

AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/9510	
Aircraft Registration	ZU-RON	Date of Accident	30 December 2015		Time of Accident	0430Z
Type of Aircraft	Aeroprakt		Type of Operation	Private (Part 94)		
Pilot-in-command Licence Type		National Pilot	Age	53	Licence Valid	Yes
Pilot-in-command Flying Experience		Total Flying Hours	877.68		Hours on Type	540
Last point of departure		Vygeboom Dam private airstrip-Mpumalanga Province				
Next point of intended landing		Vygeboom Dam private airstrip-Mpumalanga Province				
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)						
On water channel next to a dam in an area with GPS reading as: (S 25°52'39.57", E 030°37'13.66")						
Meteorological Information		Wind direction: 010°; Wind speed: 01kt; Visibility: 10km; Air temperature: 18°C; Dew point: 15°C; Cloud cover: Sct; Cloud base: 1500ft AGL				
Number of people on board	1+1	No. of people injured	2	No. of people killed	0	
Synopsis		<p>The pilot accompanied by a passenger (his son) was operated a scenic flight over Vygeboom dam in the early hours of the morning. According to the eye witness, during a right hand turn over the dam at a low level, the aircraft was observed completing a 360 degree turn and then flew towards the eastern side of the dam. The aircraft began losing height and impacted first with the ground prior to falling into the water channel. The aircraft was destroyed during the accident sequence. The pilot was seriously injured and the passenger sustained minor injuries.</p> <p>During an investigation the pilot after his medical recovery stated that he could not remember anything regarding the accident sequence. The engine of the aircraft was recovered for further investigation and tests results showed no anomalies.</p> <p>The investigation revealed that the left fuel tank was run dry resulting on the engine stopping due to fuel starvation.</p>				
Probable Cause						
Unsuccessful forced landing following an inflight engine stoppage due to fuel starvation as a result of the left fuel tank being run dry.						
SRP Date	13 June 2017		Release Date	27 June 2017		

AIRCRAFT ACCIDENT REPORT

Name of Owner : Gemdam Trust
Name of Operator : Gemdam Trust
Manufacturer : Aeroprakt
Model : A-22
Nationality : South African
Registration Marks : ZU-RON
Place : Vygeboom Dam, Mpumalanga
Date : 30 December 2015
Time : 0430Z

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

1.1.1 The pilot accompanied by a passenger (his son) operated a private scenic flight over the Vygeboom dam. According to an eye witness who was standing on the northern west side of the dam area along with other camping personnel, testified to have witnessed the aircraft accident as it occurred. He stated that the aircraft took

off from a place in the north east of the dam at approximately 1 nautical mile and made a right turn over the dam. During a turn the aircraft was then witnessed flying towards the eastern side losing height drastically. The aircraft crashed into the water canal on the eastern side of the dam after making contact with the ground approximately 46 meters before.

1.1.2 According to the statement of the passenger, he recalls the pre-flight whereby the aircraft was refuelled by the pilot. Upon take off, the aircraft operated at a height of approximately 600ft-700ft above ground level (AGL) along the shoreline of the dam. To his recollection, the accident occurred after 4 minutes flight time. After the accident, the passenger removed his seat belt, disembarked the aircraft and attempted to help the pilot however he was struggling to walk. Also (Eye witness 2), who were on the eastern side after noticing the aircraft crashed, began running towards the aircraft in an attempt to rescue the occupants. On arrival they noticed that both occupants were injured and one was still in the aircraft. They helped to move the occupants away from the aircraft.



Figure 1: Shows the google view of the accident site

1.1.3 Relevant parties such as SAPS in the area, Off Road Search & Rescue team from Nelspruit and medical emergency (ER24) service in the area were contacted. On arrival of the police, the accident site was secured; statements of the accident witnesses were taken and submitted to investigation team upon arrival. The medical

service attended to the victims of the accident. The Off Road Site Rescue Team contacted the AIID investigator in charge and requested permission to remove the aircraft from the water canal due to fuel spillage contaminants. Permission was granted with an agreement of having photographic evidence in place before moving the aircraft. On arrival of the accident investigation team, photos of the accident scene were provided with further investigation carried for site overview. The investigator was also informed that approximately a litre of fuel spillage was observed from the damaged left wing tank with the right wing having lot of fuel as the fuel tank was still intact. The occupants were already taken to the hospital via an air ambulance that was deployed from Nelspruit. The aircraft was destroyed during the accident sequence.

1.1.4 The accident occurred in the early hours of the morning, in a daylight meteorological condition in the area next to the dam with GPS co-ordinates: S 25°52'39.32", E 030°37'14.02" and the surface elevation of 3479ft.

1.2 Injuries to Persons

1.2.1 Both occupants of the accident aircraft sustained injuries

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

1.3 Damage to Aircraft

1.3.1 The aircraft was destroyed during the accident sequence.



Figure 2: Shows the aircraft after the accident

1.4 Other Damage

1.4.1 Fuel spillage causing water contamination. However at the time of arrival of the investigator the evidence of fuel spillage was carried away by the water current. Approximately a litre of fuel was observed dripping from the damaged left fuel tank.

1.5 Personnel Information

Nationality	South African	Gender	Male	Age	53
Licence Number	0279004202	Licence Type	PPL		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	None				
Medical Expiry Date	30 November 2017				
Restrictions	Contact lenses				
Previous Accidents	None				

Flying Experience:

Total Hours	877.68
Total Past 90 Days	42.10
Total on Type Past 90 Days	15.90
Total on Type	540.00

1.6 Aircraft Information

Airframe:

Type	A-22	
Serial Number	142	
Manufacturer	Aeroprakt	
Date of Manufacture	2006	
Total Airframe Hours (At time of Accident)	891.2	
Last MPI (Date & Hours)	50 September 2015	816.1
Hours since Last MPI	30.1	
C of A (Issue Date)	04 September 2016	
C of R (Issue Date) (Present owner)	17 October 2011	
Operating Categories	NTCA Part 24	

Engine:

Type	Rotax 912 ULS
Serial Number	5646288
Hours since New	891.2
Hours since Overhaul	TBO not yet reached

Propeller:

Type	Ivo Medium
Serial Number	263507
Hours since New	377.6
Hours since Overhaul	TBO not yet reached

Note: The aircraft was initially fitted with Keiv prop 263 propeller type model which was removed at aircraft 513.6 hour. The new Ivo Medium adjustable in-flight propeller model was fitted with 0.8hours on 22 May 2012. This was completed with regard to the approved modification M/09/111/E by South African Civil Aviation Authority.

1.6.1 The following information was extracted from the official Aeroprakt website: www.aeropraktaircraft.com

The Aeroprakt A-22 Foxbat is a Ukrainian two-seat, high-wing, tricycle gear ultralight aircraft that was designed by Yuri Yakovlev and is manufactured by Aeroprakt. In the USA the A-22 is referred to as the *Valor*, while in the UK and Australia it is called the *Foxbat*. It has also been marketed as the *Vision*. The Aeroprakt A-22 is supplied either as "ready-to-fly" factory built aircraft, or as a kit, consisting of 152 pieces. The kit can be built in about 500 man-hours. The A-22 meets the definition of an FAI microlight. Aeroprakt of Kiev began design of the A-22 in February 1990, with the first prototype making its maiden flight on 21 October 1996, and a German-certified version entering production in 1999.

The A-22's structure is almost completely all-metal with only the engine cowling, wing fillets and wheel spats being made of composites. The wings and control surfaces are fabric covered. The aircraft has excellent visibility, due to the large amount of glazing, including convex doors that allow the occupants to look straight down. The A-22 uses a 3-axis control system, giving the pilot full control over the aircraft. The A-22 uses flaperons in place of ailerons and flaps, giving a stall speed of 52Kmh (28Kt) with the flaperons fully down. The kit comes with either the 80hp (60kW) Rotax 912UL or optionally the 100 hp (75 kW) Rotax 912ULS.

The engine is liquid cooled, with a dual electronic ignition system. Twin carburetors feed the inlet manifolds, which are heated by the engine coolant; there is no conventional carburetor heat control.

1.6.2 The fuel system description

The information is extracted from the aircraft operating handbook: AEROPRAKT-22LS

The fuel system consists of a tank in each wing with the fuel delivery lines running down behind pillars on either side of the cabin. An ON - OFF selector is fitted in each line, which gives the pilot the option of running the engine from the left, right or both tanks. The fuel lines meet at a T-piece in the centre of the fuselage, with a single line going to the engine. The fuel drain valve is located just downstream of the T-piece. Once in the engine compartment, the fuel is fed to the carburetors via a gascolator, a fuel flowmeter and an engine driven pump.

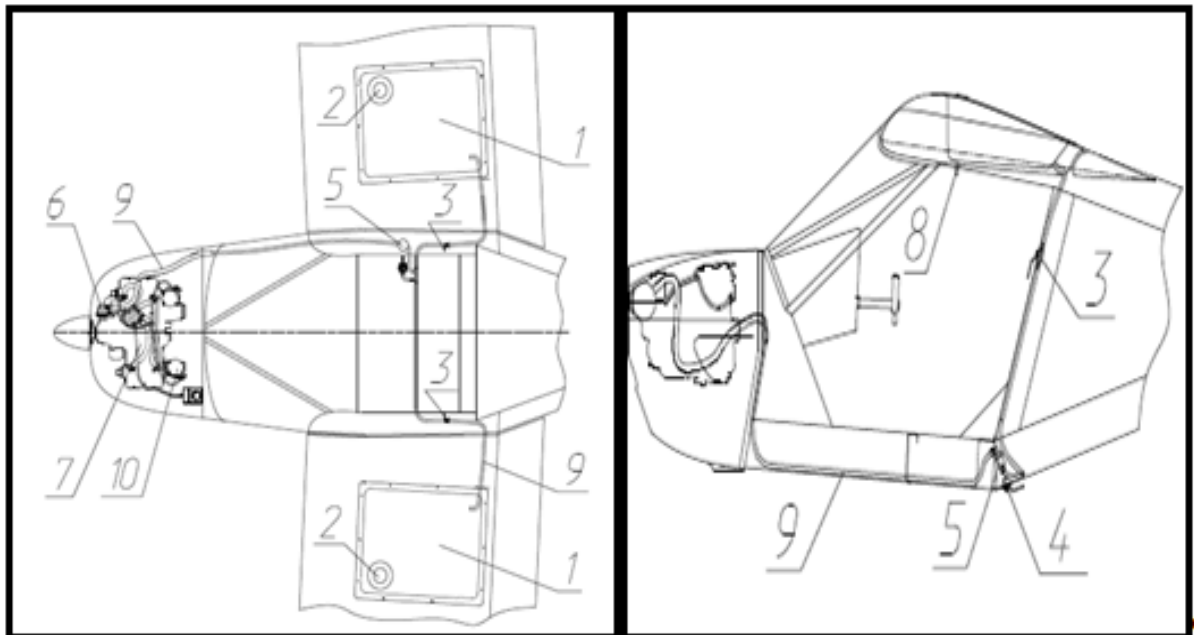


Figure 3: Shows the aircraft type fuel system schematic

(Fig.3) includes two wing fuel tanks 1 (each of 45litres or 11.9 US gal capacity) with filler inlets 2 and fuel lines 9 connecting the tanks to each other and to the engine fuel pump 6 (that is feeding fuel to the engine carburetors 10) via two fuel valves 3 and fuel filter 5. Fuel can be drained from the tanks using the drain valve 4. The fuel tanks are connected with the atmosphere via the vent lines 8.

NOTE: When both tanks are full, fuel may flow from one tank to the other (e.g. due to the lateral forces during side slipping or when wings are not level on parking or during taxiing), overfill it and spill out through the vent line. To prevent this close one of the fuel valves.

CAUTION! At all times during the flight ensure fuel coming to the engine by opening the valve(s) of the tank(s) WITH fuel. If one of the tanks is empty, close its valve to prevent air getting into the fuel line and causing engine malfunction or even failure.

1.6.3 The aircraft documentation such as (maintenance logbooks, service bulletins and latest mandatory periodic inspections) were studied and reviewed. The information provided indicated that the aircraft was maintained in accordance with existing regulatory approved procedures. All service bulletins published by the engine and aircraft manufacturers were adhered to and complied with by the aircraft maintenance organisation (AMO).

1.7 Meteorological Information

1.7.1 Meteorological information as obtained from the official weather centre

Wind direction	010°	Wind speed	01kt	Visibility	9999
Temperature	18°C	Cloud cover	SCT	Cloud base	1500ft
Dew point	15°C				

1.8 Aids to Navigation

1.8.1 The aircraft was equipped with the standard navigational equipment that meets the requirements of the Regulator. There were no recorded defects to navigational equipment prior to flight.

1.9 Communications.

1.9.1 The aircraft was equipped with VHF (very high frequency) radio that meets the requirements of the Regulator. There were no recorded defects regarding the communications equipment prior to flight.

1.10 Aerodrome Information

1.10.1 The accident occurred at Vygeboom Dam on a place with GPS co-ordinates: S 25°52'39.32", E 030°37'14.02" and a field elevation of 3486ft.

1.11 Flight Recorders

1.11.1 The aircraft was not equipped with a flight data recorder or a cockpit voice recorder. Neither recorder was required by the relevant aviation regulations.

1.12 Wreckage and Impact Information

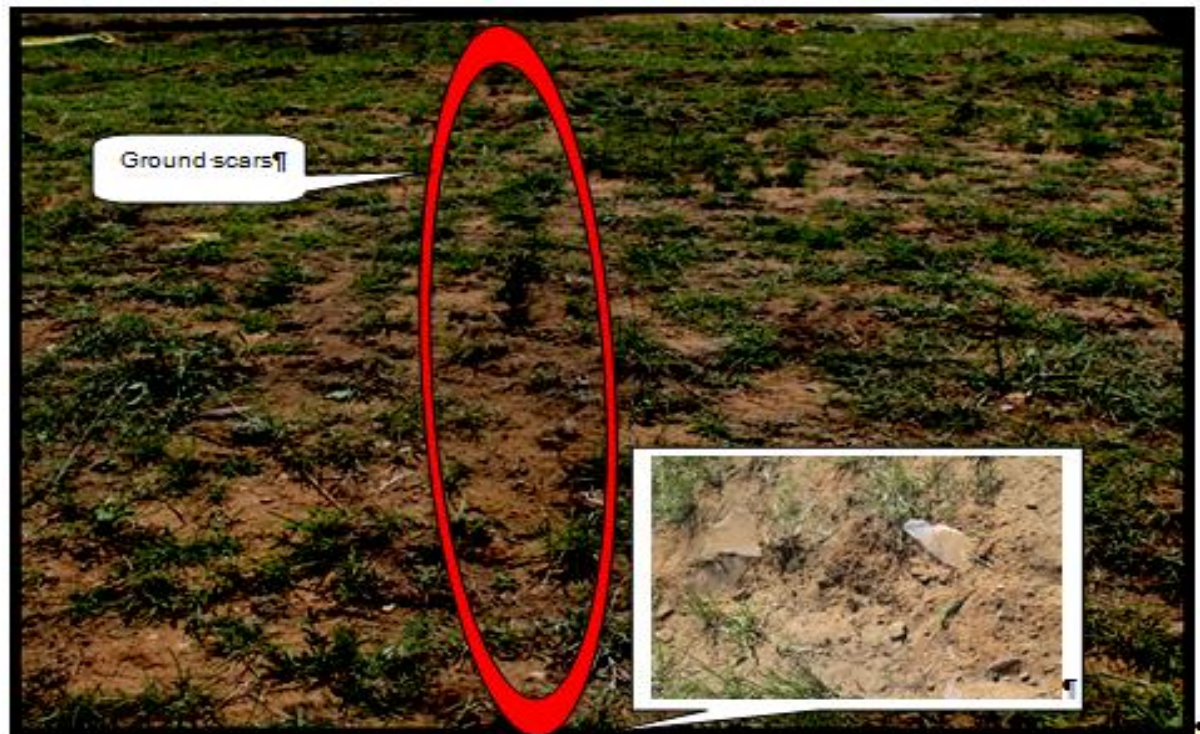


Figure 4: Shows the impact trail

1.12.1 The pilot took off from a private airstrip (prepared grass runway) which is approximately 1 mile north east of the crash point. According to the eye witness, the aircraft came from the north east of the dam and made a right turn over the dam at a low height. During a turn the aircraft engine stopped running and was then observed losing height as it was heading towards the eastern side of the dam. Upon arrival of the Off Road Rescue Unit Nelspruit who responded to the accident site, permission was requested to remove the aircraft from the channel due to fuel spilling into the water causing contamination.

1.12.2 According to the details of the ground impact marks, the initial impact contact with the ground was at a distance of approximately 46 m from the dam and continued

until it fell into a water canal. The aircraft wreckage showed evidence of impact with the right hand wing outer leading edge followed by the nose section. This was in relation with the ground scare marks on the accident site that showed a trail and a position of impact which was in consistence with damages on the wings and the fuselage. The wreckage damage pattern resembled the aircraft that experienced a stall.



Figure 5: Shows damages on the right wing

1.12.3 The ground marks trail suggests that the right wing touched the ground first followed by the nose section which was pushed to the left on impact. Due to the low angle of impact the aircraft after initial impact, continued toward the water channel in which the left wing impacted hard with the concrete wall before turning clockwise and got stuck in between the channel walls. The aircraft remained at rest with its wings hanging on top of the water channel. The fuselage bottom was immersed in the water.

1.12.4 All landing gears detached from the main airframe following the impact sequence. The right main landing gear wheel was found at approximately 84m north of the crash point. Beside the right main landing gear, the other aircraft wreckage was

fairly localised within a radius of approximately 15m.



Figure 6: Right main landing gear



Figure 7: Shows the nose landing gear

The damages on the propeller were in consistent with damages caused when the engine was not under power.



Figure8: Shows fuel pump positions

1.12.5 The observation of the wreckage and the photographic evidence also revealed that the right tank supply line valve was closed whereas the left tank was open during flight. The right hand seat belt (shoulder harness) was in a condition that shows that they were never used during flight whereas the left hand seat belt showed that were used during flight.

1.13 Medical and Pathological Information

1.13.1 The pilot and his passenger were injured during the accident sequence. The pilot was admitted to the hospital due to the severity of his injuries. The passenger sustained minor injuries. The medical helicopter was deployed from Nelspruit which helped to transport the pilot and the passenger after the onsite medical assessment to the hospital. The pilot after health recovery stated that he could not remember anything regarding the accident sequence.

1.13.2 The pilot sustained serious head injuries on his forehead whereas the passenger who was seated parallel to him had minor scratches. These injuries are associated with injuries caused by sudden deceleration of the aircraft resulting from hard impact.

1.14 Fire

1.14.1 There was no evidence pre or post impact fire during the accident.

1.15 Survival Aspects

1.15.1 The accident was considered survivable as damage to the cockpit and cabin area were minimal. Both pilot and passenger used the safety harness fitted in the aircraft.

1.16 Tests and Research

1.16.1 All damages on the aircraft were attributed to as results of the accident sequence. The investigation was focused on the engine and fuel system. The aircraft engine was taken for further investigation purposes.

Examination of the aircraft and systems

The aircraft owner recovered the aircraft. The engine was recovered by South African Civil Aviation Authority-Accident Incident Investigation Department to an appropriate maintenance company, where it was examined. No anomalies were found with the engine and its components

Engine inspection results

According to the Rotax accredited Engineer who is also rated on the engine type maintenance, during a post-accident inspection, the engine's condition did not show evidence of anomalies that could have contributed to the accident. All damages on the engine and engine accessory components were accounted for and attributed to as results of the accident sequence.

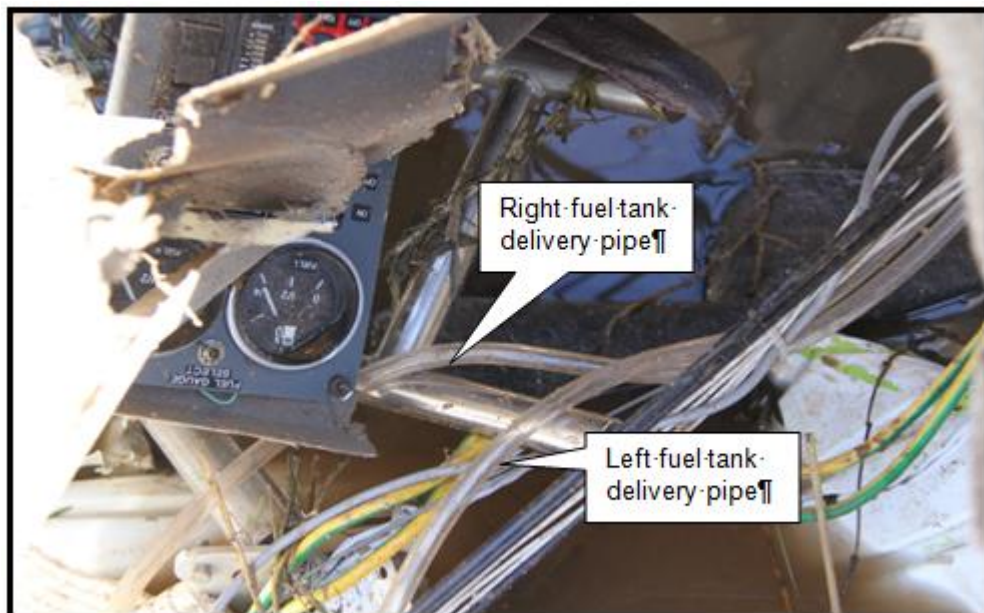


Figure 9: Shows the fuel lines from the fuel tanks

The observation on the fuel pipe lines showed no fuel from both fuel tanks. During investigation, when opening the right hand tank fuel valve, fuel was observed running out of the delivery fuel line in much quantity with no sign of restrictions. The left hand side tank unusable fuel was empty due to damages.

According to post-accident engine inspection, there was no fuel in the engine at the time of inspection. Also during on-site inspection, no fuel was found in the carburettor fuel cups. Less fuel spillage was observed from the left tank which was damaged.

1.17 Organizational and Management Information

1.17.1 This was a private scenic flight. Part 94

1.17.2 The aircraft is privately owned by the pilot in command. It is registered as a Non-Type Certified Aircraft. This type of aircraft although they are registered by South African Civil Aviation Authority, they are regulated Recreation Aviation Administration South Africa.

1.18 Additional Information

1.18.1 During the early investigation follow-up, the passenger who is also the son of the pilot (aircraft owner) did not want to disclose any information with regard to the accident flight. He was not seriously injured during the accident sequence. He then later as per request from the pilot disclosed the information for the Investigator in writing.

1.18.2 Fuel starvation

Fuel starvation is an interruption of fuel flow during operation. Fuel starvation causes internal combustion anomaly. During fuel starvation, fuel is enough however; the supply somehow is interrupted to deliver the required amount of fuel or nothing at all due to restriction by contaminants or wrong selection of fuel tank.

1.19 Useful or Effective Investigation Techniques

1.19.1 None

2. ANALYSIS

2.1 The pilot was qualified, equipped and licensed for the flight with the aircraft endorsed on his license. According to medical certificate which was valid until 30

November 2017, the pilot was medically fit for the flight.

- 2.2 According to the available maintenance records, the aircraft was maintained and equipped in accordance with the approved procedures by the regulator approved person. All damages on the aircraft observed during post-accident investigation were accounted for and attributed to as a result of the accident sequence. The evidence on the damaged propeller blades are in consistence with damages caused when the engine was not under power.
- 2.3 The on-site wreckage examination revealed that there was no fuel in both fuel lines from the fuel tanks and in the carburettor fuel cups. According to the reporting of the Off Road Rescue team personnel and the witnesses who observed the accident, approximately a litre of fuel was observed dripping from the damaged left fuel tank on the left wing. More fuel was found in the non-selected right fuel tank which was still intact with no damages. The tank had enough fuel with no contaminants. During fuel flow continuity test by the investigator on site, when opening the right fuel valve, fuel was observed running through the fuel feed line without restrictions. The post engine inspection revealed that there were no anomalies. No other anomalies were observed regarding the flight controls and any of the aircraft components also.

The investigation concluded that the engine failure was due to fuel starvation as there was enough fuel in the right hand tank during operation but not selected during flight. During starting with pre-flight less fuel was remaining in the left fuel which was enough to start the aircraft until failure during flight. At the time only the left wing tank was selected.

- 2.4 Fine weather conditions prevailed in the area of the accident site and cannot be considered a contributory factor to the accident.
- 2.5 The pilot was not making use of his shoulder harness during flight. He sustained more serious injuries during the accident sequence. He stated during accident follow up three months after health recovery that, he could not remember anything regarding the accident sequence. It is possible that his head injuries contributed to his memory loss conditions.

3. CONCLUSION

3.1 Findings

- 3.1.1 According to the available information, the pilot was licensed, qualified and medically fit for the flight with the aircraft endorsed on his license.
- 3.1.2 During flight the pilot was not wearing his shoulder harness. He sustained serious injuries during the accident sequence.
- 3.1.3 Due to the seriousness of the injuries, the pilot had suffered a memory loss of the accident sequence of events after health recovery as he stated that he could not remember anything regarding the accident.
- 3.1.4 According to the maintenance records, the aircraft was equipped by a regulator approved person.
- 3.1.5 The post engine inspection revealed no anomalies.
- 3.1.6 No fuel was observed on both fuel feed lines from the tanks and carburettor cups during the onsite inspection. Less fuel was observed dripping from the left fuel tank.
- 3.1.7 The on-site observation revealed no anomalies with fuel continuity on the right hand fuel tank during inspection. There was no fuel on the left hand side tank at the time of arrival of the investigator on-site. More fuel was found on the right fuel tank.
- 3.1.8 All damages on the aircraft systems and controls were accounted for and attributed to as a result of impact damages.
- 3.1.9 Weather at the time of the accident prevailed good condition which is unlikely to be considered contributory factor to the accident.

3.2 Probable Cause/s

- 3.2.1 Unsuccessful forced landing following an inflight engine stoppage due to fuel starvation as a result the left fuel tank being run dry.

4. SAFETY RECOMMENDATIONS

4.1 AIID Issued a safety awareness regarding fuel starvation, issued on the 15th November 2016. This document can be accessed on the SACAA website following the link below:

<http://www.caa.co.za/Accidents%20and%20Incidents%20Research%20Articles/Fuel%20Exhaustion%20Management.PDF>.

5. APPENDICES

5.1 None