SOUTH AFRICAN CIVIL AVIATION AUTHORITY

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

LIMITED OCCURRENCE INVESTIGATION REPORT – FINAL

Reference Number	CA18/3/2/1461										
Classification	Serious Incident		**Date**	24 November 2024			**Time**	0746Z			
Type of Operation	Private (Part 94)										
Location											
Place of Departure	Ballito Microlight Airfield, KwaZulu-Natal Province		Place of Intended Landing	Ballito Microlight Airfield, KwaZulu-Natal Province							
Place of Occurrence	During the climb after take-off from Ballito Microlight Airfield, Runway 18										
GPS Co-ordinates	Latitude	29°29'19.25" S	Longitude	31°10' 35.77" E		Elevation	230 feet				
Aircraft Information											
Registration	ZU-BUI										
Make; Model; S/N	Solo Wings; Windlass Aquilla Trike (Serial Number: WA723)										
Damage to Aircraft	None			Total Aircraft Hours	1 454.2						
Pilot-in-command											
Licence Type	National Pilot Licence		Gender	Male		Age	27				
Licence Valid	Yes	Total Hours	3 583.5	Total Hours on Type	3 144.5						
Total Hours 30 Days	50.0		Total Hours on Type Past 90 Days	50.0							
People On-board	1 + 1	**Injuries**	0	**Fatalities**	0	**Other (on ground)**	0				

What Happened

On Sunday morning, 24 November 2024, a pilot and a passenger on-board a Windlass Aquilla weight-shift controlled trike (microlight) with registration ZU-BUI took off on a private flight from Ballito Microlight Airfield in KwaZulu-Natal province with the intention to return to the same airfield. The flight was conducted under visual meteorological conditions (VMC) by day and under the provisions of Part 94 of the Civil Aviation Regulations (CAR) 2011 as amended.

The pilot reported that he performed a pre-flight inspection of the microlight and no abnormalities were found. The microlight had 30 litres (l) of Octane 95 Unleaded fuel in the tank. The pilot stated that he started the engine and taxied the microlight to the threshold of the grass-covered Runway 18. He then opened the throttle to 5 500 revolutions per minute (RPM), which is the maximum power, and commenced with the take-off run. The aircraft reached the take-off speed of 45 knots (kts) and rotated. Whilst in a climb at approximately 850 feet (ft) above ground level (AGL), the pilot executed a left turn and, thereafter, felt severe engine vibrations. Consequently, the carburettors dislodged from the fuel intake which caused fuel starvation and, thus, engine

stoppage. The pilot glided the microlight back to Runway 18 where he performed a successful forced landing. The microlight was not damaged, and no person was injured.

Post-incident examination of the engine, which was conducted by the pilot, revealed a missing exhaust outlet pipe-end part. This meant that the exhaust outlet pipe broke off in-flight.

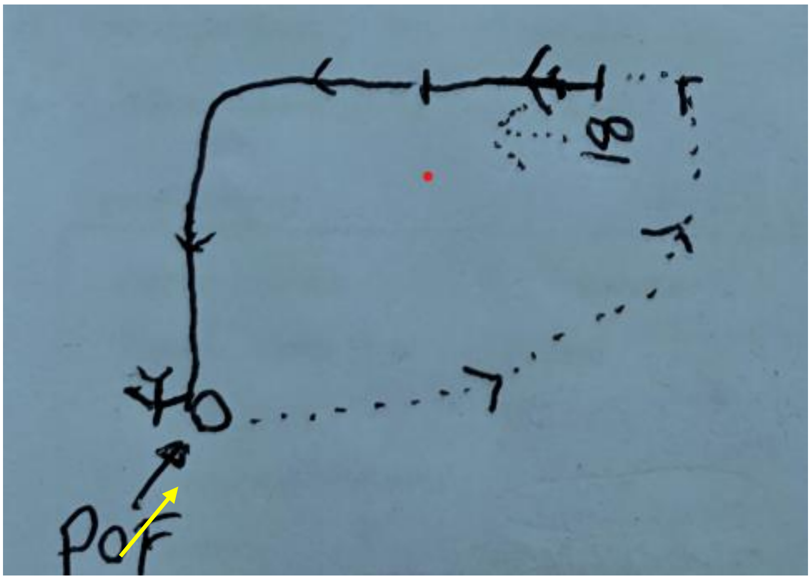

Figure 1: The pilot's sketch depicts the take-off direction and the point at which the exhaust outlet pipe-end part broke off after executing a left turn. (Source: Pilot)

The Rotax engine exhaust pipe is manufactured from stainless steel and is made up of two parts that are welded together. The missing exhaust outlet pipe was not found. An engineer from the Rotax-approved agent in Germiston, Gauteng province, indicated that the exhaust pipe-end part broke off on the welded joint area after his assessments of the engine. There had been no other related failures of the Rotax exhaust system in the past; therefore, this was an isolated case. The engineer concluded that substandard welding on the exhaust outlet pipe led to its end part breaking off due to fatigue caused by vibration.

Figure 2: The microlight parked in a hangar.

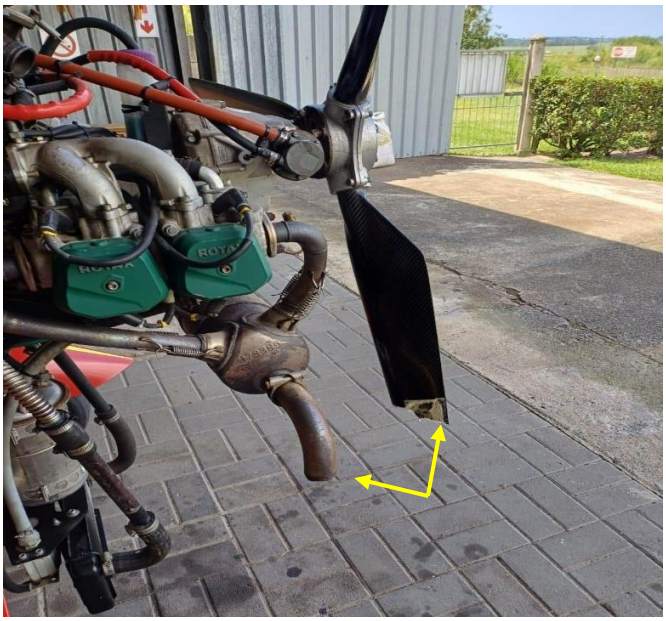

Figure 3: The yellow arrows show the remaining half of the exhaust pipe and the severed propeller blade.

Description of the Microlight (Source: Pilot's Operating Handbook (POH)

The Windlass Aquilla weight shift microlight features a cable-braced hang glider-style high-wing, weight-shift controls, a two-seat-in-tandem open cockpit, tricycle landing gear and a single engine in pusher configuration. The aircraft is made from tubing with its wing covered in Dacron sailcloth. It is powered by a four-cylinder air-cooled Rotax 912 ULS engine bearing serial number 6784510 rated at 100 horsepower (hp) at 5 800RPM.

The weather information entered in the table below was obtained from the pilot questionnaire.

Wind Direction	200º	Wind Speed	9 knots	Visibility	9999 m
Temperature	26ºC	Cloud Cover	CAVOK	Cloud Base	Nil
Dew Point	20	QNH	Unknown		

Findings

1. Personnel Information

1.1 The pilot had a National Pilot Licence (NPL) that was initially issued by the Regulator (SACAA) on 18 May 2016. The licence was reissued on 27 September 2023 with an expiry date of 31 March 2025.

1.2 The pilot had a Class 4 aviation medical certificate that was issued on 2 April 2024 with an expiry date of 31 March 2029.

1.3 The pilot had a restriction to wear suitable corrective lenses for distant vision.

2. Aircraft Information

2.1 The last 100-hour annual inspection of the microlight was conducted and certified on 17 July 2024 at 1 401.6 airframe hours. The microlight had accrued 52.6 hours after the said inspection.

2.2 The approved person (AP) who certified the last annual inspection was issued the Approved Person Certificate on 12 November 2024 with an expiry date of 11 November 2026.

2.3 The microlight had a valid Authority-to-fly (ATF) Certificate that was initially issued on 5 April 2024 with an expiry date of 30 April 2025.

2.4 The operator had the Operating Certificate that was issued on 18 December 2023 with an expiry date of 31 December 2024.

2.5 The aircraft's Certificate of Registration (C of R) was issued to the present owner on 31 August 2021.

2.6 The aircraft was issued a Certificate of Release to Service (CRS) on 17 July 2024 with an expiry date of 16 July 2025 or at 1 501.6 airframe hours, whichever occurs first.

2.7 It was found that substandard welding of the exhaust outlet pipe led to the end part breaking off due to fatigue caused by vibration.

Probable Cause(s)

The aircraft experienced sever engine vibration as a result of the exhaust outlet pipe severing one of the propeller blades. The vibration dislodged the two carburettors which resulted in the engine stoppage due to fuel starvation.

Contributing Factor(s)

The exhaust outlet pipe broke off on the welded joint area due to undetected substandard welding. Consequently, the failed outlet pipe hit one of the propeller blades and the two carburettors dislodged which resulted in engine stoppage due to fuel starvation.

Safety Action(s)

None.

Safety Message and/or Safety Recommendation/s
None.
About this Report
The decision to conduct a limited investigation is based on factors including whether the cause is known and the evidence supporting the cause is clear, the level of safety benefit likely to be obtained from an investigation, and that will determine the scope of an investigation. For this occurrence, a limited 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 limited report. The report has been compiled using information supplied in the initial notification, as well as from follow-up desktop inquiries 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 occurrence. *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
In terms of Regulation 12.03.1 of the Civil Aviation Regulations (CAR) 2011 and ICAO Annex 13, 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.
Disclaimer
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This report is issued by:
Accident and Incident Investigations Division
South African Civil Aviation Authority
Republic of South Africa