SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Section/division **Accident and Incident Investigations Division** Form Number: CA 12-57

LIMITED ACCIDENT INVESTIGATION REPORT

Reference Number	CA18/2/3/10069								
Classification	Accident	**Date**	6 November 2021	**Time**	0511Z				
Type of Operation	Private (Part 94)								
Location									
Place of Departure	Middelburg Aerodrome (FAMB), Mpumalanga Province	Place of Intended Landing	Middelburg Aerodrome (FAMB), Mpumalanga Province						
Place of Accident	During the climb phase from FAMB Runway 14, approximately 350 feet (ft) above ground level (AGL)								
GPS Co-ordinates	Latitude	S 25°40'53.11"	Longitude	E029°26'30.38"	Elevation	4 885 feet			
Aircraft Information									
Registration	ZU-CXY								
Model/Make	Cheetah 912 ULS (Serial number: CH-016)								
Damage to Aircraft	Destroyed	Total Aircraft Hours	846.7						
Pilot-in-command									
Licence Type	Private Pilot Licence	Gender	Male	Age: 50					
Licence Valid	Yes								
Total Hours on Type	182.4	Total Flying Hours	347.8						
People On-board	1 + 1	Injuries	0	Fatalities	0	Other (on ground)	0		

What Happened

On 6 November 2021 at approximately 0510Z, a pilot and a passenger on-board a Cheetah 912 ULS aircraft with registration ZU-CXY took off from Runway 14 at Middelburg Aerodrome (FAMB) in Mpumalanga province with the intention to fly around Loskop Dam area near Groblersdal and return to FAMB. The private flight was conducted under visual flight rules (VFR) by day and under the provisions of Part 94 of the Civil Aviation Regulations (CAR) 2011 as amended.

The pilot stated that after the pre-flight checks, he taxied the aircraft to the holding point of Runway 14 where he did his pre-take-off run-up checks. The pilot ran the engine at different power settings including at 3 000 revolutions per minute (rpm) for quite a while until the oil pressure and temperature were within the green arch. Once satisfied, he took off from Runway 14; however, during the climb phase at approximately 350 feet (ft) above ground level (AGL), he made a left turn towards Loskop Dam. He stated that moments later, the engine started to lose power and the aircraft lost height very quickly. At the time, the aircraft was approximately 3 nautical miles (nm) from the aerodrome. The pilot verified the position of the throttle, which was in the fully open position, he then turned left in an attempt to return to FAMB with the intention to land on Runway 20. However, during the turn back, the aircraft entered into a spin.

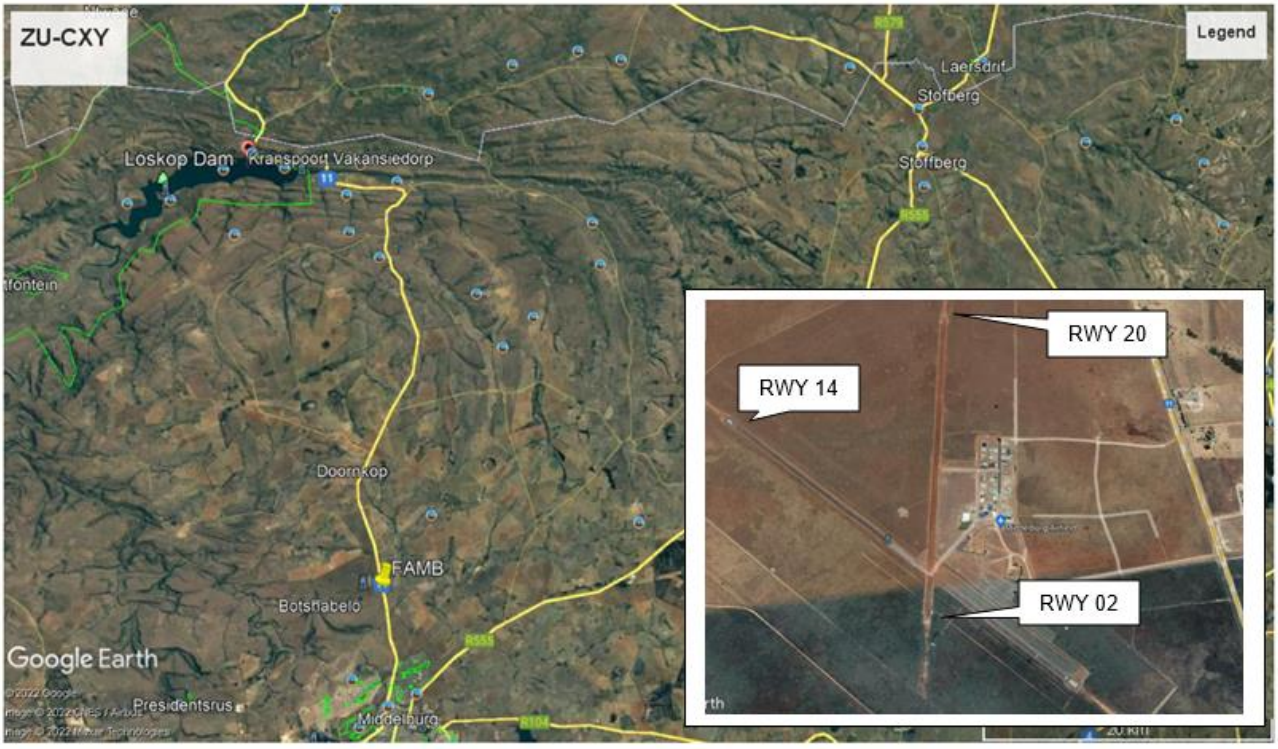


Figure 1: Aerial photo of the accident area indicating the runways at FAMB. (Source: Google Earth)

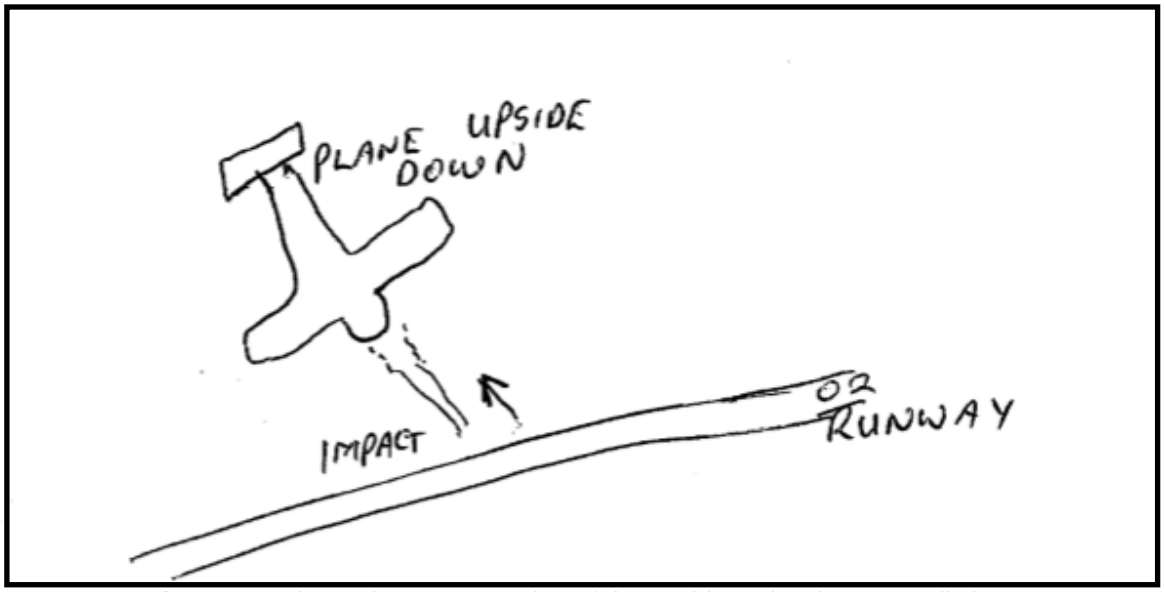


Figure 2: Schematic representation of the accident site. (Source: Pilot)

The pilot stated that he attempted to stop the spin by applying the right rudder pedal and by pushing the control stick to the right-side to level the wings before executing a forced landing on Runway 20, but the aircraft lost forward speed and crash-landed on the grass approximately 10 metres (m) from the runway edge. During the landing roll, the nose gear strut broke off and the aircraft nosed over. The aircraft sustained substantial damage. The occupants were not injured during the accident sequence.

Figure 3: The aircraft as it came to rest in an inverted position. (Source: Operator)

What was found:

- The pilot was initially issued a Private Pilot Licence (PPL) Aeroplane on 6 February 2019 with an expiry date of 31 March 2022. A Class 2 medical certificate was issued to the pilot on 19 February 2020 with an expiry date of 18 November 2021, with a restriction to wear corrective lenses. The pilot had a total of 182.4 hours on type.

- The last annual inspection carried out on the aircraft prior to the accident flight was certified on 11 August 2021 at 841.4 airframe hours. The aircraft was flown a further 5.3 hours since its last annual inspection.

- The aircraft was issued an Authority to Fly on 8 May 2019 with an expiry date of 31 October 2022.

- The flight folio revealed that the annual inspection was completed on 11 August 2021, however, the aircraft was not flown post-inspection. The last flight prior to the inspection was on 1 May 2021. The aircraft was then parked for a further five months. On 28 October 2021, the aircraft was re-fuelled with 40 litres of 95 octane fuel and then flown for 36 minutes; thereafter, it was parked for nine days after that flight. The aircraft was then re-fuelled with 20 litres to make up 70 litres in the tanks before undertaking the accident flight.

- The aircraft maintenance organisation (AMO) that bought the engine stated that the only components that were inspected in the engine were the carburettors. The carburettors were found dirty and the gaskets were broken.

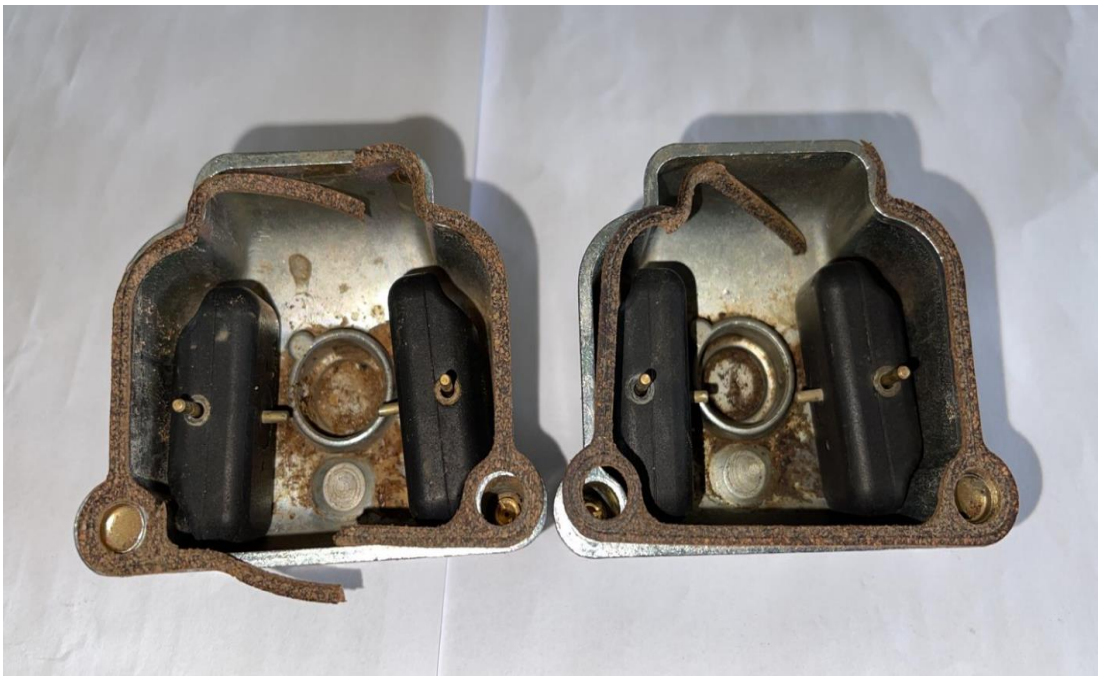
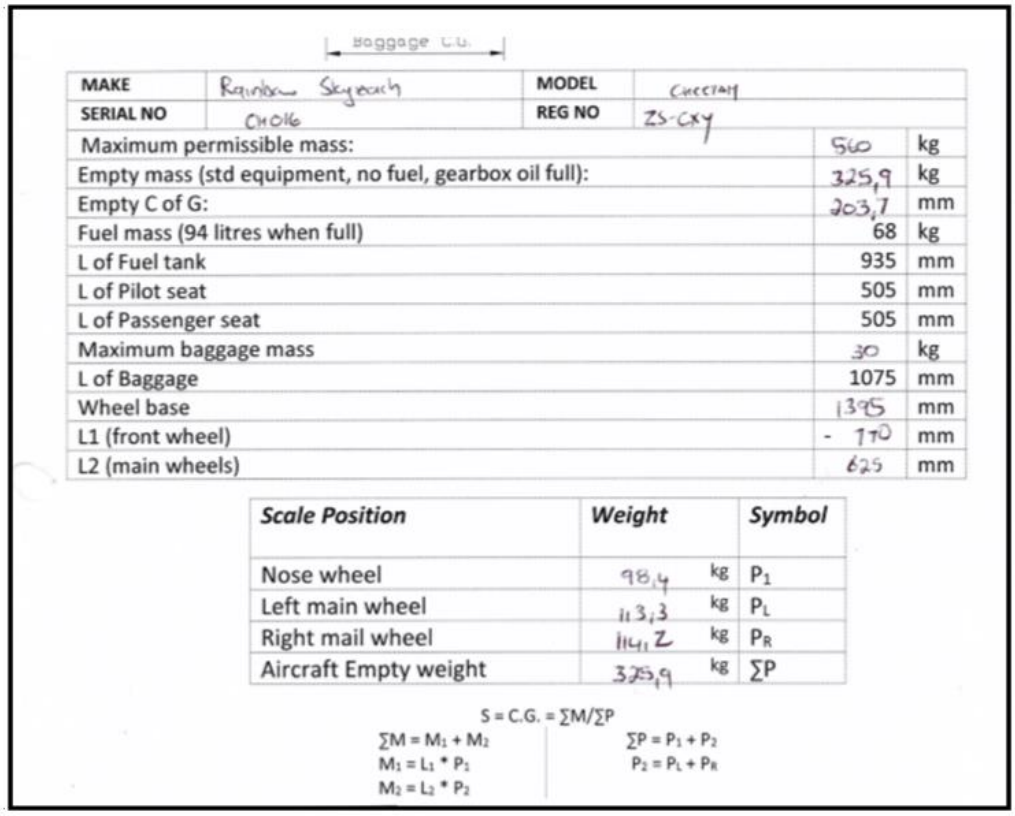


Figure 4: Carburettors with dirt and broken gaskets.

- The pilot stated that there was not enough fuel to check for any contamination due to spillage during the accident.
- According to aircraft's available information, the weight and balance at the time of the accident flight was calculated as follows:



Baggage C.G.

MAKE	Rainbow Skycoach	MODEL	Cheetah
SERIAL NO	CH016	REG NO	ZS-CXY

Maximum permissible mass:	560	kg
Empty mass (std equipment, no fuel, gearbox oil full):	325,9	kg
Empty C of G:	203,7	mm
Fuel mass (94 litres when full)	68	kg
L of Fuel tank	935	mm
L of Pilot seat	505	mm
L of Passenger seat	505	mm
Maximum baggage mass	30	kg
L of Baggage	1075	mm
Wheel base	1395	mm
L1 (front wheel)	- 770	mm
L2 (main wheels)	625	mm

Scale Position	*Weight*		*Symbol*
Nose wheel	98,4	kg	P_1
Left main wheel	113,3	kg	P_L
Right mail wheel	114,2	kg	P_R
Aircraft Empty weight	325,9	kg	$\sum P$

S = C.G. = $\sum M / \sum P$

$\sum M = M_1 + M_2$ $\quad$ $\sum P = P_1 + P_2$

$M_1 = L_1 * P_1$ $\quad$ $P_2 = P_L + P_R$

$M_2 = L_2 * P_2$

Figure 5: Weight and balance table of ZU-CXY.

- According to the pilot, on the day of the accident the aircraft had 70 litres/70kg of fuel. The pilot and the passenger weights were 130 and 100 kilograms (kg), respectively; which added to a total of 300kg. When 325.9 of aircraft's empty weight is added to 300kg, it brings the total weight of the aircraft to 625.9kg.

Scale Position	**Weight(kg)**
Nose wheel	98.4 kg
Left main	113.3 kg
Right main	114.2 kg
Pilot	130 kg
Passenger	100 kg
Fuel	70 kg
Total	**625.9 kg**

- The aircraft was 65.9kg over-weight or above limit.

Source: Cheetah Operator's Manual

Section 5 Emergency Procedures

5_1 ENGINE FAILURE AFTER TAKEOFF

Fly the aircraft to the ground. Do not become so busy with restart attempts that control is lost. Take full flaps to ensure the lowest possible landing speed. Sacrifice aircraft structure to ensure the survival of the crew.

The following comment was taken from Rotax 912 ULS Manual, Page 1-5, Safety Notice:

Warning: It should be clearly understood that the choice, selection and use of this particular engine on any aircraft is at the sole discretion and responsibility of the aircraft manuafacturer, assembler and owner/user.

Probable cause/s:

The engine stopped in-flight because of fuel starvation, this was followed by an unsuccessful forced landing.

Contributing factor:

The aircraft was overweight and could not climb at an expected rate of climb and it rapidly lost height, resulting in the pilot crash-landing the aircraft.

Poor decision taken to return to the aerodrome.

During engine stoppage, the aircraft was allowed to stall, resulting in the left-side spin.

Safety Action/s

None.

Safety Message

Safety message: In the interest of safety, all pilots are reminded of the importance of following the manufacturer's limitations on every aircraft they fly as that will prevent injuries and damage to property.

Purpose of the Investigation

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (CAR) 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 apportion blame or liability****.*

About this Report

Decisions regarding whether to investigate, and the scope of an investigation are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, no investigation has been conducted, and the Accident and Incident Investigations Division (AIID) has relied on the information submitted by the affected person/s and organisation/s to compile this brief report. The report has been compiled using information supplied in the initial notification, as well as follow-up information to bring awareness of potential safety issues to the industry in respect of this occurrence, as well as possible safety action/s that the industry might want to consider in preventing a recurrence of a similar accident.

This report provides an opportunity to share safety message/s in the absence of an investigation.

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.

Disclaimer	
This report is produced without prejudice to the rights of the AIID, which are reserved.	

This report is issued by:

Accident and Incident Investigations Division
South African Civil Aviation Authority
Republic of South Africa