SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Section/division **Accident and Incident Investigations Division** Form Number: CA 12-58

UAS LIMITED OCCURRENCE INVESTIGATION REPORT – FINAL

Reference Number	CA18/2/3/1414								
Classification	Serious Incident	**Date**	2 June 2023			**Time**	2241Z		
Type of Operation	Remotely Piloted Aircraft Systems – Surveillance (Part 101)								
Location									
Place of Departure	Doornpoort, Gauteng Province	Place of Intended Landing	Doornpoort, Gauteng Province						
Place of Occurrence	3.4 nm north-east of Wonderboom Airport, Gauteng Province								
GPS Co-ordinates	Latitude	25º36'31" S	Longitude	28º15'08" E	Elevation	3929ft			
Aircraft Information									
Registration	ZT-XOA	Class	3A						
Make; Model; S/N	Arace Sirin (Serial Number: SIR0021)								
Damage to Aircraft	Minor	Total UAS Hours	1021.7						
Pilot-in-command									
Licence Type	Remote Pilot Licence (RPL)	Gender	Male	Age	22				
Licence Valid	Yes	Total Hours	998.51	Total Hours on Type	998.51				
Total Hours 30 Days	51.53	Total Flying on Type Past 90 Days	92.16						
People controlling	1	**Injuries (On ground)**	0	**Injuries**	0	**Fatalities (on ground)**	0		

What Happened

On 2 June 2023, an unmanned aircraft system (UAS) with registration ZT-XOA was engaged in a railway line surveillance flight near Doornpoort, Gauteng province. The flight was conducted under beyond visual line of sight (BVLOS) rules by night and under the provisions of Part 101 of the Civil Aviation Regulations (CAR) 2011 as amended.

The pilot reported that during the surveillance flight, the remote pilot station video feed experienced anomalies. He then activated the return-to-home (RTH) function and, whilst the UAS was returning to home launch, it started to descend. The pilot switched over to manual control and increased the throttle; the UAS climbed to 410 feet (ft) above ground level (AGL). He continued to route the UAS back to base and, upon landing and during inspection, he noticed that the tracking device was hanging on the side of the UAS and that the front plate of the gimbal was damaged. The UAS sustained minor damage; no person(s) on the ground were injured.

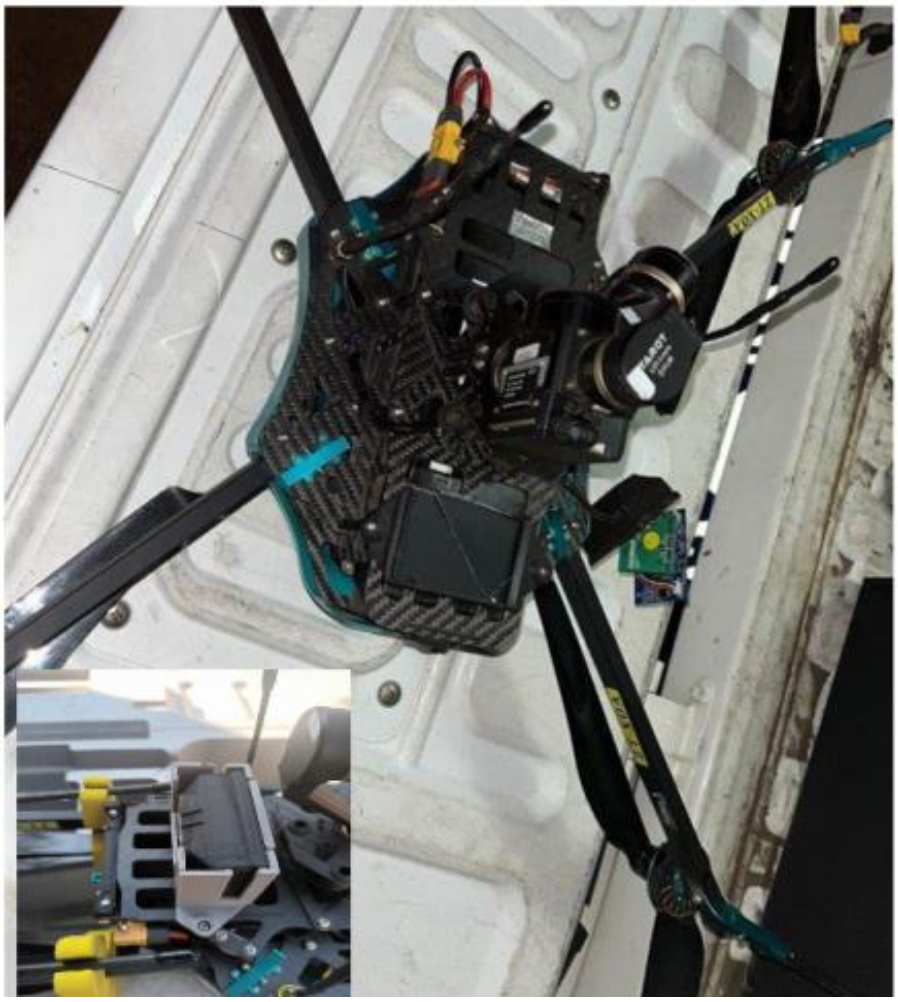

Figure 1: ZT-XOA showing lose tracking device. Inset picture shows ZT-XOA before it was damaged. (Source: Operator)

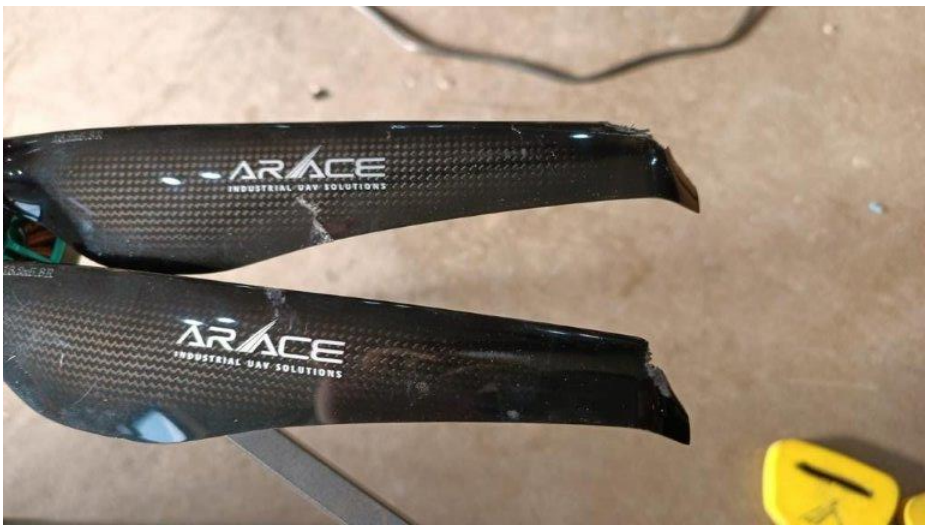

Figure 2: Damage to propellers was caused by contact with the lose tracking device. (Source: Araceuas.com)

The Sirin UAS with the battery fully charged can be airborne for approximately 60 minutes and can cover more than 20 kilometres (km) in a single flight. Field deployment takes less than 1 minute and requires no assembly. The UAS model uses a single battery to fly. (Source: Araceuas.com)

Findings

1. The pilot was issued a Remote Pilot Licence (RPL) with multirotor and beyond visual line of sight (BVLOS) ratings on 12 April 2022, with an expiry date of 30 April 2024. His Class 2 medical certificate was issued on 12 February 2020 with an expiry date of 28 February 2025 and with the restriction to wear corrective lenses.

2. The UAS was initially issued a Remotely Piloted Aircraft Systems Letter of Approval (RLA) on 5 April 2022; the RLA was renewed on 7 February 2023 with an expiry date of 4 April 2024.

3. The operator was issued an RPAS Operating Certificate (ROC) with an endorsement of Part 101 by the Regulator (SACAA) on 31 October 2022 with an expiry date of 31 October 2023.

4. The technician who repaired the UAS was properly qualified; her Remote Maintenance Technician (RMT) licence was issued on 21 June 2021 with an expiry date of 20 June 2023.

5. A mandatory periodic inspection (MPI) at 974.08 hours was completed on 23 May 2023. The next MPI was due at 1049.08 hours. During the MPI on 23 May 2023, it was found that the battery voltage was malfunctioning, and it was duly replaced.

6. The prevailing wind conditions at the time of the incident were not strong enough to interfere with the UAS's ability to RTL successfully.

7. FAWB 022300Z AUTO 00000KT 06/04 Q1020=

8. The UAS operated at 3.54 nautical miles (nm) north-east of Wonderboom Airport (FAWB), however, FAWB was closed at the time the UAS was being operated. Their operational times at FAWB are from 0500Z to 1700Z daily.

9. The operator stated that "*The Bidtracker device is encased in a 3D-printed enclosure, which is fastened to the aircraft's fuselage using stainless steel screws. Loctite is applied to secure the screw threads*."

Probable Cause
The enclosure of the tracking device failed, and the device floated freely; as a result, it impacted the rotating propeller blades several times which caused an imbalance during the flight. This resulted in the inability of the UAS to continue with the automated flight. The pilot manually controlled the UAS back to the launch site.
Contributing Factor(s)
None.
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 desk top enquiries 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