

SERIOUS INCIDENT

Aircraft Type and Registration:	DJI Phantom 4 Pro	
No & Type of Engines:	4 electric motors	
Year of Manufacture:	2018 (Serial no: OAXDDAB 0A20205)	
Date & Time (UTC):	25 November 2021 at 1018 hrs	
Location:	Railway Terrace, Rugby, Warwickshire	
Type of Flight:	Commercial Operations (UAS)	
Persons on Board:	Crew - N/A	Passengers - N/A
Injuries:	Crew - N/A	Passengers - N/A
Nature of Damage:	None	
Commander's Licence:	Other	
Commander's Age:	58 years	
Commander's Flying Experience:	40 hours (of which 40 were on type) Last 90 days - 8 hours Last 28 days - 3 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

The pilot, without a separate observer, was conducting a flight to document a construction site. Shortly after takeoff, the pilot's attention was diverted to two messages displayed on his controller. After reading them he was unable to regain visual contact with the aircraft. One message advised that the aircraft had lost its heading reference due to magnetic interference and prompted the pilot to resume manual flying, the second advised of reduced propulsion due to battery health. The lack of heading reference prevented the aircraft from responding to the pilot's command for it to return to home and a subsequent message identified that the command link signal was too weak and that the connection had been lost.

The aircraft, out of the pilot's control, drifted over a congested area and subsequently landed in a tree.

History of the flight

The pilot was using the aircraft to document progress on a construction site. He was not assisted by an observer. The site is in a congested area, amongst housing and close to a railway line. Two automated flights had been flown, with some deviation during the end of the second flight necessitating the pilot to take manual control to return it. The third flight was flown manually and the wind at the time was from 330° at 13 kt.

The pilot reported that two messages were displayed almost immediately after takeoff. One stated PROPULSION OUTPUT HAS BEEN LIMITED TO ENSURE BATTERY HEALTH and the second advised MAGNETIC FIELD INTERFERENCE. EXIT P-GPS MODE. The pilot stated that on looking back up from reading the messages he could not regain visual contact with the aircraft. His response was to trigger the return-to-home function, but this did not work. The next message displayed to the pilot advised that the signal was too weak, and the connection had failed.

Given a loss of connection, the pilot stated that he would have expected the aircraft to have returned to home. However, the MAGNETIC FIELD INTERFERENCE. EXIT P-GPS MODE message meant that the aircraft was unsure of its heading and so was unable to hold a fixed position as it did not have sufficient information to correct a deviation from that position. This also means it cannot return home.

The EXIT P-GPS MODE is the prompt to resume manual flying which requires the pilot to be able to see the aircraft clearly in order to control it. A video link was still active, but the information displayed was insufficient for him to regain visual contact. He continued to attempt to regain control but was unsuccessful. Finally, a LANDING message was displayed.

The aircraft, out of the pilot's control, drifted 630 m over a congested area, before landing in a tree. The aircraft was located using the 'Find My Drone' feature on the pilot's controller.

The PROPULSION OUTPUT HAS BEEN LIMITED TO ENSURE BATTERY HEALTH message means that the ability of the aircraft to counter wind was reduced. The wind at the time was about 13 kt, but the aircraft manufacturer did not provide any information regarding what the effective wind limit is reduced to under these circumstances. Although it was not determined whether wind limits were a factor in this incident, it does highlight the potential risk associated with reduced power when flying adjacent to congested areas in windy conditions.

The pilot stated that having an observer during the operation would have been helpful to avoid loss of visual contact when the messages on his controller diverted his attention. He also advised that the sun was low at the time of flight, which hampered his ability to see the aircraft.

Conclusion

The aircraft, having been subject to magnetic interference, was unable to hold its position or return home. It drifted, out of the pilot's control, for a considerable distance over a congested area thus posing a risk to uninvolved persons and property.

This incident highlights the importance of understanding the implications of any messages displayed to a pilot and also shows the benefits of having an additional observer to maintain visual contact.