

**ACCIDENT**

<b>Aircraft Type and Registration:</b>	DJI Matrice 210 (UAS, registration n/a)	
<b>No &amp; Type of Engines:</b>	4 electric motors	
<b>Year of Manufacture:</b>	2017 (Serial no: 0G0DE8CLD30020)	
<b>Date &amp; Time (UTC):</b>	26 October 2018 at 1255 hrs	
<b>Location:</b>	Ledbury, Herefordshire	
<b>Type of Flight:</b>	Emergency services operations (Training)	
<b>Persons on Board:</b>	Crew - N/A	Passengers - N/A
<b>Injuries:</b>	Crew - N/A	Passengers - N/A
<b>Nature of Damage:</b>	Damage to front motor arms, gimbal mount, propellers and camera	
<b>Commander's Licence:</b>	N/A	
<b>Commander's Age:</b>	40 years	
<b>Commander's Flying Experience:</b>	4 hours (of which 0 were on type) Last 90 days - 4 hours Last 28 days - 4 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot and further enquiries by the AAIB	

**Synopsis**

The aircraft dropped to the ground from a height of 4 m when the electric motors shut down due to insufficient battery charge remaining. The batteries' State of Charge (SOC) was indicating erroneously that 75% charge remained. The cause of the erroneously high SOC is discussed in the report on the accident to DJI Matrice 210 on 4 September 2018 (ref EW/G2018/09/04, AAIB Bulletin 11/2019).

**History of the flight**

The pilot was receiving instruction on how to operate the Matrice 210 Unmanned Aircraft System (UAS). The aircraft was fitted with two TB55 batteries and a Zenmuse Z30 Camera. The latest aircraft firmware v01.01.0913 and battery firmware 01.00.00.71<sup>1</sup> were loaded and the pilot was using the DJI Go 4 app to operate the aircraft.

Both batteries had been fully charged during the morning of the accident and some power had been used during ground training. Following a pre-flight inspection and a 3-minute test flight by the instructor the controller was passed to the pilot. The batteries' SOC was indicating about 80% charge remaining. Following a normal takeoff in an open field the

**Footnote**

<sup>1</sup> The battery firmware version was confirmed from the aircraft log file. Battery firmware v01.00.0071 and aircraft firmware v01.01.0913 were released on 13/08/2018 and were the latest versions at the time of the accident.

aircraft was flown to a height of 4 m where control checks were carried out. At the end of the checks the aircraft's tail indicator lights changed from green to red indicating an issue. The controller screen indicated 'Battery Error' and then all four motors stopped simultaneously, causing the aircraft to fall to the ground. The aircraft hit the ground inverted about 1 m in front of the takeoff area.

### **Recorded data**

The log file from the aircraft revealed that when the aircraft took off both batteries were indicating 76% SOC and 20.1 V. A fully charged battery is about 25.5 V.

16 seconds after takeoff, at a height of 4 m, the voltage had dropped to 17.4 V and 17.7 V on batteries 1 and 2 respectively, and the 'Vol Not Safe' battery status was triggered. The batteries SOC was still indicating 75% charge remaining. Eight seconds later, when the voltage had reduced to 14.4 V and 15.2 V on batteries 1 and 2 respectively, the 'Vol Not Safe/Dangerous' battery status was triggered and the 'flightAction' parameter changed from 'NONE' to 'BATTERY\_FORCE\_LANDING'. According to the aircraft manufacturer this triggered an auto-land. The log file ends less than 1 second later when the aircraft shuts down.

### **Analysis**

The data indicated that the aircraft dropped to the ground from a height of 4 m when the aircraft shut down, due to insufficient battery charge remaining. The batteries' SOC was indicating erroneously high for the voltage. The cause of the erroneously high SOC is discussed in the report on the accident to DJI Matrice 210 on 4 September 2018 (ref EW/G2018/09/04, AAIB Bulletin 11/2019).