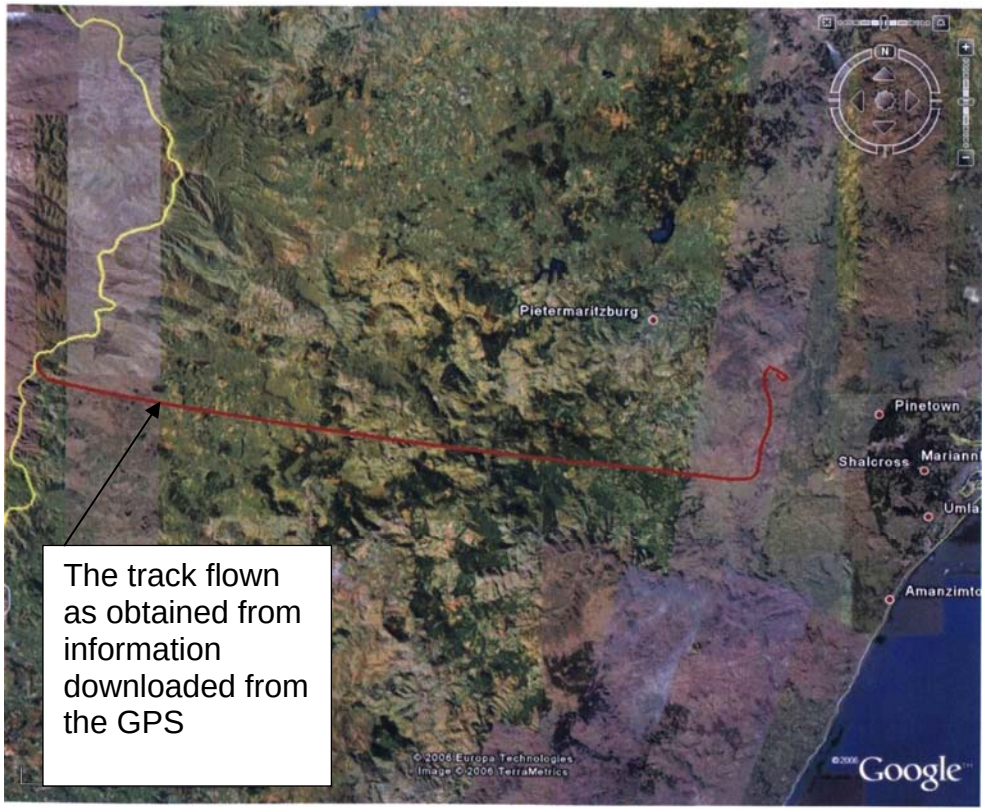
1.10 Aerodrome Information

1.1 Not applicable

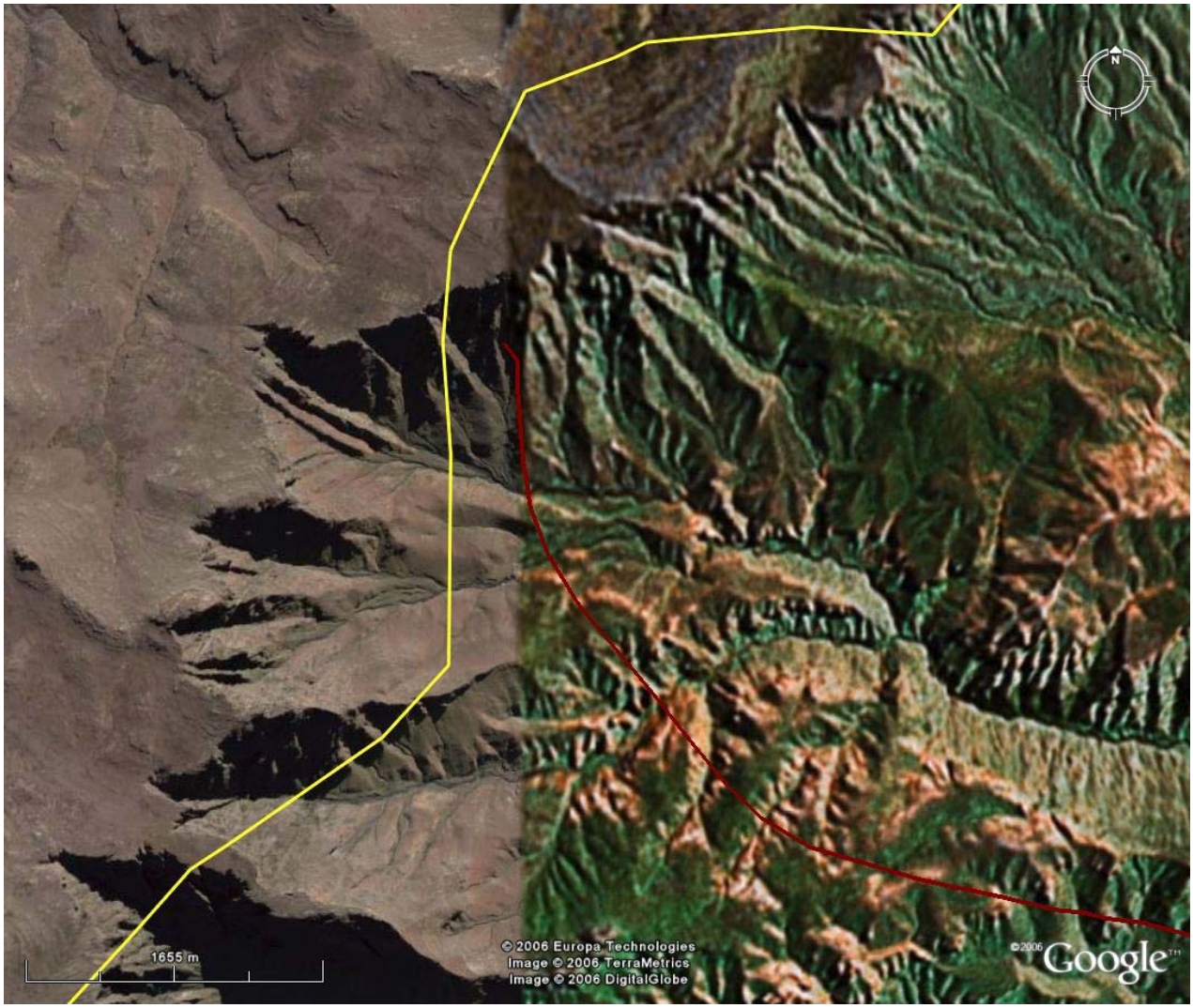
1.11 Flight Recorders

1.11.1 The aircraft was not fitted with flight recorders nor was it required by regulation.

1.11.2 During the on-site investigation, a Garmin 296 GPS was recovered in the vicinity of the main wreckage. The GPS was forwarded to the French Bereau Encartes (BEA) to download any recorded track information that might be available on the non-volatile memory of the unit. The BEA was able to download the aircraft’s track from take-off to impact. The following picture is a depiction of the aircraft’s track superimposed onto the area map obtained from the Google Earth database:



1.11.3 When the last part of the flight track was enlarged, the following picture was produced:



From the above picture it can be observed that the aircraft made a turn to the right in the last part of the flight and in the last four seconds of the flight entered a left climbing turn to the point of impact.

1.12 Wreckage and Impact Information

1.12.1 According to the GPS-information, the aircraft impacted the terrain at an altitude of 8957 ft (2707m) whilst in a climbing turn and with a reduction in groundspeed.

1.12.2 Impact occurred on the southern ridge of a valley with raising ground which offered no escape or turn-around options for the pilot.

1.12.3 It could not be determined whether impact occurred within IMC or VMC conditions.

1.12.4 Impact occurred with a lower-than-cruising airspeed whilst climbing, implying that the pilot was attempting to avoid raising terrain.

These images show the position of the wreckage and surrounding terrain

1.12.5 The engine separated from the airframe and was substantially damaged from a high-energy type impact event into the terrain.

1.12.6 An onsite visual examination suggested that the engine crankcase was fairly intact, fuel component fairly intact, but with starter, vacuum pump and alternator separated.

1.12.7 The exhaust system exhibited ductile deformation (this occurs when the material is still in a high temperature state during impact sequence).

1.12.8 The McCauley propeller separated from the crankshaft flange in overload; the propeller studs were pulled from the hub assembly and threads appeared to be stripped out and remained attached to the studs.

1.12.9 The propeller blades separated from the hub assembly and exhibited twisting, s-bending and leading edge gouging.

1.12.10 The wings and fuselage were destroyed by the impact and post-impact fire.

1.13 Medical and Pathological Information

1.13.1 The body of the pilot was extensively burnt. The cause of death was identified as multiple injuries with extensive fractures and injuries, involving both the upper body and lower body. Histological examination of the organs did not indicate any abnormalities. Chemical examination of a blood sample revealed a carbon monoxide level of 2.9% and blood alcohol level of 0%.

1.13.2 Autopsy findings on the rest of the occupants did not indicate any abnormal aspects.

1.14 Fire

1.14.1 A post impact fire erupted and the aircraft centre fuselage and wings were destroyed by the fire. The source of ignition was not determined, but was ascribed to the probability of electrical arcing after the impact when the area was sprayed with fuel due to the explosive impact of the wings and fuel tanks.

1.15 Survival Aspects

1.15.1 Due to the damage to the aircraft and injuries sustained, the accident was not survivable.

1.16 Tests and Research

1.16.1 No further tests and research were deemed necessary.

1.17 Organisational and Management Information

1.17.1 This was a flight operated by the pilot in his private capacity.

1.17.2 Processing of a filed flight plan.

The flight plan is received by a clerk in the ATNS filter centre with little aviation operational knowledge and who would not query the information provided by the filer of the flight plan. The emphasis is on the provision of all the required information. It remains the responsibility of the pilot to ensure that the flight can be conducted safely on the intended route. The original flight plan was filed after arrival at Cato Ridge on 9 October with the ATNS filter centre for a flight directly to Henneman, which was then changed to Welkom. However, this flight plan was never activated by the pilot. On the morning of 10 October the pilot again phoned the filter centre and requested to re-file the flight plan but now with destination New Tempe with a departure time of 0530Z.On acceptance of a flight plan, the air traffic services unit receiving the flight plan or any changes is obligated to check it for compliance with the format, data conventions, check it for completeness and to indicate acceptance of the flight plan or change thereof to the originator. There is no obligation to verify the acceptability of the route and height to be flown as defined by the pilot-in-command.

1.17.3 The classification of airspace with reference to the route to be flown

After becoming airborne, ZS JYB joined the FADN TMA at 1032Z and was vectored to remain clear of the FAPM CTA due to other IF-traffic. This airspace is classified as Class G – airspace in which IFR-flights and VFR-flights are permitted and all such flights receive flight information services, if requested. The aircraft was subsequently cleared to climb to FL080 and to proceed directly to the destination and was handed over to Johannesburg-East Air Traffic Control Centre. Again the clearance was to proceed directly and to call again at Maseru TMA. Refer extract below from the applicable aeronautical maps with ground track imposed.

1.17.4 Planning of the route to be flown.

It is the responsibility of the pilot-in-command to plan the flight to ensure adequate separation with the terrain. Reviewal of the applicable aeronautical maps would have indicated to the pilot that the minimum safe altitude for the route would at least have to have been 12 700 ft agl. Selection of a flight level of 8000 ft would not have ensured adequate terrain clearance on the selected route, i.e. Cato Ridge direct New Tempe.

1.17.5 Air traffic control oversight

Neither air traffic controller expressed any concern that the FL requested by the pilot (FL080) would not provide adequate clearance with terrain for the direct routing that the pilot intended to fly. A more experienced air traffic controller, familiar with the terrain and area, may have advised the pilot to reconsider his requested flight level due to high terrain on the route requested. It is not an obligation on the air traffic controller to advise him on the route or altitude to be flown.

1.17.6 Deviation from IFR flight plan routing.

Reviewing of the GPS flight track indicates that on nearing high terrain the pilot initiated a turn to the right, implying that he must have had sight of the terrain and then deviated from his IFR flight plan to fly VFR to maintain terrain clearance. The track indicates that he then entered a valley with raising ground and appears to have made a climbing turn to the left. It is not known whether he was in a position to have remained clear of cloud during the final seconds of the flight. The aircraft subsequently impacted the raising terrain.

1.18 Additional Information

1.18.1 The SACAA airworthiness department had conducted an audit on AMO no 133 on 15 September 2004 and on 23 September 2005. Both audits indicated no major findings. This AMO had certified maintenance on the applicable aircraft.

1.18.2 The aeronautical charts indicate that the MORA for the area of the Drakensberg was 12 700 feet.

1.19 Useful or Effective Investigation Techniques

1.18.1 The GPS 296 Garmin as found at the wreckage site, was used to download the track and provided the track information as shown below:

2. ANALYSIS

2.1 Whilst flying from Bloemfontein to Bethlehem and then to Cato Ridge, the selection of FL 080 would ensure adequate terrain clearance. However to route directly from Cato Ridge or south of FAPM to New Tempe, the minimum safe altitude would have been to have exceeded at least FL127 as is shown on the relevant aeronautical map.

2.2 The selected FL, as filed with the ATS Unit by the pilot, nominated FL 080 for a flight directly from Cato Ridge to New Tempe.

2.3 The ATS–unit, on receiving a flight plan, will not question the pilot's selected routing or flight level selection, as that remains the prerogative and responsibility of the pilot to ensure a safe flight.

2.4 Weather information provided by the Weather Services indicated that during the day

of the accident, poor weather conditions prevailed on the route as flown.

2.5 A flight at FL080 would not have ensured adequate terrain clearance under IMC-conditions.

2.6 The track downloaded from the GPS indicates that at about 13:15:22 the pilot deviated from the IFR-flight and turned north, implying he had sight of the terrain and was attempting to remain clear of terrain in VMC-conditions. (The cloud base was estimated by SAWS to have been about 500 Ft AGL.)

2.7 At about 13:16: 26 the pilot turned up a valley and increased the rate of climb to about 1000 ft/min and turned left either to turn back or remain clear of terrain.

2.8 However, he was unable to avoid impacting terrain.

2.9 The aircraft impacted at an altitude of approximately 8957 feet.

3. CONCLUSION

3.1 Findings

3.1.1 The pilot had a valid pilot's licence and was properly rated for the aircraft type.

3.1.2 The pilot held a valid instrument rating which entitled him to fly IFR in IMC.

3.1.3 The pilot had filed a flight plan of FL080, but in the final minutes of the flight deviated from his IFR-flight and probably flew VFR to attempt avoiding raising terrain, including increasing the rate of climb and turning left.

3.1.4 The aircraft impacted terrain at approximately 8957feet.

3.1.4 To ensure adequate terrain separation for the route flown, the selected IFR FL should have been FL140 or higher.

3.2 Probable Cause/s

3.2.1 Controlled flight into terrain by the pilot flying a direct course with destination as New Tempe at an altitude insufficient to ensure adequate terrain clearance, notwithstanding last-minute attempts to remain clear of terrain.

4. SAFETY RECOMMENDATIONS

4.1 The SACAA should in its safety promotions programme, safety seminars and other method of information distribution, make pilots aware of the danger of flying without proper planning of the selection of routes and altitudes. The limitation of GPS-information and dangers of relying solely on GPS-information without taking safe altitudes in consideration should be emphasised.

5. APPENDICES

5.1 Appendix A; Downloaded data of final moments of flight.

Report reviewed and amended by Advisory Safety Panel.

18 November 2009

Down Loaded GPS Data: **Last Minutes of flight** **ZS-JYB**

Appendix A:

Position	Time	Altitude m	Feet	Height Change Ft	Leg Length m	Height m	Leg Time	Leg Speed kmp	MPH	Hdg Course	Rate of climb
S29 43.506 E29 16.602	10/10/2006 13:13:24	2568	8425	0	881	2890	00:00:15	211	131	284° true	
S29 43.400 E29 16.057	10/10/2006 13:13:39	2571	8435	3	900	2953	00:00:15	216	134	283° true	
S29 43.266 E29 15.422	10/10/2006 13:13:56	2570	8432	-1	1100	3609	00:00:17	223	139	284° true	
S29 43.163 E29 14.892	10/10/2006 13:14:10	2575	8448	5	874	2867	00:00:14	225	140	283° true	
S29 43.037 E29 14.240	10/10/2006 13:14:27	2573	8442	-2	1100	3609	00:00:17	228	142	283° true	
S29 42.868 E29 13.437	10/10/2006 13:14:48	2570	8432	-3	1300	4265	00:00:21	228	142	284° true	
S29 42.682 E29 12.601	10/10/2006 13:15:10	2575	8448	5	1400	4593	00:00:22	228	142	284° true	
S29 42.553 E29 12.155	**10/10/2006 13:15:22**	2572	8438	-3	757	2484	00:00:12	227	141	289° true	
S29 42.445 E29 11.955	10/10/2006 13:15:28	2569	8428	-3	379	1243	00:00:06	227	141	302° true	
S29 42.328 E29 11.814	10/10/2006 13:15:33	2573	8442	4	315	1033	00:00:05	227	141	314° true	
S29 42.144 E29 11.640	10/10/2006 13:15:40	2576	8451	3	441	1447	00:00:07	227	141	320° true	
S29 41.638 E29 11.179	10/10/2006 13:15:59	2583	8474	7	1200	3937	00:00:19	227	141	322° true	
S29 41.462 E29 11.057	10/10/2006 13:16:05	2584	8478	1	381	1250	00:00:06	229	142	329° true	
S29 41.300 E29 10.992	10/10/2006 13:16:10	2578	8458	-6	319	1047	00:00:05	229	142	341° true	
S29 41.130 E29 10.961	10/10/2006 13:16:15	2580	8465	2	318	1043	00:00:05	229	142	351° true	
S29 40.892 E29 10.949	10/10/2006 13:16:22	2580	8465	0	442	1450	00:00:07	228	142	358° true	0