SOUTH AFRICAN CIVIL AVIATION AUTHORITY

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

LIMITED OCCURRENCE INVESTIGATION REPORT – FINAL

Reference Number	CA18/2/3/10240								
Classification	Accident			**Date**	30 November 2022			**Time**	1712Z
Type of Operation	Remotely Piloted Aircraft System Aerial Surveillance (Part 101)								
Location									
Place of Departure	Simunye Colliery Secunda, Mpumalanga Province			Place of Intended Landing			Simunye Colliery Secunda, Mpumalanga Province		
Place of Occurrence	At Simunye Colliery Secunda whilst hovering at 394 feet above ground level following launch								
GPS Co-ordinates	Latitude	26° 34' 37.23" S		Longitude	29° 11' 09.10" E		Elevation	5 331 ft	
Aircraft Information									
Registration	ZT-WWH								
Make; Model; S/N	DJI; Matrice 300 RTK (Serial Number: 1ZNDHAL00C2569)								
Damage to Aircraft	Destroyed			Total Aircraft Hours	832.11				
Pilot-in-command									
Licence Type	Remote Pilot Licence (RPL)			Gender	Male		Age	33	
Licence Valid	Yes	Total Hours		501.02	Total Hours on Type		501.02		
Total Hours 30 days	64.48			Total Flying on Type Past 90 days	177.55				
People Controlling	1	**Injuries**	0	**Fatalities**	0		**Other (on ground)**	0	

What Happened

On Wednesday, 30 November 2022, a pilot launched a DJI Matrice 300 RTK remotely piloted aircraft (RPA) with registration ZT-WWH to perform a night aerial surveillance flight at Simunye Colliery Mine in Secunda, Mpumalanga province. The flight was conducted in visual line of sight (VLOS) at dusk under the provisions of Part 101 of the Civil Aviation Regulations (CAR) 2011 as amended.

The pilot reported that a pre-flight inspection was conducted on the RPA and no anomalies were noted. At approximately 1710Z, the RPA was manually launched for a pre-flight test with 94% battery power. The pre-flight test was carried out at approximately 5 metres (m) above ground level (AGL) to establish if the controls were responding as expected (that is, forward and backward flight, left and right roll, left and right yaw). Also, checks on the gimbal for the payload (H20T) were carried out and all the units were in good working condition.

After the tests, the RPA climbed to 120m (394 feet [ft]) AGL and it hovered for a few seconds before proceeding with the surveillance flight. At approximately 1712Z, the pilot and the ground crew heard a screeching sound coming from the RPA, which was immediately followed by a total loss of control. The RPA entered an uncontrolled descent until it impacted the ground.

The RPA was recovered after a brief search by the ground crew; it had sustained substantial damage. There was no damage to property during the accident and no person on the ground was injured.

Post-accident Investigation Report:

- The wreckage distribution indicated that the RPA was substantially damaged beyond economical repair during the accident sequence.

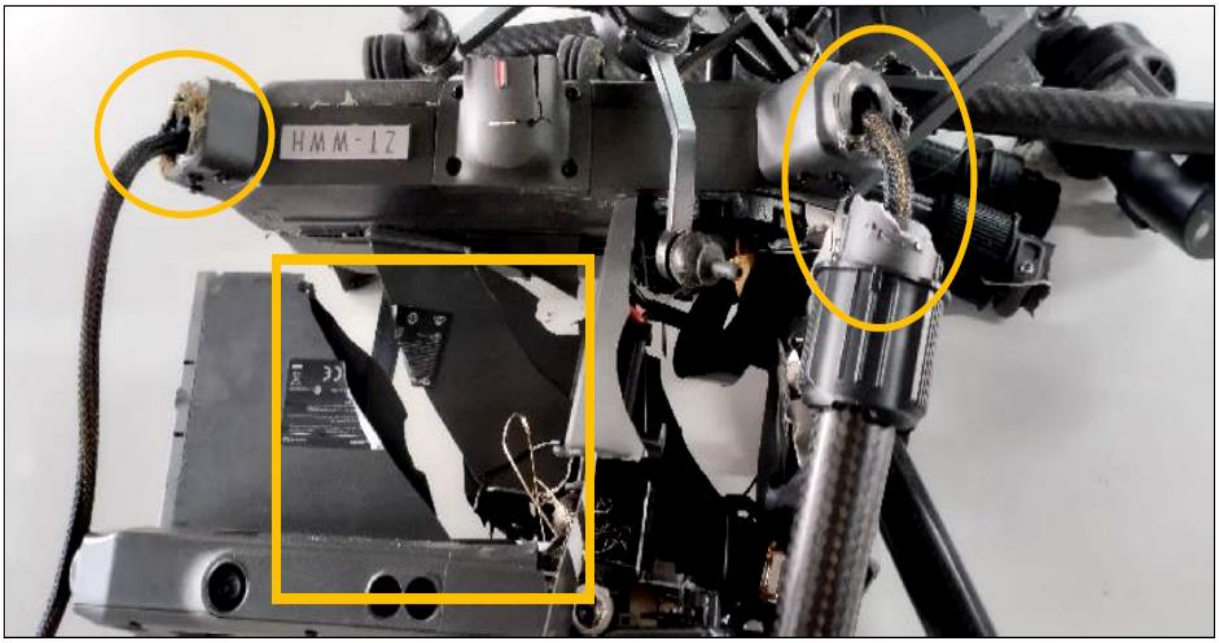

Figure 1: Damaged arms and camera. (Source: Operator)

- A screenshot from the RPA's flight log indicated that it experienced a propulsion error at 120m (394 ft) AGL which seemed to have been caused by either a motor or an Electronic Speed Control (ESC) malfunction.

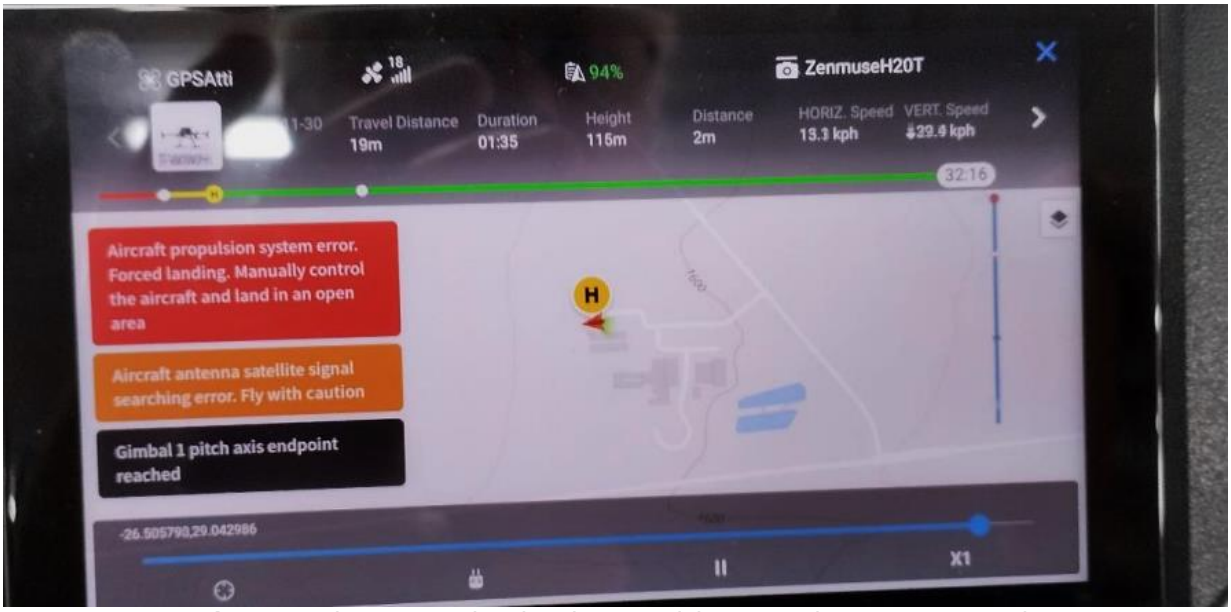

Figure 2: The screen showing the propulsion error. (Source: Operator)

- The picture above shows the results of the diagnoses which indicate that the malfunction was either the RPA motor and/or the ESC. A further indication was that the RPA attempted to maintain stability whilst in a tumble following the propulsion error at a vertical speed of 22.4 kilometres per hour (kph) in a downward direction.

- The operator's investigation determined that it was not the pilot's inputs that led to the accident.

Findings

1. The pilot was issued a multirotor Remote Pilot Licence (RPL) with visual line of sight (VLOS) and beyond visual line of sight (BVLS) ratings by the Regulator (SACAA) on 31 July 2021 with an expiry date of 31 July 2023. The pilot's Class 4 medical certificate was valid with no waivers; it was issued on 30 July 2020 with an expiry date of 30 July 2025.

2. The operator was issued a Remotely Piloted Aircraft Systems (RPAS) Letter of Approval (LOA) by the Regulator on 22 January 2022 with an expiry date of 22 February 2023. The RPA was issued a Certificate of Registration by the Regulator on 17 December 2020. The last maintenance check on the RPA was conducted on 12 November 2022 at 782.43 airframe hours. The RPA had approximately 832.11 airframe hours at the time of the accident.

3. The RPA maintenance was carried out by an approved person with a Remote Maintenance Technician (RMT) certificate that was issued by the Regulator on 7 July 2022 with an expiry date of 6 July 2024.

4. The RPA was launched with 94% battery. The RPA was involved in an accident during flight transitioning. According to the RPA's flight log, it experienced a propulsion error at 120m (394 ft) AGL, which was likely caused by either a malfunctioning motor or ESC.

Probable Cause(s)

The RPA experienced a propulsion error which was likely caused by an over speeding motor or malfunctioning of the ESC.

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

This report is issued by:

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