ACCIDENT

Aircraft Type and Registration:	Yuneec H520 (registration N/A)
No & Type of Engines:	6 electric motors
Year of Manufacture:	2019 (Serial no: YU18340018B11A03)
Date & Time (UTC):	24 April 2020 at 2354 hrs
Location:	Hove, East Sussex
Type of Flight:	Emergency Services Operations
Persons on Board:	Crew - N/A Passengers - N/A
Injuries:	Crew - N/A Passengers - N/A
Nature of Damage:	Broken legs and cracks to body and battery
Commander's Licence:	Not applicable
Commander's Age:	28 years
Commander's Flying Experience:	6 hours (of which 1.5 were on type) Last 90 days - 3 hours Last 28 days - 0 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and additional enquiries made by the AAIB

Synopsis

The aircraft dropped to the ground from a height of 15 m when power was lost to the electric motors even though the battery's energy level (State of Charge) was 97.7%. The wind conditions were turbulent and an investigation by the Unmanned Aircraft System's (UAS) manufacturer concluded that the probable cause for the power loss was that the battery had become loose in flight.

History of the flight

After an initial flight, the pilot landed the Yuneec H520 UAS and changed the battery with one that was fully charged, checking to make sure it was secure before deploying the aircraft again. Not long into this flight, while the aircraft was hovering at about 49 ft (15 m) agl, the LEDs on the aircraft flickered. No warning was displayed on the control and, when the LEDs flickered a second time, the pilot decided to bring the aircraft back to the landing site to conduct some checks. The LEDs then flickered a third time and, as the pilot tried to manoeuvre the aircraft, it lost power and fell to the ground. Damage to the aircraft was substantial including broken legs and cracks in the aircraft body, camera casing and battery.

Aircraft information

The Yuneec H520 (Figure 1) is a UAS hexacopter with a mass of 1.6 kg with the battery installed (but without gimbal and camera) and a maximum takeoff mass of 2.133 kg. It is

controlled on the ground using a handheld Android-based ST16 all-in-one controller with a maximum transmission distance of 1.6 km. A storage device in the aircraft is used to log data for each flight in a ULog file. Telemetry data is also recorded by the ST16 controller in a TLog file.

Figure 1

Yuneec H520 UAS hexacopter
(Photo courtesy of Yuneec)

Recorded data

A review of the aircraft's ULog data was made which confirmed that this flight log file stopped abruptly after 34 s of flight with the aircraft 15 m above the ground. The data in Figure 2 shows that for the last five seconds of controlled flight, during which the aircraft was flying forwards at about 1 m/s while maintaining altitude, the aircraft's roll attitude oscillated between -5° and +1°, and pitch attitude between -24° and +22°. The flight log also recorded 97.7% battery energy level (State of Charge) at power loss.

Investigation by the UAS manufacturer

An investigation by the aircraft's manufacturer established that the aircraft had experienced a total power loss at the point when the aircraft was moving forward '*aggressively*' in '*windy conditions*'. It concluded that the most probable cause for the power loss was the battery becoming loose and finally disconnecting in flight. This was supported by the flickering LEDs which could have been caused by the '*intermittent bridging/touching of the battery terminals*'. Also, the damage to the battery indicated that it may have been sustained with the battery partially sticking out of its housing when the aircraft hit the ground.

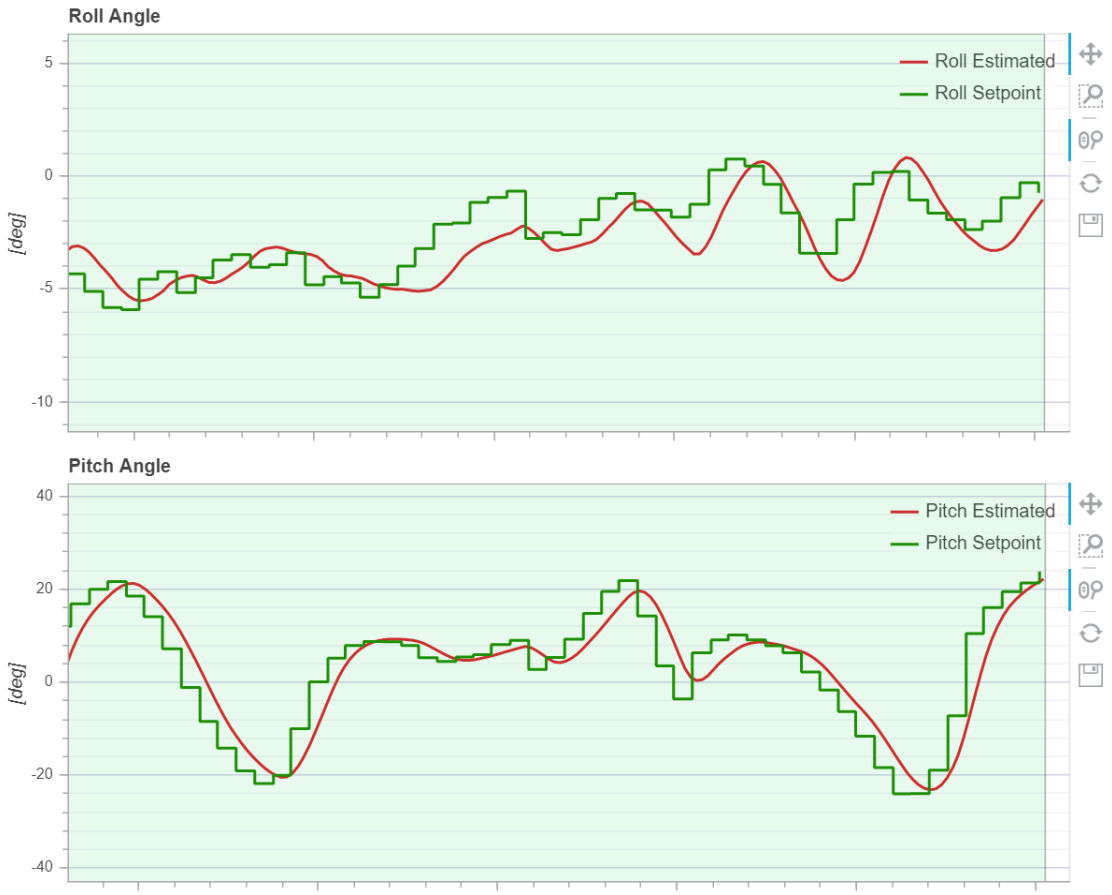

Figure 2

Aircraft pitch and roll for the last five seconds of controlled flight

Analysis

The sudden loss of power to the motors from a battery that was almost fully charged was consistent with the battery disconnecting in flight. The data indicated that the aircraft was pitching through 6° and rolling through 46° as it maintained altitude while moving slowly forward, suggesting that the conditions were turbulent enough to dislodge the battery if it had not been properly secured in place, even though the pilot had checked to make sure it was.

Safety actions

The manufacturer stated that future versions of the Yuneec H520 will include logic to prevent takeoff if it detects that the clip holding the battery in its housing is not securely in place.