

LIMITED ACCIDENT INVESTIGATION REPORT

Reference Number	CA18/2/3/10161					
Classification	Accident	Date	18 March 2022	Time	1049Z	
Type of Operation	Surveillance (Part 101)					
Location						
Place of Departure	Camps Drift Canal near Pietermaritzburg, KwaZulu-Natal Province		Place of intended landing	Camps Drift Canal near Pietermaritzburg, KwaZulu-Natal Province		
Place of Accident	Camps Drift Canal near Pietermaritzburg in KwaZulu-Natal Province					
GPS Co-ordinates	Latitude	29° 37'.28." S	Longitude	030° 22'.15" E	Elevation	2059ft
Aircraft Information						
Registration	ZT-UKY					
Make/Model	DJI Phantom 4 Pro (Serial Number: OAXDECD00S1153)					
Damage to Aircraft	Substantial		Total Aircraft Hours	164.04		
Pilot-in-command						
Licence Type	Remote Pilot Licence (RPL)		Gender	Male		Age: 31
Licence Valid	Yes					
Total Hours on Type	44.31		Total Flying Hours	257.04		
What Happened						
<p>On 18 March 2022, a DJI Phantom 4 Pro remotely piloted aircraft (RPA) with registration ZT-UKY was piloted for surveillance purposes at Camps Drift, near Pietermaritzburg in KwaZulu-Natal province. The operation was conducted under visual line of sight (VLOS) by day and under the provisions of Part 101 of the Civil Aviation Regulations (CAR) 2011 as amended.</p> <p>The pilot reported that he completed one automated survey flight successfully. He then swapped the batteries and launched the aircraft for the second automated survey flight. When the assigned operation was complete, he commanded the aircraft to return-to-home base and, after a few seconds, he switched from 'automated' to 'manual' flight at approximately 250 metres above ground level (AGL). The pilot stated that at 500m from base and with 30% battery life remaining, the aircraft lost connection. It was later found suspended on a tree with a broken landing gear and gimbal. The aircraft, with a battery endurance of 30 minutes, is equipped with a return-to-home mode when the battery is low, as well as a ground proximity sensor. The accident flight lasted 20 minutes. The aircraft was substantially damaged during the accident sequence.</p>						



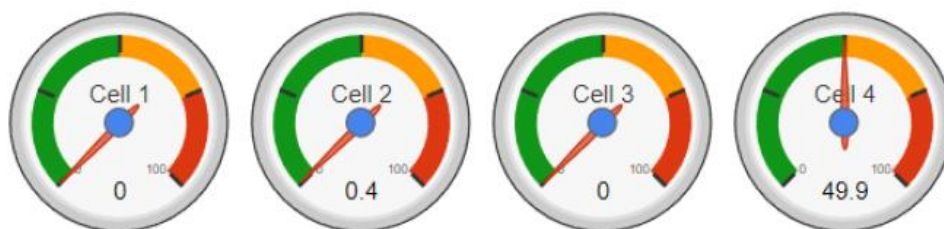
Figure 1: The damaged landing gear. (Source: Operator)



Figure 2: The gimbal that broke off. (Source: Pilot)

What was found:

- The pilot was initially issued a Remote Pilot Licence (RPL) on 28 August 2017. His licence revalidation was carried out on 7 August 2020 with an expiry date of 31 August 2022. A visual line of sight (VLOS) and beyond visual line of sight (BVLOS) ratings were endorsed on his licence. His Class 4 medical certificate was issued on 17 July 2017 with an expiry date of 31 August 2022 with a restriction to use corrective lenses during flight operations.
- The last inspection carried out on the aircraft prior to the accident flight was on 11 February 2022 at 152.1 hours.
- The operator was issued a Remotely Piloted Aircraft System (RPAS) certificate on 16 April 2021 with an expiry date of 30 April 2022.
- Fine weather conditions prevailed at the time of the accident.
- Post-accident inspection conducted by the operator revealed that one of the battery cells failed in-flight and, thus, the aircraft crashed.
- According to RPAS emergency procedures, when there is loss of connection, the pilot is required to call emergency, land immediately and, if there is a crowd, caution the people as briefed in the Phantom 4 Manual.
- According to the manufacturer, the life span of the battery depends on battery maintenance by the owner; if the battery is well-maintained, it will last longer.
- The battery's date of manufacture is 27 September 2017, and the purchase date is 23 July 2019.
- During testing, the failed battery cell number 4 showed a higher deviation voltage than the other battery cells (see results below).



Minor cell voltage deviation(0.01v) per minute
Lower numbers are better

Battery Printed Serial Number: **0DQAE9S032006M**

Figure 2: Test results of the battery cells. (Source: Operator)

- According to the operator, the pilots have been visually monitoring all batteries and they have been monitoring the trends on batteries digitally and in line with their policy.
- The operator stated that the cause of the battery cell failure was because of the prolonged usage and potentially not being strict enough in grounding batteries that showed digital signs of wear and tear. Although the operator's battery monitoring systems have statistically proven to be successful.

Probable cause:

The RPA lost connection because of the battery cell failure and, subsequently, collided with a tree during a return-to-home flight.

Safety Action

None.

Safety Recommendation/Message

None.

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

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**This report is issued by:
Accident and Incident Investigations Division
South African Civil Aviation Authority
Republic of South Africa**