



AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/9620	
Aircraft Registration	ZU-ULU	Date of Accident	21 May 2017		Time of Accident	0810Z
Type of Aircraft	Aerostar Yak-52		Type of Operation	Private (Part 94)		
Pilot-in-command Licence Type	PPL	Age	54	Licence Valid	Yes	
Pilot-in-command Flying Experience	Total Flying Hours	946.5		Hours on Type	78.1	
Last point of departure	Rand Airport (FAGM): Gauteng Province					
Next point of intended landing	Rand Airport (FAGM): Gauteng Province					
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)						
Open field next to Thinasonke Township 3,35nm South East of Panorama Airfield (GPS S 26° 22' 28.65" E 028° 5' 51.3528"); Elevation 5020 feet above mean sea level (AMSL).						
Meteorological Information	Wind: 200°/5kts, Temperature: 19°C, Dew point: 2°C, CAVOK					
Number of people on board	1+0	No. of people injured	0	No. of people killed	1	
Synopsis	<p>The pilot, who was the sole occupant on board the aircraft, took off from FAGM on a private flight to the general flying area for about half an hour with the intention to land back at FAGM. The aircraft was flown under VFR and the weather was reported to be fine.</p> <p>At about 0838Z, the FAGM tower initiated a call via radio to check and verify the whereabouts of the ZU-ULU aircraft. The call was unsuccessful. As an alternative measure, the FAGM tower made a call to other aircraft that flew to the same general area with a request to check if they had spotted the ZU-ULU aircraft and they all replied that they had not seen it. After 7 minutes, the FAGM tower received a call from a police officer that the ZU-ULU aircraft had crashed.</p> <p>The witnesses observed an aircraft approaching an open field from a westerly direction in Thinasonke township where it first pitched down, then pitched up and became inverted. The aircraft was descending and completed two or more spins before it impacted the ground in a nose-down attitude.</p> <p>The pilot was fatally injured and the aircraft was destroyed.</p> <p>The investigation revealed that the pilot lost control of the aircraft after it stalled and entered into a spiral dive before impacted the ground in a steep nose down attitude.</p>					
Probable Cause						
The pilot lost control of the aircraft after it stalled and entered into a spiral dive before impacted the ground in a steep nose down attitude.						
SRP Date	14 August 2018		Release Date	21 August 2018		

AIRCRAFT ACCIDENT REPORT

Name of Owner /Operator : Dr H G de Wet
Manufacturer : Aerostar
Model : Yak-52
Nationality : South African
Registration Marks : ZU-ULU
Place : Thinasonke near Panorama Airfield
Date : 21 May 2017
Time : 0810Z

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 Sunday morning 21 May 2017, at about 0810Z daylight, an aircraft model Aerostar YAK 52 with registration marks ZU-ULU was involved in an accident at Thinasonke Township in the Gauteng Province of South Africa. The pilot was the sole occupant on board the aircraft and departed from FAGM aerodrome on a private flight to the general flying area (GFA), with the intention to land back at FAGM. The aircraft was flown under visual flight rules (VFR) and fine weather conditions prevailed on the day of the accident.

- 1.1.2 At about 0838Z, FAGM tower contacted the pilot of the ZU-ULU aircraft via radio on GFA frequency 122.35MHz, but there was no response from the pilot of the accident aircraft. Following the unsuccessful contact with the pilot of the accident aircraft, FAGM ATC alternatively made contact with other aircraft on the same frequency and asked if they had seen ZU-ULU flying in GFA. All the pilots that were contacted replied that they had not seen the accident aircraft in the GFA at that time. A few minutes later, at about 0845Z, the FAGM tower received a call from the police, informing them that the aircraft had crashed in an open field near Thinasonke Township.
- 1.1.3 According to the witnesses the aircraft came from a westerly direction and approached an open field in Thinasonke Township. The aircraft suddenly pitched down, then pitched up and became inverted. It then entered a spiral dive and impacted the ground in a nose-down attitude.
- 1.1.4 The pilot was fatally injured and the aircraft was destroyed during the accident.
- 1.1.5 The accident happened during day-light conditions in an open field near Thinasonke Township, at GPS coordinates determined to be S 26° 22' 28.65" E 028° 5' 51.3528", at an elevation of 5 029 feet above mean sea level (AMSL).



Figure 1: Showing the aircraft as found at the accident site

1.2 Injuries to Persons

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

1.3 Damage to Aircraft

1.3.1 The aircraft was destroyed.

1.4 Other Damage

1.4.1 None

1.5 Personnel Information

Nationality	South African	Gender	Male	Age	54
Licence Number	0270410988	Licence Type	Private Pilot Licence		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Night & Safety Pilot Rating				
Medical Expiry Date	30 November 2017				
Restrictions	None				
Previous Accidents	10 May 2015 (Collided with a parked aircraft)				

Flying Experience:

Total Hours	946.5
Total Past 90 Days	Unknown
Total on Type Past 90 Days	Unknown
Total on Type	78.1

Note: Pilot hours as per the logbook were last updated until the 20th November 2016.

1.6 Aircraft Information

1.6.1 Airframe:

Type	Yak-52	
Serial Number	855813	
Manufacturer	Aerostar (Yakovlev)	
Date of Manufacture	1985	
Total Airframe Hours (At time of Accident)	Unknown	
Last MPI (Date & Hours)	29 October 2016	876.5
Hours since Last annual inspection	Unknown	
ATF (Issue Date)	09/11/2016	
ATF (Expiry Date)	29/10/2017	
C of R (Issue Date) (Present owner)	30/10/2015	
Operating Categories	NTCA Private (Part 94)	

NB: During an on-site investigation, the total airframe hours could not be read from the Hobbs meter due to excessive damage sustained by the instrument panel.

1.6.2 Engine:

Type	M14PF (Vedeneyew)
Serial Number	KR042004
Hours since New	240.30
Hours since Overhaul	2.49

1.6.3 Propeller:

Type	V530TA-D35
Serial Number	1000050
Hours since New	Unknown
Hours since Overhaul	25

- 1.6.4 The aircraft flight folio was updated on the 23 October 2016 during the last flight prior to the accomplishment of the annual inspection on 29 October 2016.
- 1.6.5 The airframe and engine logbooks were last updated until the 29 October 2016 during the accomplishment of the last annual inspection.
- 1.6.6 The certificate of release to service indicated that the aircraft was due for the next annual inspection at a total of 976.5 hours of flight time or on 29 October 2017, whichever comes first.
- 1.6.7 The aircraft was certified to carry a total quantity of 120 litres of fuel, whereby each tank of the left and right carries 60 litres. During the on-site investigation, both fuel tanks were found ruptured due to impact with the ground. There was a strong smell of fuel, which indicated that there was fuel in the tanks. However, the investigation could not determine the amount of fuel on board at the time of the accident.

1.7 Meteorological Information

- 1.7.1 The weather information below was obtained from the South African Weather Service (SAWS) report:

Wind direction	200°	Wind speed	5kts	Visibility	>10km
Temperature	19°C	Cloud cover	Clear sky	Cloud base	None
Dew point	2°C				

1.8 Aids to Navigation

- 1.8.1. The aircraft was equipped with standard navigation equipment. There were no recorded defects in the navigation equipment prior to the accident.

1.9 Communications

- 1.9.1 The aircraft was equipped with standard communications equipment as per the minimum equipment list approved by the regulator. There were no recorded defects prior to the accident.

1.10 Aerodrome Information

1.10.1 The accident did not happen within an aerodrome but in an open field near Thinasonke Township in Alberton with the coordinates GPS S 26° 22' 28.65" E 028° 5' 51.3528", at an elevation of about 5020 feet AMSL.

1.11 Flight Recorders

1.11.1 The aircraft was not equipped with a flight data recorder (FDR) or cockpit voice recorder (CVR), nor were these required to be fitted by the regulations.

1.12 Wreckage and Impact Information

1.12.1 The aircraft approached an open field near Thinasonke Township from a westerly direction where it first pitched down then pitched up and became inverted. It then entered into a spiral dive and impacted the ground in a nose-down attitude. Most of the wreckage was found intact whereas one propeller blade was found in a north-easterly position away from the main wreckage.

1.12.2 The wreckage and impact examination determined as follows:

1.12.2.1 The main wreckage was found intact at GPS coordinates S 26° 22' 28.65" E 028° 5' 51.3528" and the angle of impact with the ground were estimated to be 10 degrees. The investigation determined that the impact in a nose-down attitude was most probably as a result of the stall and entering into a spiral dive.

1.12.2.2 The engine was found deep into the ground, about 0.5 metres deep, and the RPM indicator was found positioned at 100%, indicative that the engine was producing power at the point of impact with the ground. The speedometer was found pointing at 220km/h, which indicated that the aircraft impacted the ground at high speed. One propeller blade broke off from the hub and was found lying about 50 metres away from the main wreckage. The evidence on the propeller blades hub after it was exhumed from the ground also indicated that the engine was producing power at impact with the ground.

1.12.2.3 The empennage was inspected and found to have sustained compression damage on the tail section due to impact with the ground; it got twisted around see figures below. The horizontal stabiliser and both its elevators sustained minor damages. The vertical stabiliser also sustained minor damages and the rudder was found in a right-hand side position. The rudder position could not be checked, because the control stick had broken off due to the impact with the ground and its position could not be determined

1.12.2.4 Both wings were inspected and found damaged due to the impact. The flaps positions could not be determined due to the fact that the selector inside the cockpit was destroyed. Both fuel tanks were found ruptured, with a strong smell of fuel present, indicating that there was an amount of fuel on board.



Figure 2: Showing the speedometer as found at the accident site



Figure 3: Showing the RPM indicator at 100%

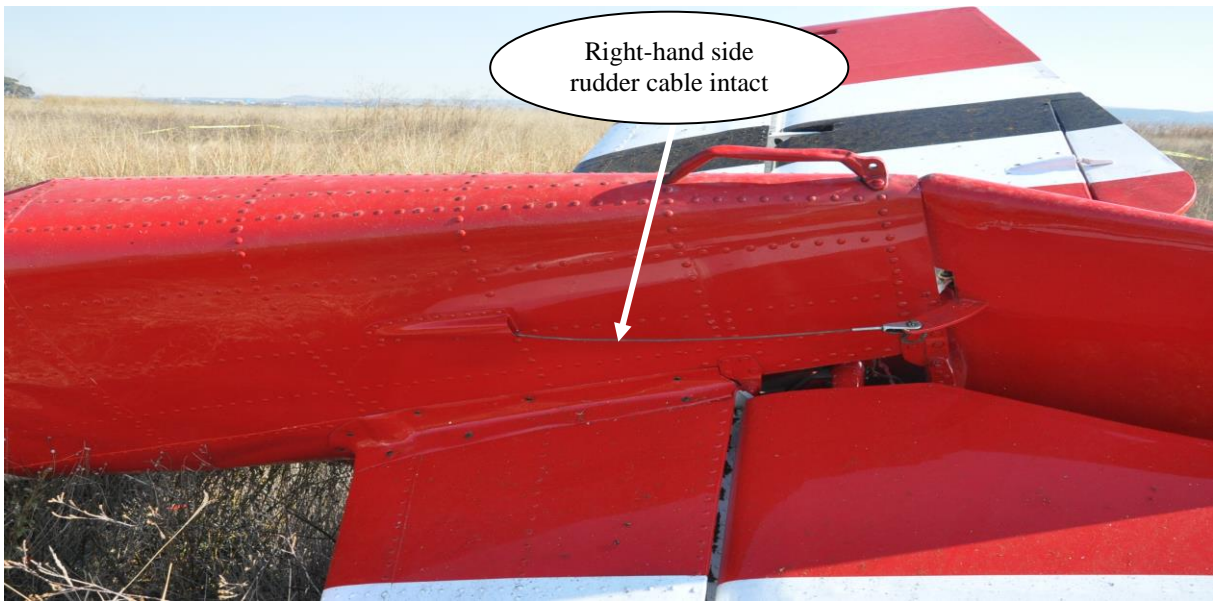


Figure 4: Showing the rudder cable on the right hand side still intact



Figure 5: Arrow showing the rudder position as found after impact with the ground



Figure 6: Tail section showing compression damage

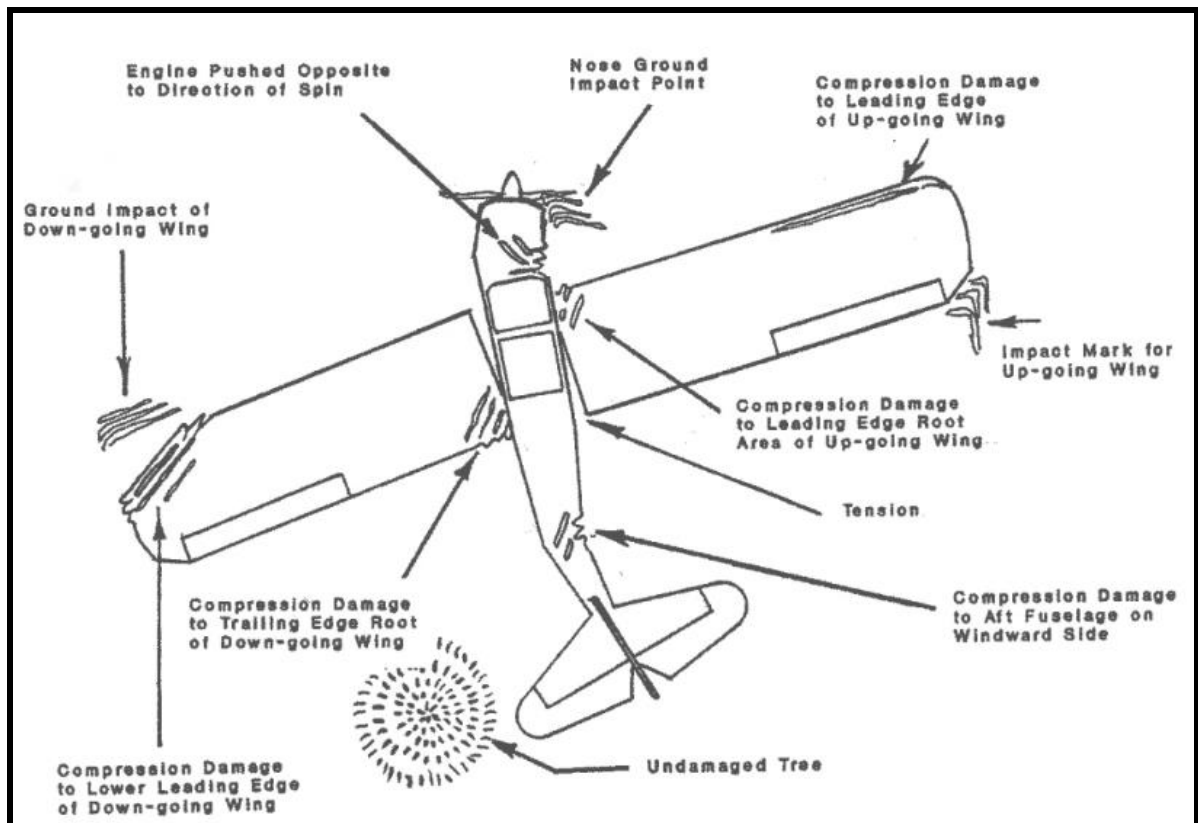


Figure 7 Wreckage pattern of a spinning aircraft (Source: Aircraft Accident Investigation-second edition by Richard H.Wood /Robert w. Sweginnis)



Figure 7: Showing damage and the position of the wing flaps

1.13 Medical and Pathological Information

1.13.1 According to the post-mortem report, the cause of death was determined to be multiple blunt-force injuries.

1.14 Fire

1.14.1. There was no evidence of pre- or post-impact fire.

1.15 Survival Aspects

1.15.1 The accident was considered not survivable due to the high force at which the aircraft impacted the ground. The cockpit was destroyed and the body of the pilot was trapped in the wreckage.

1.16 Tests and Research

1.16.1 None

1.17 Organisational and Management Information

1.17.1. This was a private flight conducted under the provisions as contained in Part 94 of the Civil Aviation Regulations of 2011.

1.17.2 The last annual inspection on the 30 October 2016 was carried-out by an Approved Person (AP) who held a valid AP certificate.

1.18 Additional Information

Source: POH for the Yakovlev YAK52

1.18.1 According to the Pilot Operating Handbook of YAK 52 aircraft, it is not difficult to get into a flat spin through mishandling a steep turn at high Power settings and low air speed and if power is kept on, it would be impossible to recover from a flat spin.

1.18.2 The Yak 52 is a heavy aircraft with a significant amount of rotational inertia in a flat spin. This is because there is a heavy engine in the front and a heavy radio and other equipment behind the rear seat and therefore once the aeroplane begins spinning, it will take time for the inertia to be destroyed and for the aircraft then to recover from the spin.

1.18.3 In particular, if the spin is allowed to fully develop into a power-on flat spin, the rate of rotation can be rapid and disorientating, and importantly, the more rapid the spin, the greater the rotational energy to be stopped before the spin slows down and therefore the longer the spin recovery. This can lead to the rate of rotation increasing during spin recovery before slowing down, which can be disconcerting if not anticipated.

1.18.4 Closing the throttle will not in itself cause any recovery.

1.18.5 Once the flat spin has fully developed it can take up to four complete revolutions for recovery to be made and of course much more if the absolutely correct control movements are not used. Additionally there will be further height loss during the return to level flight.

1.18.6 Recovery process:

Apply FULL opposite rudder.

Apply stick forward past the neutral (somewhere between neutral and fully forward).

As rotation stops, bring both controls back to the neutral.

Check the airspeed, and when it is 200 km/h start to recovery into straight and level, at the same time smoothly start opening the throttle. By the time the aircraft reaches straight and level the throttle should be fully open.

Caution: Ensure that the wings are level prior to spin entry - DO NOT USE AILERONS IN THE SPIN - ENSURE THE THROTTLE IS FULLY CLOSED.

Warning: All spinning must be carried out at an altitude where recovery can be made. i.e. by 1000m AGL (3300ft AGL). Spin training must be carried out under the supervision of a suitably qualified person.

1.19 Useful or Effective Investigation Techniques

1.19.1 None

2 ANALYSIS

- 2.1 The pilot held a valid private licence with the aircraft type rating endorsed on it and his aviation medical certificate was valid with no restrictions. The pilot accumulated a total of about 946.5 flying hours and 78.1 on type as per the logbook that was last updated in November 2016.
- 2.2 The aircraft had both a valid Certificate of Registration (C of R) and Authority to Fly (ATF) at the time of the accident. The certificate of release to service indicates that the last annual inspection was carried out on the 29 October 2016 by the AP at a total airframe hours of 876.5. The maintenance records indicated that the aircraft was properly maintained in accordance with the aircraft maintenance manual and was considered to be in a serviceable condition prior to the flight.
- 2.3 The weather conditions at the time of the accident were fine. The temperature was 19°C. The wind speed was 5 knots and the direction 200°. Based on the weather components indicated, the investigation can deduce that the prevailing weather conditions did not have a bearing on the accident.
- 2.4 The aircraft approached an open field from a westerly direction whereby it pitched down, then pitched up and became inverted. It entered into a spiral dive and impacted the ground in a nose-down attitude.

- 2.5 The wreckage and impact examination was conducted with the sole purpose to determine if there was any indication of pre-accident defects, component and system malfunction or failure that could have contributed to the cause of the accident. The wreckage examination revealed no anomalies in the aircraft component and systems that could have contributed to the accident.
- 2.6 The investigation revealed that the pilot lost control of the aircraft after it stalled and entered into a spiral dive before impacted the ground in a steep nose down attitude.

3. CONCLUSION

3.1 Findings

- 3.1.1 The pilot held a valid private pilot license (PPL) with the correct aircraft type rating endorsed on it.
- 3.1.2 The pilot held a valid aviation medical certificate with no restrictions or limitations.
- 3.1.3 The pilot logged a total of about 946.5 flying hours and 78.1 on type.
- 3.1.4 The last entry on the pilot logbook was made on the 20 November 2016.
- 3.1.5 The aircraft had both a valid C of R and ATF at the time of accident.
- 3.1.6 The last annual inspection on the aircraft was carried out by an AP on the 29 October 2016 at a total airframe hours of 876.5.
- 3.1.9 The aircraft was properly maintained in accordance with the aircraft maintenance manual and it was considered serviceable.
- 3.1.10 Fine weather conditions prevailed at the time of the accident.
- 3.1.11 The aircraft stalled, entered a spiral dive and impacted the ground in a nose-down attitude.
- 3.1.12 The investigation revealed that the pilot lost control of the aircraft after it stalled and entered into a spiral dive before impacted the ground in a steep nose down attitude.

3.2 Probable Cause/s

3.2.1 The pilot lost control of the aircraft after it stalled and entered into a spiral dive before impacted the ground in a steep nose down attitude.

4. SAFETY RECOMMENDATIONS

4.1 None

5. APPENDICES

5.1 None