

AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/9574	
Aircraft Registration	ZS-FAI	Date of Accident	13 October 2016		Time of Accident	1010Z
Type of Aircraft	Piper PA-28-235		Type of Operation	Private Part 91		
Pilot-in-command Licence Type	Private Pilot (PPL)		Age	67	Licence Valid	Yes
Pilot-in-command Flying Experience	Total Flying Hours	619.0		Hours on Type	619.0	
Last point of departure	Manzengwenya Airfield KwaZulu-Natal (KZN) Province					
Next point of intended landing	Brakpan-Benoni (FABB) Gauteng Province					
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)						
Jozini in KwaZulu-Natal at GPS coordinates : S27° 18'.32' & E032° 15.55' at 203 feet AMSL						
Meteorological Information	Surface Wind: Calm; Clouds: SCT018 BKN018; Cloud base:1800ft AGL; Precipitation: Drizzling.					
Number of people on board	1 + 1	No. of people injured	0	No. of people killed	2	
Synopsis	<p>On 13 October 2016 at approximately 0915Z, the private pilot (PPL) accompanied by a passenger who were both German Nationals, took off from Manzengwenya airfield in KwaZulu-Natal on a private flight to Brakpan-Benoni aerodrome (FABB) in Gauteng. The chef at the lodge that transported the pilot and passenger to the aircraft stated that the pilot requested him to activate his "Go Pro" camera for him whilst he was busy with the pre-flight inspection and secured the baggage in the aircraft. The pilot also requested him to wait at the airfield for approximately 30 minutes after they took off, in case he elected to turn back to the Manzengwenya airfield. However, en-route to Brakpan-Benoni aerodrome, the aircraft was involved in an in-flight breakup in instrument meteorological conditions (IMC) in the vicinity of the Jozini dam in KwaZulu-Natal near the Mozambique border at GPS coordinates: S2718'.32" & E032 15.55". The pilot and the passenger were fatally injured during the accident sequence. The aircraft was destroyed by a post impact fire that erupted following impact with the ground.</p> <p>The investigation revealed that the pilot entered into IMC conditions and subsequently became disorientated and lost control of the aircraft. In an attempt to regain control the left wing separated due to upward static overload which led to an inflight break up.</p>					
Probable Cause						
The pilot entered into IMC conditions and subsequently became disorientated and lost control of the aircraft. In an attempt to regain control the left wing separated due to upward static overload which led to an inflight break up.						
SRP Date	13 February 2018		Release Date	27 February 2018		



AIRCRAFT ACCIDENT REPORT

Name of Owner : Trade A Plane CC
Name of Operator : Private
Manufacturer : Piper Aircraft Corporation
Model : PA-28-235
Nationality : Germany
Registration Marks : ZS-FAI
Place : Jozini in Kwa-Zulu-Natal at GPS S27° 18.32' E032° 15.55'
Date : 13 October 2016
Time : 1010Z

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 blame or 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 13 October 2016 at approximately 0915Z, the private pilot (PPL) accompanied by a passenger who were both German Nationals, took off from Manzengwenya airfield in KwaZulu-Natal on a private flight to Brakpan-Benoni aerodrome (FABB) in Gauteng. The chef at the lodge that transported the pilot and passenger to the aircraft stated that the pilot requested him to activate his personal "Go Pro" camera for him whilst he was busy with the pre-flight inspection and securing the baggage in the aircraft. The pilot also requested that the chef wait at the airfield for

approximately 30 minutes after they took off, in case he elected to turn back to the Manzengwenya airfield.

- 1.1.2 However, at approximately 1010Z, en-route to Brakpan-Benoni aerodrome, the aircraft was involved in an in-flight breakup in IMC conditions in the vicinity of the Jozini dam in KwaZulu-Natal near the Mozambique border at GPS coordinates: S2718'.32" & E032 15.55".
- 1.1.3 The pilot and the passenger were fatally injured and the aircraft was destroyed during the accident and by impact and post impact fire.
- 1.1.4 Witnesses at Jozini in KwaZulu-Natal stated that the aircraft made a loud noise and saw debris falling from the sky.
- 1.1.5 The aircraft impacted the ground in a nose down attitude where after a post impact fire erupted that subsequently destroyed the main wreckage and engine.
- 1.1.6 According to available information obtained from the South African Weather Services, the weather indicated "Drizzle" at the accident site with the temperature 17°C and cloud base at 1800ft AGL and it was IMC.
- 1.1.7 The pilot and the passenger, who were both German citizens, were scheduled to depart South Africa back to Germany the day after the accident occurred. The accident happened at Jozini in KwaZulu-Natal at GPS coordinates: S27 18'.32' & E032 15.55' at 203ft AMSL

1.2 Injuries to Persons

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

1.3 Damage to Aircraft

1.3.1 The aircraft was destroyed during accident by impact and post impact fire.



Figure 1: Wreckage of the aircraft destroyed by impact and post-impact fire

1.4 Other Damage

1.4.1 None

1.5 Personnel Information

Nationality	Germany	Gender	Male	Age	67
Licence Number	0272577826	Licence Type	PPL Validation		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	None				
Medical Expiry Date	14 April 2017				
Restrictions	Corrective lenses				
Previous Accidents	None				

1.5.1 The pilot was issued with the South African Validation Licence from 16 August 2016 to 15 August 2021.

1.5.2 In accordance with the South African Civil Aviation Authority, the “Validation of Foreign Licence” of the German pilot was valid at the time of the accident. He had flown a total of 619.0 flying hours on the aircraft type. He was however, not in possession of a valid instrument rating.

1.5.3 According to the Aircraft Operator, the pilot had flown the Piper PA28-235 aircraft on the following dates as stipulated below:

1. 24 September 2016: The pilot flew the aircraft on an introductory flight for 1.6 hours with South African maps and an airfield directory on board the aircraft.
2. 25 September 2016: The pilot flew the aircraft for 1.2 hours where after he passed his proficiency test satisfactorily in all aspects and was issued with a South African rating.
3. 26 September 2016: The pilot accompanied by a safety pilot and a passenger took off from Brakpan airfield (FABB) to a private airstrip, north of Brits. The route flown from FABB was as follows: Petit airfield (FARA), Zynkraal, Kitty Hawk (FAKT) and Brits (FABS) were followed with touch and go landings performed at FARA, Zynkraal and FAKT.
4. 27 September 2016: The pilot accompanied by a safety pilot and a passenger, took off at 0900Z from Kunkuru private airstrip on a private flight to several airfields in the Waterberg region. Runway inspections were performed during the flights.
5. 28 September 2016: The pilot again accompanied by a safety pilot and passenger took off from Kunkuru private airstrip on a private flight to several airfields in the Waterberg region. Similarly the runway inspections were briefed and performed, this was the last day the pilot was accompanied by a safety pilot. To this date the pilot had accumulated 9.1 hours of the flight time.
6. 29 September 2016: The pilot accompanied by the passenger departed from Kunkuru private airstrip on an uneventful flight to Madikwe.
7. 04 October 2016: The pilot accompanied by the passenger took off from Hanaline airfield via Polokwane international Airport (FAPP) which was uneventful.
8. 06 October 2016: The pilot and the passenger took from Hanaline Boerdery airfield to East gate airfield (FAHS) which was uneventful.
9. 09 October 2016: The pilot and the passenger planned to fly to Manzegwenya airfield via Kruger International Airport (FAKN) which was uneventful.
10. 10 October 2016: The pilot and the passenger took off from FAKN to Manzegwenya private airstrip which was uneventful.
11. 11 and 12 October 2016: No flights planned due to adverse weather conditions around the area.

1.5.3 Flying Experience:

Total Hours	619.00
Total Past 90 Days	11.46
Total on Type Past 90 Days	11.46
Total on Type	619.00

1.6 Aircraft Information

1.6.1 Airframe:

Type	Piper Cherokee PA-28-235	
Serial Number	28-10906	
Manufacturer	Piper Aircraft Cooperation	
Year of Manufacture	1967	
Total Airframe Hours (At time of Accident)	7830.0	
Last MPI (Date & Hours)	20 June 2016	7794.0
Hours since Last MPI	36	
C of A (Issue Date)	08 August 2014	
C of A (Expiry Date)	07 August 2017	
C of R (Issue Date) (Present owner)	15 March 2010	
Operating Categories	Standard part 91	

1.6.2 Engine:

Type	Lycoming O-540-E4B5
Serial Number	L-6480-40C
Hours since New	7824.0
Hours since Overhaul	471.1

1.6.3 Propeller:

Type	Hartzell HC-C3YR-1RF
Serial Number	PA 897B
Hours since New	436.0
Hours since Overhaul	TBO not reached

1.7 Meteorological Information

1.7.1 The following weather information is obtained from the South African Weather Services (SAWS):

Wind direction	Nil	Wind speed	Calm	Visibility	IMC
Temperature	17°C	Cloud cover	BKN018	Cloud base	1800ft
Dew point	15°C				

1.7.2 According to available information obtained from the South African Weather Services, the weather indicated “Drizzle” at the accident site with the temperature 17°C and cloud base at 1800ft AGL.

1.8 Aids to Navigation

1.8.1 The aircraft was equipped with standard navigational equipment as required by the Regulator. There were no defects to navigational equipment reported prior to the flight.

1.9 Communications.

1.9.1 The aircraft was equipped with standard communication equipment as required by the Regulator. There were no recorded defects to communication equipment prior to the flight.

1.10 Aerodrome Information

1.10.1 The aircraft took off from the private airstrip in Manzengwenya in KwaZulu-Natal.

Aerodrome Location	Manzengwenya	
Aerodrome Co-ordinates	S27° 15' 34.8" E032° 45' 08.4"	
Aerodrome Elevation	2953 feet AMSL	
Runway Designations	03	21
Runway Dimensions	900m x 15m	900m x 15m
Runway Used	21	
Runway Surface	Asphalt	
Approach Facilities	Nil	

Note: The pilot took off from Manzengwenya airfield that was an unmanned airfield with no Flight Plan filed.

1.10.2 The accident happened at Jozini in KwaZulu-Natal at GPS coordinates: S27° 18.32' E032° 15.55" at 203 feet AMSL

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

1.12 Wreckage and Impact Information:

1.12.1 The main wreckage was located in the backyard of a homestead at the GPS coordinates of S27° 18.543' & E032° 15.916'. The main wreckage consisted of the engine and fuselage with the right-hand wing still attached to the main wreckage. The left wing was located 584.03m and the vertical stabilizer located 412.78m from the main wreckage. The horizontal stabilizer and part of the tail section were located 445.77m from the main wreckage.

1.12.2 The main wreckage (fuselage) impacted the ground in a nose down attitude followed by a post impact fire that erupted. The left-hand wing tip, the horizontal and vertical stabilizers were located at different areas from the main wreckage.

1.12.3 Examination of the aircraft wreckage revealed signatures consistent with the inflight break-up of the aircraft. Debris of the aircraft wreckage was found scattered in different locations around the accident area. The map below indicates the wreckage distribution path plotted with all the debris which is indicative of an in-flight break-up.

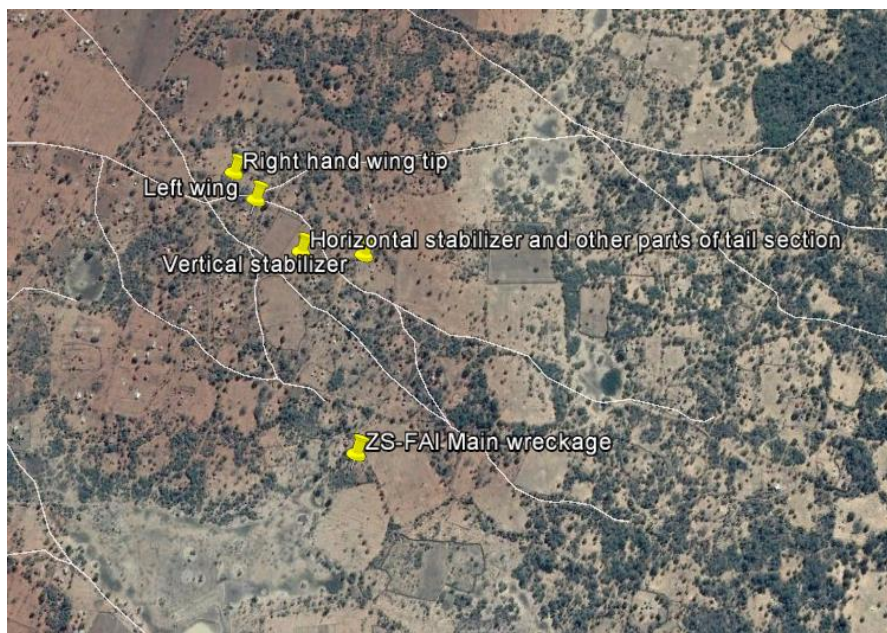


FIGURE 2 SHOWS THE WRECKAGE PLOT AFTER THE A/C BREAK-UP IN FLIGHT

- 1.12.5 The wreckage was recovered from the accident site in order to conduct a detailed examination of the failure modes and to determine whether the in-flight break-up was caused by any mechanical failure. All fracture surfaces and tear lines on the wing section and the aileron were consistent with overload failures. No evidence of any pre-existing deficiency such as fatigue fractures or corrosion were found.



Figure 2: Shows the left-hand wing that separated from the a/c

1.13 Medical and Pathological Information

- 1.13.1 According to the post-mortem report, the cause of the death for both occupants was determined to be multiple blunt force injuries and burns.
- 1.13.2 The results of the toxicology were not yet available at the time of completion of this report. If the findings of the toxicology report have a significant impact on the cause of this accident the report will be reopened.

1.14 Fire

- 1.14.1 There was evidence of a post impact fire which destroyed the aircraft.

1.15 Survival Aspects

- 1.15.1 The accident was considered not survivable due to the failure of the cabin and cockpit structure resulting in the fatal injury to the occupants.

1.16 Tests and Research

1.16.1 The engine tear down was conducted by an Approved Aircraft Maintenance Organisation (AMO) engine overhaul facility in the presence of the investigator. The AMO report concluded that the engine was operating as required, see Appendix 1 below.

1.17 Organizational and Management

1.17.1 This was a private flight.

1.17.3 The private pilot who was a German National flew the aircraft on an introductory flight of 1.6 hours and was also familiarized with South African maps. He also flew the aircraft where after he passed the proficiency test and was issued with a South African Validation.

1.18 Additional Information

1.18.1 As the pilot was restricted to Visual Flight Rules (VFR), which refers to the navigation and control of the aircraft, visual reference to the ground and the natural horizon were very important during the flight.

1.18.2 The aircraft entered IMC conditions, it was structurally overloaded leading to an inflight breakup, the possibility exists that the pilot became disorientated in IMC conditions.

Human Physiology (The Editors of Encyclopedia Britannica-Date accessed: 06 December 2017)

<https://www.britannica.com/science/spatial-disorientation> :

The inability of a person to determine his true body position, motion, and altitude relative to the earth or his surroundings. Both airplane pilots and underwater divers encounter the phenomenon.

Most clues with respect to orientation are derived from sensations received from the eyes, ears, muscles, and skin. The human sensory apparatus, however, is often not delicate enough to perceive slow and gradual changes in motion; also, when motion changes are abrupt, the sense organs tend to overestimate the degree of change. Spatial disorientation in aircraft can arise from flight situations or visual misinterpretation. Banks and turns often create false sensations. When turning gradually, a pilot may feel as though he were on a straight course but ascending; when a turn is corrected, the impression is that of descending. If the plane banks or ascends or descends slowly, the pilot may not perceive the change, and the plane will feel level to him. If the plane skids while turning, the sensation is one of being banked in the direction opposite from the skid. A reaction called "leans" is caused by level flight after a rapid roll; the inertia of the roll causes the body to lean in a direction opposite to the direction of turning even after the motion of the roll has been stopped. If the pilot rapidly looks downward while turning, the so-called Coriolis effect

occurs, in which the plane feels as though it is descending. The usual reaction of the pilot is to pull back on the stick to raise the plane. In a spin, the illusion of nonmotion is created if the spin is continued long enough; when the pilot corrects the spin, he has the feeling of spinning in the opposite direction, and his natural reaction is to counter his corrective measures and go back into the original spinning pattern. This phenomenon is known as the "graveyard spin." The "graveyard spiral" results when the sensation of turning is lost in a banked turn. Because the pilot's instruments show that he is losing altitude, he may pull back on the stick and add power, thus inducing a spiral motion. The oculogyral illusion is created by acceleration and turning: a turning target watched by a pilot while turning himself appears to move faster than it is actually going; it may appear to continue to turn even after the pilot has stopped his motion and the target has stopped. Another illusion is caused by forward acceleration: when a pilot takes off from land, the increased speed gives the impression of nosing the plane too high; to compensate the pilot may lower the nose and dive back to the ground. During a rapid deceleration the nose of the plane appears to drop; if the pilot corrects this feeling by trying to gain more altitude, the plane stalls and goes into a spin. The gravitational forces on a pilot cause the oculoagravic illusions: a target watched by a pilot appears to rise if weightlessness occurs and appears to fall when gravity is increased.

1.18.3 **IN-FLIGHT BREAKUP**

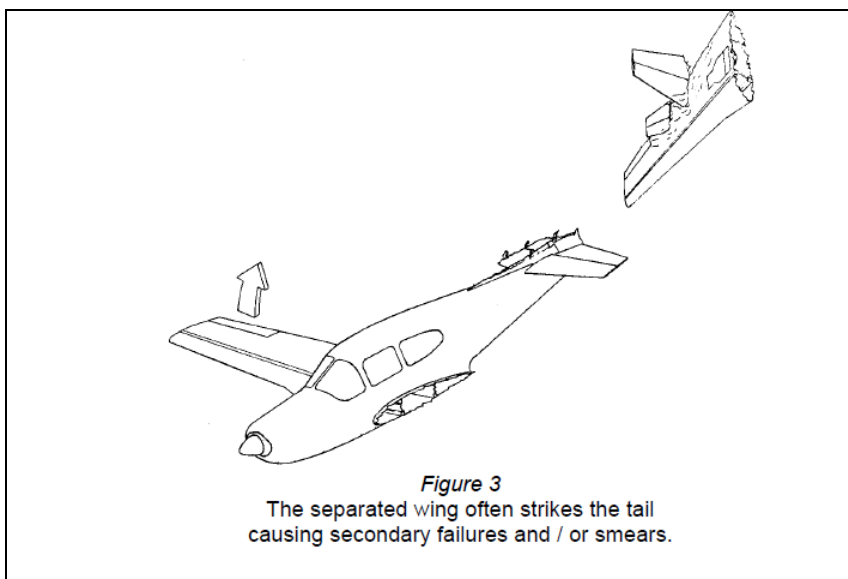
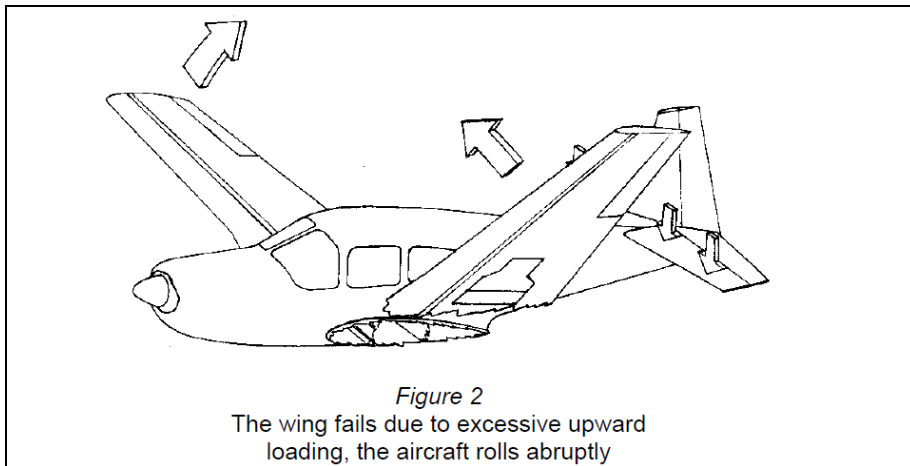
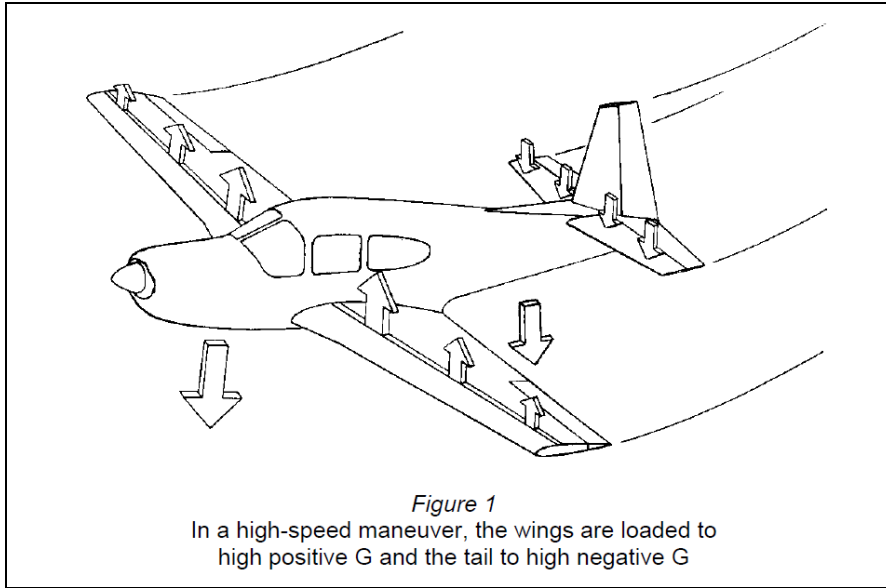
The following information is extracted from an ICAO manual of aircraft and incident investigation:

Sequence of failure

When a structural part or component fails in flight, generally a chain of events is started during which other parts or components fail. In a high speed manoeuvre, the wing load becomes high positive (up bending) and the balancing tail load becomes high negative (down bending). If the loading is excessive either the wing will break off in an upward direction or the tail will break off in an upward direction or the tail will break off in a downward direction. These circumstances will cause secondary failure.

Wing first sequence

When the wing fails first due to upward static overload the separated wing will bend up and back over the fuselage. At the same time the unbalanced lift from the opposite wing causes rapid roll acceleration with the side of the aircraft missing its wing rotating downward. In some instances, the roll rate is rapid enough to cause a torsional failure in the empennage. The separated wing often impacts the tail surfaces causing matching impact marks and smears between the broken off wing and the leading edges of the tail. The impact with the tail may be severe enough to cause secondary failures in the tail structures.



Wing first characteristics

If the wing fails in flight, it will most often bend upward and break off with characteristic instantaneous overload signatures. The rapid rolling may then cause the broken off wing piece to strike the tail leaving mutual indentations and smears. The tail may also then fail as a secondary effect.

1.19 Useful or Effective Investigation Techniques

1.19.1 None

2. ANALYSIS,

- 2.1 The private pilot was a Germany national issued with a valid South African validation after he flew an introductory flight and passed his proficiency test. He was accompanied by a passenger on a private flight from Manzengwenya airfield in KwaZulu-Natal to Brakpan-Benoni aerodrome (FABB) in Gauteng. The aircraft accident occurred at the Jozini area in KwaZulu-Natal near the Mozambique border at the GPS coordinates of S2718'.32" & E032 15.55".
- 2.2 The pilot's aviation medical certificate was valid with the medical expiry date being 14 April 2017 with the restriction of corrective lenses.
- 2.3 The pilot was returning to Johannesburg as he was scheduled to fly back to Germany the next day. Though he had requested the Chef at his departure air field to wait 30 minutes as he may return due to bad weather, it is the opinion of the investigators that he pressed on regardless of the weather.
- 2.4 According to available maintenance records, the aircraft was properly maintained with the last Maintenance Periodic Inspection (MPI) carried out on 20 June 2011. No defect or malfunctions were reported that could have contributed to the cause of the accident.
- 2.5 The aircraft certification documents issued by the Regulator were examined and found to be valid.
- 2.6 The weather was a contributing factor and according to available information obtained from the South African Weather Services, the weather indicated "Drizzle" at the accident site with the temperature of 17°C and cloud base at 1800ft AGL which the pilot was not rated for.
- 2.7 The aircraft entered IMC conditions and the pilot most probably became disoriented. As a result, the structure of the aircraft was over stressed resulting in an inflight break-up. Disorientation occurs when there are insufficient visual cues to determine orientation. The sense of balance is extremely unreliable and depending on the circumstances of the flight may provide erroneous information to the pilot. Because of the pilots disorientation his input on the controls would have put the aircraft in an unusual attitude and in an attempt to correct the attitude the aircraft was overstressed.

- 2.8 The main wreckage with the right wing and engine still attached, impacted the ground in a nose down attitude. The left wing failed first and was located 584.03m from the main wreckage. The vertical stabilizer was located 412.78m from the main wreckage. The horizontal stabilizer and part of the tail section were located 445.77m from the main wreckage. The wreckage distribution is indicative of an inflight break-up.
- 2.9 The investigation revealed that the pilot entered IMC conditions and subsequently became disorientated, putting the aircraft in an unusual attitude. In an attempt to correct the attitude he overstressed the aircraft structure which led to an inflight break up.
- 2.10 The pilot and passenger sustained fatal injuries and the aircraft was destroyed.

3. CONCLUSION

3.1 Findings

- 3.1.1 The pilot had a foreign licence validation and was properly rated on the aircraft. The pilot total flying hours at the time of the accident were approximately 619.0 hours on fixed wing aircraft.
- 3.1.2 The pilot was not instrument rated
- 3.1.3 It is the opinion of the investigators that the pilot pressed on in an attempt to get to Johannesburg so as not to miss his flight back to Germany the following day.
- 3.1.4 The aircraft entered IMC conditions and the pilot became disorientated.
- 3.1.5 The weather was a contributing factor and according to available information obtained from the South African Weather Services, the weather indicated “Drizzle” at the accident site with the temperature of 17°C and cloud base at 1800ft AGL.
- 3.1.6 The aircraft had a valid Certificate of Airworthiness which was issued on the 08 August 2014 with the expiry date of 07 August 2017.
- 3.1.7 The aircraft was a Hire and Fly (private operation) aircraft at the time of the accident.
- 3.1.8 There were no reported defects of the aircraft during and before flight.
- 3.1.9 The aircraft impacted the ground in a nose down attitude where after a post impact fire erupted that subsequently destroyed the main wreckage and engine.

3.1.10 The main wreckage with the right wing and engine still attached, impacted the ground in a nose down attitude. The left wing failed first and was located 584.03m from the main wreckage. The vertical stabilizer was located 412.78m from the main wreckage. The horizontal stabilizer and part of the tail section were located 445.77m from the main wreckage. The wreckage distribution is indicative of an inflight break-up.

3.1.11 The aircraft accident occurred in the Jozini area in KwaZulu-Natal near the Mozambique border at the GPS coordinates of S2718'.32" & E032 15.55".

3.1.12 The investigation revealed that the pilot entered into IMC conditions and subsequently became disorientated and lost control of the aircraft. In an attempt to regain control the left wing separated due to upward static overload which led to an inflight break up.

3.2 Probable Cause/s

3.2.1 The pilot entered into IMC conditions and subsequently became disorientated and lost control of the aircraft. In an attempt to regain control the left wing separated due to upward static overload which led to an inflight break up.

4. SAFETY RECOMMENDATIONS

4.1 **Safety Message:** It is important that pilots plan their flights properly by obtain deviation aerodromes and weather information for the areas of take-off, route and landing to ensure that they don't get surprised by weather and should weather be bad, they can land at an aerodrome in their route.

5. APPENDICES

5.1 Engine investigation report.

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20 April 2017

STRIP REPORT FOR ZS-FAI

PA 28-235 SN: 28-10906

ENGINE LYCOMING O-540 SERIES

Engine and propeller collected from Richards Bay.

Propeller and engine assemblies sustained serious impact damage.

Engine sump and carburettor destroyed including engine data plate.

Magnetos and engine rear case suffered extensive fire damage.

Propeller removed from engine and engine placed on stands for disassembly.

Engine stripped in presence of SACAA inspectors.

Cylinders removed and crankcase parted, all parts inspected and found satisfactory, apart from obvious impact/ fire damage.

From what we can see there is no reason to believe that this engine failed in flight.

.....
(Signature)

D. DAVIS

ENGINE SHOP MANAGER

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