AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/9075		
Aircraft Registration	**ZU-ODZ**	**Date of Accident**	24 August 2012		**Time of Accident**	1505Z	
Type of Aircraft	Aeroprakt A-22LS		**Type of Operation**		Ferry Flight		
Pilot-in-command Licence Type		Commercial	**Age**	44	**Licence Valid**	Yes	
Pilot-in-command Flying Experience		Total Flying Hours	535.9		Hours on Type	Unknown	
Last point of departure	Gariep dam aerodrome (FAHV), (Free State province)						
Next point of intended landing	Upington aerodrome (FAUP), (Northern Cape province)						
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
Farm Bywater – Niekerkshoop area (Northern Cape province) at GPS position S 29°16'15.8" E 023°03'01.2" .							
Meteorological Information	Wind: 320°/16 gusting 26 knots, Visibility: 10 km, Temperature: 26°C, Dew point: 0°C, Cloud base: Nil						
Number of people on board	1+1	**No. of people injured**	0		**No. of people killed**	1+1	

Synopsis

On 24 August 2012 at approximately 1245Z an Aeroprakt A-22, registration ZU-ODZ with two persons onboard took-off from Gariep dam aerodrome on the second leg of a ferry flight to Upington aerodrome.

At approximately 1510Z the owner of Bywater, a farm in the Niekerkshoop area in the Northern Cape was informed by his farm workers that there is a veld fire on the farm. The farmer then investigated the fire and found the wreckage of the aircraft ZU-ODZ where it impacted high ground at the origin of the veld fire. The farmer then immediately proceeded to the wreckage where he found the pilot deceased and the passenger seriously injured but still alive. The farmer then called for help but the passenger succumbed to his injuries before medical help could arrive.

Apart from the empennage, the remainder of the fuselage was consumed by the post-impact fire.

Probable Cause

In an attempt to avoid collision with raising terrain, the pilot collided with the ground.

Contributory cause
Undetermined engine stoppage in flight.

IARC Date		Release Date	

AIRCRAFT ACCIDENT REPORT

Name of Owner/Operator : African Parks Network
Manufacturer : Aeroprakt
Model : A-22LS
Nationality : South African
Registration Marks : ZU-ODZ
Place : Farm Bywater, Niekerkshoop area, Northern Cape province
Date : 24 August 2012
Time : 1505Z

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 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 On 24 August 2012 at approximately 1245Z, an Aeroprakt A-22LS registration ZU-ODZ, took-off from Gariep dam aerodrome (FAHV) on a ferry flight with the intention to land at Upington aerodrome (FAUP). The ferry flight was conducted under visual meteorological conditions (VMC). The intention of the flight was to deliver the aircraft to the Congo in Central Africa for use by the African Parks Network. This was the second leg of the day, the first leg was from Light Flight aerodrome near Pietermaritzburg in KZN to Gariep dam aerodrome.

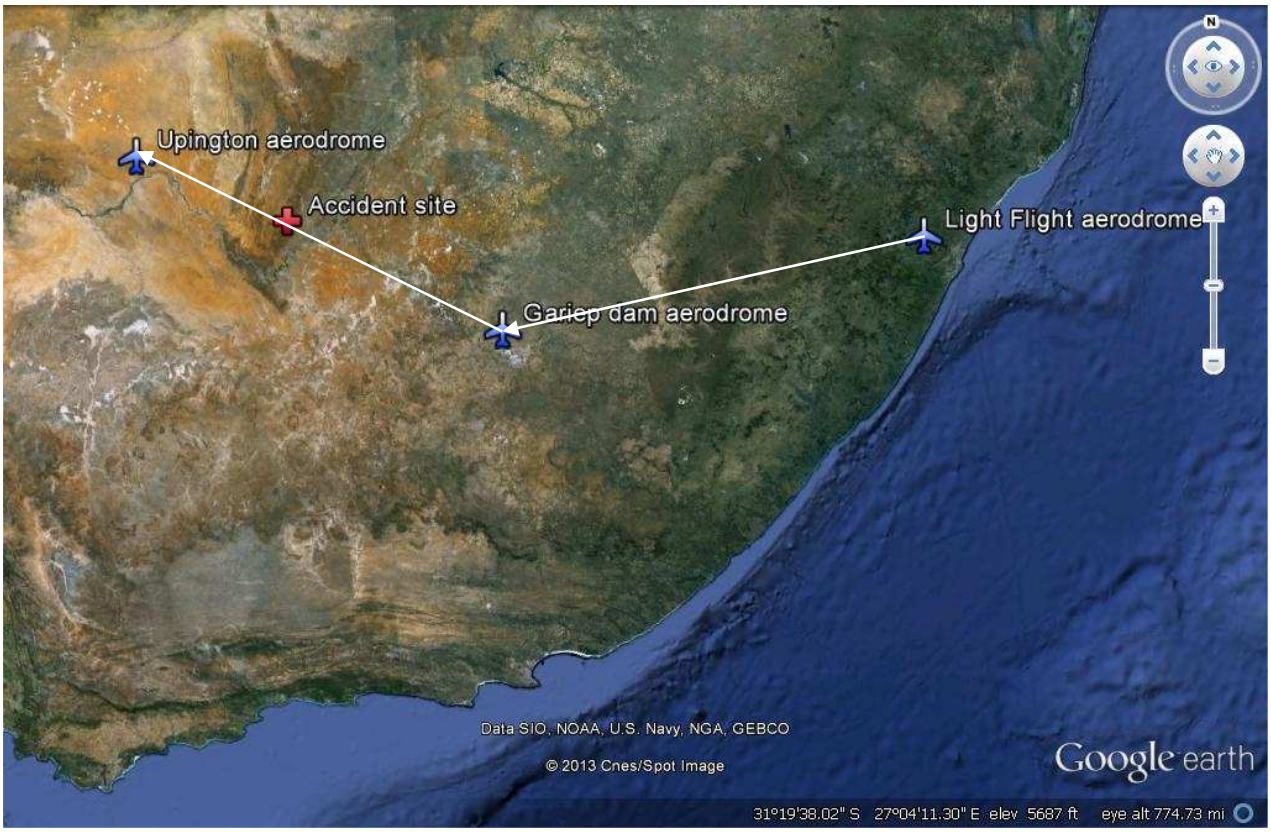

Figure 1 Planned route on the day of the accident

1.1.2 At approximately 1510Z the owner of Bywater, a farm in the Niekerkshoop area in the Northern Cape was informed by his farm workers that there was a veld fire on the farm. The farmer then investigated the fire and found the wreckage of ZU-ODZ at the origin of the veld fire on the slope of a small mountain range.

1.1.3 The farmer then immediately proceeded to the wreckage where he found the pilot deceased and the passenger seriously injured but still alive. The farmer then called a qualified medical sister for help which arrived on scene approximately 20 minutes after the call but the passenger succumbed to his injuries.

1.2 Injuries to persons

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

1.3 Damage to aircraft

1.3.1 Apart from the empennage, the remainder of the aircraft fuselage was consumed by the post-impact fire.

Figure 2 A view of the burnt out wreckage.

Figure 3 A view of the empennage.

1.4 Other damage

1.4.1 The surrounding vegetation was consumed by the post-impact fire.

1.5 Personnel information

Nationality	South African	Gender	Male	Age	44
Licence Number	0270437320	Licence Type	Commercial		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Night rating, Instrument rating, Flight Test Single and Multi Engine				
Medical Expiry Date	30 November 2012				
Restrictions	Corrective lenses				
Previous Accidents	None				

Flying Experience :

Total Hours	535.9
Total Past 90 Days	49.2
Total on Type Past 90 Days	48.0
Total on Type	Unknown

The logbook copy that was obtained from the deceased pilot's wife was only completed until 20 August 2012 and no summary was available to obtain the pilot's total hours on type. The total amount of hours flown since 20 August 2012 up until the accident flight could not be determined.

1.6 Aircraft information

Airframe :

Type	Aeroprakt A-22LS	
Serial Number	129	
Manufacturer	Aeroprakt	
Year of Manufacture	2012	
Total Airframe Hours (At time of Accident)	45	
Last Annual Inspection (Date & Hours)	16 August 2012	40 hours
Hours since Last Annual Inspection	Approximately 5 hours	
Authority to Fly (Issue Date)	20 August 2012	
C of R (Issue Date) (Present owner)	28 June 2012	
Operating Categories	Private	

The hours since the last Annual inspection could not be accurately determined due to the aircraft's documents that were consumed by the post-impact fire. The above is therefore only an estimate of the hours flown since the last inspection. The hours was calculated by measuring the distance covered and using the aircrafts cruising speed as indicated in the Pilot Operating handbook (POH)

Engine :

Type	Rotax 912 ULS
Serial Number	6779343
Hours since New	± 45
Hours since Overhaul	TBO not yet reached

Propeller :

Type	Kiev 263 Propeller
Serial Number	No serial number
Hours since New	±45
Hours since Overhaul	TBO not yet reached

Weight calculation:

Aircraft empty weight	316 kg
Pilot and passenger (95+110kg)	205 kg
Fuel (110L)	84.7 kg
Luggage	25 kg
Total	**630.7kg**

The take-off weight of the aircraft was 630.7 kg before the accident. The certified maximum take-off weight of the aircraft is 600 kg. The aircraft was 30.7 kg above the certified maximum take-off weight during the take-off from Gariep dam. Weights used for this calculation of this table was obtained from documentation used by the crew when doing weight and balance calculations before the flight. See **Appendix A**.

1.6.1 The aircraft, engine and propeller hours tabled above was taken from the CAA aircraft file. The aircraft logbook and flight folio were onboard the aircraft and were destroyed during the post-impact fire. The hours in the CAA aircraft file was last updated on 20 August 2012 when the Authority to Fly application was received.

1.6.2 The last annual inspection of the aircraft was signed off on 16 August 2012. Evidence indicates an auxiliary fuel system was fitted to the aircraft on 14 August 2012. The certification of the aircraft as serviceable after the annual inspection indicated all modifications to the aircraft was approved by the Director of Civil Aviation, which was not the case as no application or approval for the installation of a auxiliary fuel system could be found in the aircraft documentation.

1.7 Meteorological information

1.7.1 An official weather report was obtained from the South African Weather Services (SAWS) for the day, time and place of the accident. The following meteorological conditions were observed:

Wind direction	320°M	Wind speed	16 gusting 26 knots	Visibility	10 km
Temperature	26°C	Cloud cover	Nil	Cloud base	Nil
Dew point	0°C				

1.8 Aids to navigation

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

1.9 Communications.

1.9.1 The aircraft was equipped with standard communication equipment as required by the Regulator. A witness stated the take-off from Lite Flight aerodrome in the

morning was delayed due to a technical problem with a radio which was repaired before take-off.

1.9.2 The pilot did not communicate with Bloemfontein aerodrome air traffic control (ATC) on frequency 120.8 MHz or Kimberley aerodrome ATC on frequency 118.2MHz on route from Gariep dam to Upington prior to the accident.

1.10 Aerodrome information

1.10.1 The accident did not occur at or near an aerodrome but on Bywater, a farm in the Niekerkshoop area, (Northern Cape province) at a GPS position; South 29°16'15.8" East 023°03'01.2".

1.11 Flight recorders

1.11.1 The aircraft was not fitted with a cockpit voice recorder (CVR) or a flight data recorder (FDR) and neither was required by regulations to be fitted to this type of aircraft.

1.12 Wreckage and impact information

1.12.1 Final position of the flight path

The aircraft was flying in a direction of approximately 300 degrees magnetic and collided with a ridge in a direction of approximately 260 degrees magnetic at GPS position S 29°16'15.8" E 023°03'01.2"

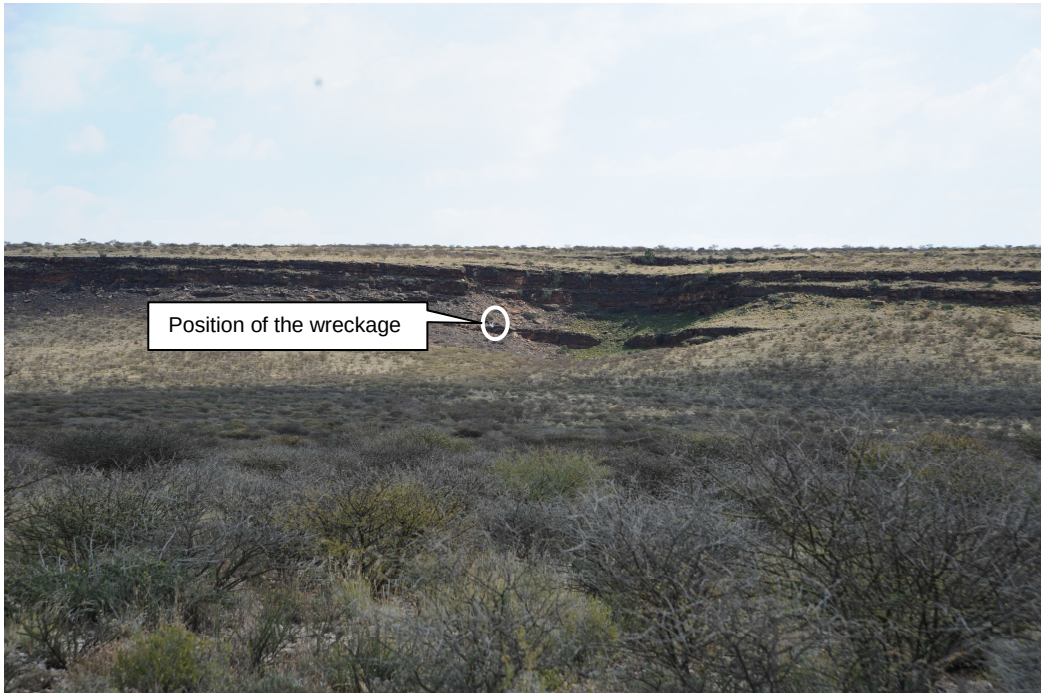

Figure 4 Landscape surrounding the accident site.

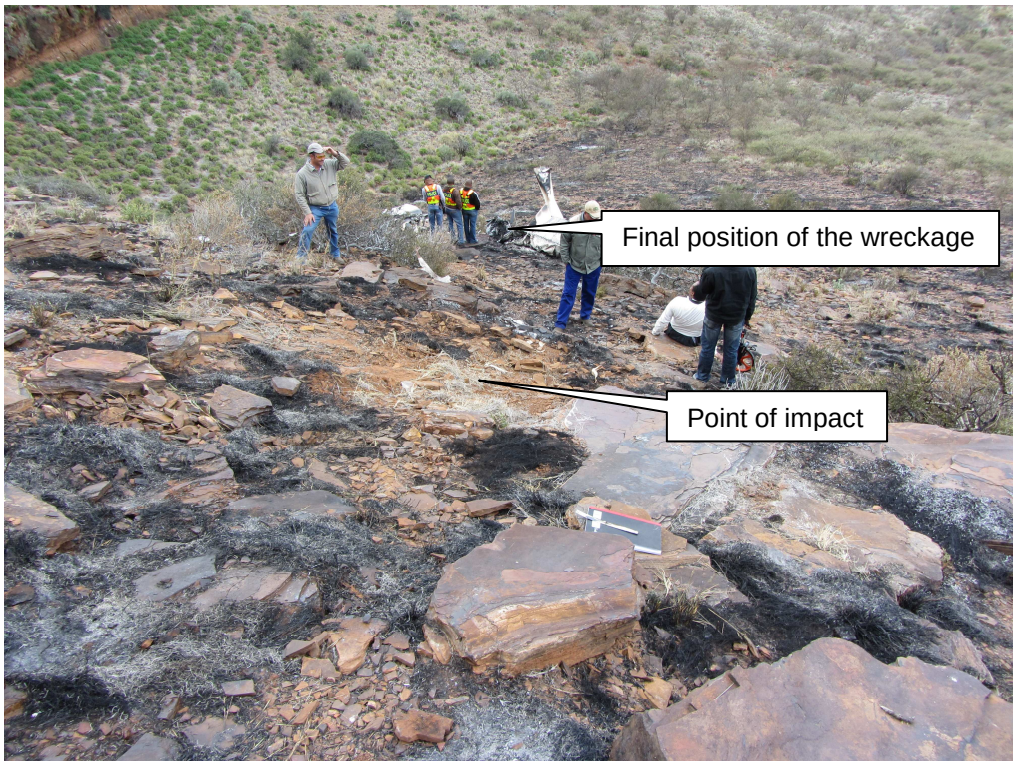

Figure 5 Point of impact and final position of the wreckage.

1.12.2 Impact sequence

The point of impact was at a height of approximately 3803 feet above mean sea level (AMSL) where after the wreckage slid down the ridge and came to rest at a height of approximately 3753 feet. (50 feet below the impact point)
Evidence indicates the post impact fire did not erupt during the impact but only after the wreckage came to rest.

1.12.3 Aircraft attitude during impact

The aircraft was in a left wing low attitude when it collided with terrain. Impact markings indicate that the first contact with the ground was with the lower fuselage of the aircraft.

1.12.4 Aircraft configuration during impact

The aircraft was in the normal flight configuration during impact.

1.13 Medical and pathological information

1.13.1 The pilot and his passenger were fatally injured during the sequence of the accident.

1.13.2 A post mortem examination was performed on the deceased pilot after the accident and the cause of death was found to be charring. The results of the toxicology tests were not available at the time the report was compiled. Should any of the results once received indicate that medical aspects may have affected the performance of

the pilot, this will be considered as new evidence and the investigation re-opened.

1.14 Fire

1.14.1 Apart from the empennage section and the nose wheel, the entire aircraft was consumed by the post-impact fire that erupted during the impact sequence.

1.15 Survival aspects

1.15.1 Due to the intensity of the post impact fire both occupants suffered severe burn wounds. As a result their survival rate was severely impaired with the pilot who died on impact and the passenger who passed away approximately 45 minutes after the accident.

The accident occurred in a very remote part of South Africa and medical assistance had to travel a long way to get to the scene of the accident.

1.16 Tests and research

1.16.1 Although the engine had suffered substantial post-impact fire damage, a strip down inspection was done and no abnormalities other than impact and fire damage could be found.

1.16.2 Both carburettors were inspected after the accident and both carburettor pistons were found in the idle/low power setting range.

1.17 Organizational and management information

1.17.1 This was a ferry flight to deliver the new aircraft to African Parks Network in the Congo (Brazzaville) (a Central African country).

1.17.2 The last annual inspection that was carried out on the aircraft prior to the accident was certified by Approved Person No. 173, who was accredited by the Aero Club of South Africa. The annual inspection was certified on 16 August 2012 at 40 airframe hours.

1.18 Additional information

1.18.1 The aircraft landed at Gariep dam on a flight from Light Flight aerodrome near Cato Ridge in Kwazulu Natal province. On arrival at Gariep dam aerodrome the main fuel tanks of the aircraft were filled to capacity (90 litres was uplifted). The person refuelling the aircraft confirmed to the investigator-in-charge he only filled the main fuel tanks but could see additional plastic fuel containers in the baggage compartment of the aircraft. He did not know if these containers contained any fuel as he was only refuelling the main fuel tanks.

1.18.2 The aircraft was seen flying by the wife of a farmer on an adjacent farm approximately 12 km south-east of the accident site at approximately 1555Z. When the aircraft flew over her it was at a height of approximately 200 feet above ground

level (AGL). Although the aircraft was low, it sounded normal at the time.

1.18.3 According to evidence found during the investigation, an unauthorised auxiliary fuel system was fitted to the aircraft during the certification flights. Information regarding the fitment of this auxiliary fuel system is restricted to invoices indicating the purchase and fitment of the system components. An e-mail was written by the deceased passenger on 19 August 2012 whereby he stated the following: *"We tried the extra tank fuelling system yesterday and today: 2*25 litres + 2*10 litres on our legs – worked very well with an electric pump system going straight to the wing tank"*. No documentation for such a modification was found and due to the aircraft being consumed by the post-impact fire, no evidence other than an empty 10 litre fuel container was found on the accident scene.

Figure 6 A 10 litre fuel container found at the scene.

1.18.4 Evidence at the scene indicated the engine was not running when the aircraft collided with the ground. A strip down inspection of the engine revealed no abnormalities; all damage to the engine was caused by impact forces and the post-impact fire. One propeller blade was still attached to the hub of the propeller shaft with no indication of any damage caused by the rotation of the propeller. The remaining two propeller blades were found close to the wreckage in the area where the aircraft started slidding down the ridge after the collision. Neither of these propellers blades had any marks on them indicating they made contact with any object whilst rotating.

Figure 7 The propeller blade attached to the propeller shaft.

Figure 8 A second propeller found close to the wreckage without any sign of damage caused by rotation.

Figure 9 A third propeller blade found underneath the wreckage without any damage indicating rotation-associated with normal engine operation (to sustain flight).

1.18.5 Impact marks and wreckage evidence indicate the aircraft was in a left wing low attitude during the impact with the ground. The impact direction was at 260 degrees magnetic which indicates a 40 degree turn to the left.

1.18.6 The amount of fuel that was onboard the aircraft at the time of the accident could not be determined with certainty due to the post-impact fire that consumed the aircraft.

The aircraft was fitted with two 55L wing tanks that were filled to capacity (110L) at Gariep dam. The estimated flying time from take-off at Gariep dam till the time of the accident was approximately 2 hours 25 minutes. It was known the flight was done with a strong head wind. The head wind together with a high power setting could result in a fuel consumption of approximately 20L per hour. If the fuel consumption was as high as 20L per hour the estimated amount of fuel onboard the aircraft at the time of the accident could be calculated at approximately 60L.

1.19 Useful or effective investigation techniques

1.19.1 None

2. ANALYSIS

2.1 Pilot

The pilot was the holder of a valid commercial pilot license at the time of the accident and had the aircraft type endorsed in it. The pilot was in possession of a valid medical certificate. The pilot's total flying experience on the Aeroprakt A-22 could not be determined with certainty as there was no documented evidence to substantiate the information. The last entry in the pilot's logbook was on 20 August 2012, four days before the accident flight.

Due to the post impact fire that had consumed the aircraft it was not possible to gain any evidence from the cockpit area there for it was not possible to correlate the carburettor piston position to the throttle settings at the time of the accident. The possibility could not be excluded that for some reason the pilot did experience an engine problem and attempted a restart of the engine.

The ground impact marks indicates the aircraft did not collide nose first with the high ground but with the under-belly of the aircraft first with the aircraft in a left wing low attitude. This can also be an indication of a last attempt by the pilot to avoid a nose first collision with the high ground.

2.2 Aircraft

Accept for a radio problem prior to departure, the first leg of the flight earlier on the day of the accident from Light Flight aerodrome to Gariep dam aerodrome was uneventful.

After landing at Gariep dam the aircraft's main fuel tanks were filled to capacity for the flight to Upington. The refueller at Gariep dam was aware of extra fuel tanks in the baggage compartment but was asked to only refuel the main fuel tanks. According to the person refuelling the aircraft, the taxi and take-off a Gariep dam

was uneventful.

Although the certification of the last annual inspection by the Approved Person (AP) stated all modifications to the aircraft have been approved by the Director, this was not the case as no application or approval for the installation of a auxiliary fuel system could be found. No technical documentation was completed to indicate the modification was done to the aircraft. Due to no information available on the illegal modification it could not be established if the modification could have had any influence on the supply of fuel to the engine during the flight.

No records could be found indicating if there was any fuel uplifted in the auxiliary fuel tanks before the initial take-off from Light Flight aerodrome.

2.3 Environment

Although the accident flight was conducted into sunset, it is believed the weather conditions that prevailed on the day had no effect on the accident.

3. CONCLUSION

3.1 Findings

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

3.1.2 The pilot was the holder of a valid aviation medical certificate that was issued by a CAA accredited medical examiner.

3.1.3 The aircraft was in possession of a valid Authority to Fly at the time of the accident.

3.1.4 No official documentation could be found of the fuel system modification that was fitted to the aircraft in the weeks prior to the accident flight.

3.1.5 Both carburettor pistons were in the idle/low power setting after the accident.

3.1.6 The pilot was seen flying low level (approximately 200 feet AGL) minutes before the accident.

3.1.7 The amount of fuel onboard the aircraft at the time of the accident could not be determined due to the post-impact fire.

3.2 Probable cause/s

3.2.1 In an attempt to avoid collision with raising terrain, the pilot collided with the ground.

3.3 Contributory cause

3.3.1 Undetermined engine stoppage in flight.

4. SAFETY RECOMMENDATIONS

4.1 None.

5. APPENDICES

5.1 Appendix A Weight and Balance calculation figures.

Weight and Balance calculation figures

				100mph		85mph	
Depart point	Destination	Day number	Distance (statute miles)	Time cruising (decimal hours)	Fuel (45 min reserve)	Time cruising (decimal hours)	Fuel (45 min reserve)
Light flight	Bethlehem	1	171	1.71	46	2.01	51.2
Bethlehem	Kimberley	1	220	2.20	55	2.59	61.9
Kimberley	Upington	1	214	2.14	54	2.52	60.6
Total Day 1			605	6.05	154	7.12	173.7
Upington	Keetmanshoop	2	232	2.32	57	2.73	64.5
Keetmanshoop	Emertus	2	293	2.93	68	3.45	77.8
Total Day 2			525	5.25	125	6.18	142.3
Emertus	Ondangwa	3	345	3.45	78	4.06	89.1
Ondangwa	Lubango	3	257	2.57	62	3.02	69.9
Total Day 3			602	6.02	139	7.08	159.0
Lubango	Benguela	4	159	1.59	43	1.87	48.6
Benguela	Sumbe	4	103	1.03	33	1.21	36.4
Sumbe	Luanda	4	164	1.64	44	1.93	49.7
Total Day 4			426	4.26	121	5.01	134.7
Luanda	Brazzaville	5	346	3.46	78	4.07	89.3
Brazzaville	Mboko	5	292	2.92	68	3.44	77.6
Total Day 5			638	6.38	146	7.51	166.9
Total			2,796	27.96	685	32.89	776.5

Weight and balance

W and B	Mass	Arm	Moment
Empty aircraft	316.0	29.8	9417
Pilots (95+110)	205.0	36.0	7380
Fuel main (110l)	84.7	76.0	6437
Fuel ferry (50l)	48.5	106.0	5141
Luggage	25.0	141.3	3533
Total	679.2	47.0	31908
Maximum Arm allowed		51.8	

Fuel + ferry	160	litres
Duration	7.9	decimal hours with 45min reserve
Distance	790	statute miles at 100mph
Distance	553	statute miles at 70mph